TWITTER SPAM DETECTION USING MACHINE LEARNING APPROACH

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Computer Security) with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I hereby declare that this project report entitled

TWITTER SPAM DETECTION USING MACHINE APPROACH

is written by me and is my own effort and that no part has been plagiarized

without citations.

STUDENT : _____YAN SHIH_____ Date : ___11/9/2021___

([CHAN YAN SHIH])

I hereby declare that I have read this project report and found

this project report is sufficient in term of the scope and quality for the award of

Bachelor of [Computer Science (Computer Security)] with Honours.

SUPERVISOR : _____ _fadzilah_ _____ Date : 14/9/2021

NUR FADZILAH BINTI OTHMAN

DEDICATION

I would wish to dedicate my work to my beloved parents whose motivation or determination rings in my ears and continuously provide their moral, spiritual, and funding.

I also dedicate this dissertation to my siblings, grandparents, mentor and friends who advised and motivated me all the time to finish this study.

Finally, I dedicate this book to the Great God for granting me power, courage, skills as well as healthy life to complete this project.
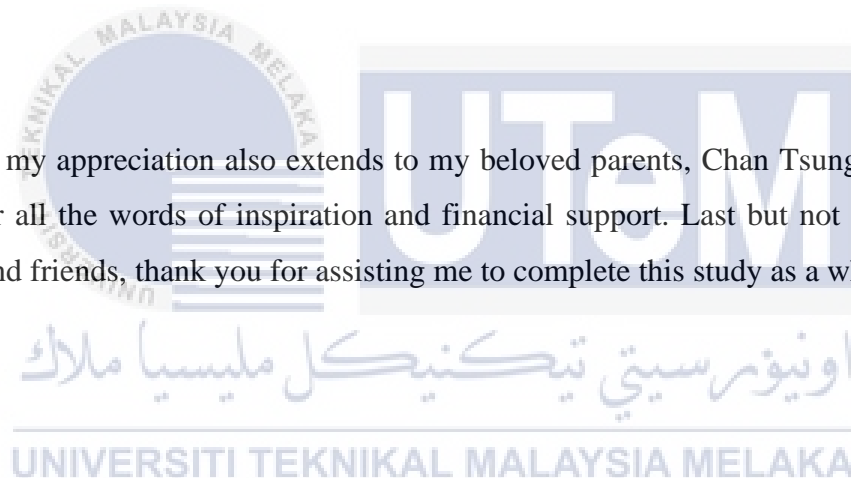
ACKNOWLEDGEMENTS

ABSTRACT

Nowadays, the application of social media has grown widely in our daily routine. People can freely post and share any contents on social media. With the growth of social media, people can now make use of it for building connections whether for business or personal gain. The popularity of Twitter has also noted to attract awareness of spammers who make use of Twitter for their own malevolent objectives such as conducting acts of phishing real Twitter users or spreading malicious software through URLs that are shared in tweets as well as hijack topics to attract users' attention. The Internet is a boundless platform for information and data sharing. Detecting spam contents from social media network is an intriguing research topic because it is important for cyber forensic agencies to detect the way of social media in broadcasting malicious activities or attacks before offenses are performed. This research attempts to detect spam in Twitter platform using three different machine learning classifier models which is Naïve Bayes, Support Vector Machine (SVM), and Random Forest in addition propose the model that produce the highest accuracy and precision in predicting spam by comparing each of the model's result. At the end of this study, the results of each model's analysis will be explained and compared to achieve the objective of this study. The dataset is categorized into Training and Testing and the samples for testing is divided into 5 categories such as 100, 200, 300, 500, and 1000 sample tweets. The reason of dividing the samples into different size is to analyses whether the size of samples affect the analysis results or not. After comparing the results, we can conclude that Naïve Bayes has the highest accuracy and precision value in predicting spam while Random Forest has the worst accuracy. Thus, this research includes all features from extracting contents from social media network such as Twitter, applying different machine learning classifiers based on specific keywords like URLs on social media network to finally classifying them as Spam or Ham as well as equating the accuracy differences between each of the machine learning classifiers.

ABSTRAK

Pada masa kini, penggunaan media sosial telah berkembang secara meluas dalam rutin harian kita. Orang ramai boleh menghantar dan berkongsi kandungan di media sosial dengan bebas. Dengan pertumbuhan media sosial, orang kini dapat menggunakannya untuk membina hubungan sama ada untuk perniagaan atau keuntungan peribadi. Populariti Twitter juga diperhatikan untuk menarik kesedaran spammer yang menggunakan Twitter untuk tujuan jahat mereka sendiri seperti melakukan tindakan memancing pengguna Twitter sebenar atau menyebarkan perisian jahat melalui URL yang dikongsi dalam tweet serta topik rampasan untuk menarik pengguna 'perhatian. Internet adalah platform tanpa batas untuk berkongsi maklumat dan data. Mengesan kandungan spam dari rangkaian media sosial adalah topik penyelidikan yang menarik kerana penting bagi agensi forensik siber untuk mengesan cara media sosial dalam menyiarkan aktiviti atau serangan jahat sebelum kesalahan dilakukan. Penyelidikan ini cuba mengesan spam di platform Twitter menggunakan tiga model pengkelasan pembelajaran mesin yang berbeza iaitu Naïve Bayes, Support Vector Machine (SVM), dan Random Forest di samping mencadangkan model yang menghasilkan ketepatan dan ketepatan tertinggi dalam meramalkan spam dengan membandingkan masing-masing hasil model. Pada akhir kajian ini, hasil analisis setiap model akan dijelaskan dan dibandingkan untuk mencapai objektif kajian ini. Set data dikategorikan ke dalam Latihan dan Pengujian dan sampel untuk ujian dibahagikan kepada 5 kategori seperti 100, 200, 300, 500, dan 1000 contoh tweet. Sebab membahagikan sampel ke dalam ukuran yang berbeza adalah dengan menganalisis sama ada ukuran sampel mempengaruhi hasil analisis atau tidak. Setelah membandingkan hasilnya, kita dapat menyimpulkan bahawa Naïve Bayes mempunyai nilai ketepatan dan ketepatan tertinggi dalam meramalkan spam sementara Random Forest mempunyai ketepatan terburuk. Oleh itu, penyelidikan ini merangkumi semua ciri dari mengekstrak kandungan dari rangkaian media sosial seperti Twitter, menerapkan pengelasan pembelajaran mesin yang berbeza berdasarkan kata kunci tertentu seperti URL di rangkaian media sosial untuk akhirnya mengklasifikasikannya sebagai Spam atau Ham serta menyamakan perbezaan ketepatan antara masing-masing pengelasan pembelajaran mesin.
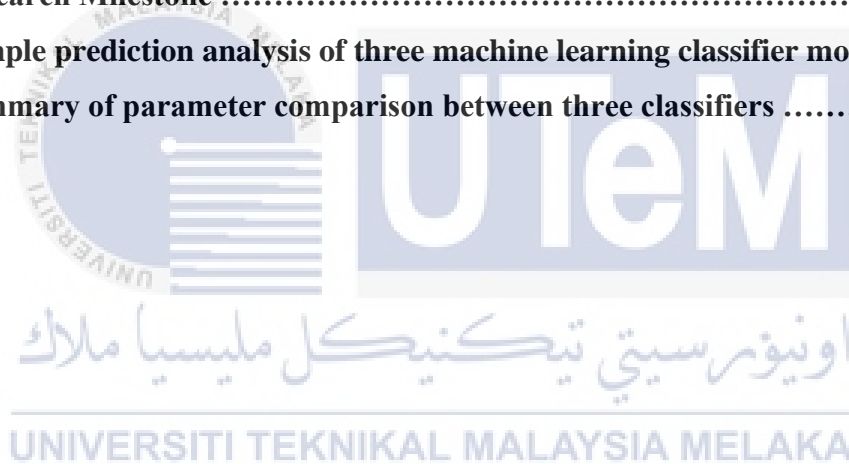
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LIST OF ABBREVIATIONS

SVM – Support Vector Machine

2D – Two Dimensional

3D – Three Dimensional

PSM – Projek Sarjana Muda

LIST OF APPENDICES

1.1 Introduction

People's communication modes are no longer restricted and limited to only on-site features in this advanced era where technology has evolved tremendously. Social media networks, particularly social media platforms like Twitter, have grown in importance as a means of communication and news dissemination, attracting spammers from all over the world to divert users' attention. (Sepideh Bazzaz Abkenar, 2020). Twitter's popularity, among so many social media platforms, has made it an easy and appealing platform for spammers to spread spam to the point where it has become a serious problem. Twitter spam is often described as unwanted tweets that contains hostile links that redirect victims to third-party web site infested with risks such as phishing, terrorists, drug sales, malware downloads, scam, and lots of others (Susana Boniphace Maziku, 2020).

A series of incidents from the past to the present have demonstrated that Twitter spam does, in fact, affect the user experience and poses significant threats beyond social media platforms. For example, in April 2021, India was hit by a disinformation warfare campaign in which spammers used Twitter by changing their username and profile picture to a well-known figure in order to spread controversial fake news that could lead to riots and large-scale disruption. In another case, spammers abused Twitter by distributing fake or misleading posts and videos using a hashtag or keyword (Mishra, 2021).

Suspicious accounts that send duplicate or the same content to multiple users or post tweets that only include URL contents can be marked and reported as spammers in the current Twitter feature for further action by users. Twitter has used blacklisting services such as Trend Micro's Web Reputation Energy for spam filtering purposes. However, spammers' attack strategies are constantly changing, and blacklist services have their own limitations, making them unable to

detect spams earlier. As a result, researchers supported Machine Learning (ML) methods for identifying the underlying patterns of spammers' activities to detect spam more efficiently. (Sepideh Bazzaz Abkenar, 2020).

Social media network is an online platform that permit many people to interact remotely. There are various types of social medias accessible today, each of them comes with its own set of features and functionalities based on the intention for which it is expected. The simplicity of these networks, combined with the proliferation of personal devices like smartphones that enable continuous network access, encourages users to overcome some of the communicative difficulty that exist. Accordingly, individuals are emboldened to share private information with unknown being such as human or system (F. Concone, 2019). Machine learning algorithms, on the other hand, utilize data to discover unique patterns in data such as graphic images, words, and phrase, and even figures. A machine learning algorithm can only be fed digitally stored data. Many of today's recommendation systems, such as those algorithms on Netflix, Spotify, and Youtube; search engines used on Google and Baidu; and interactive social-media feeds such as Facebook and Twitter, are all operated by machine learning. Each of the platforms starts by gathering as much information about user as possible. The collected information comprises what user like to watch, how user react to status updates, as well as the links user click. Then, machine learning is used by the platforms to create highly educated speculations about what user might want next based on their records (B. Mukunthan, 2020).

1.2 Problem Statement

Among the various Twitter assessments, spam account identification is quite possibly the most explored and important. Spammers are entities, regardless of whether genuine individuals or robotized bots, whose objective is to over and again share messages containing undesirable substance for business or hostile purposes, like connects to pernicious sites, to spread malware, phishing assaults, and other hurtful action. Twitter spam detection is a continuous fight among cops and looters. To debilitate vindictive practices, interpersonal organizations are continually developing, and therefore, spammers have advanced too, embracing more complex methods that make it simple to avoid security systems. Following various studies, the researchers concluded that many works on social spam detection have been conducted; nonetheless, most prior work on

social media such as Twitter spam has focused on the strategies and procedures for spam detection and evasion on a solitary social network. These works have been discovered as being done for Facebook, MySpace, or Twitter. Various classifier models presented by a variety of researchers have previously been tested in spam detection, and it has been discovered that selecting the right one for the same purpose is a significant challenge. Spam is an evolving issue on the Internet by and large, and Twitter is no special case. Furthermore, Twitter spam is far more effective than email spam. Other researchers have proposed a variety of methods for dealing with Twitter spam, including detecting spammers dependent on tweeting history or social characteristics, recognizing sporadic activities, and grouping tweet-inserted URLs.

As the improvement of new spam recognition strategies requires the utilization of stable and commented on datasets to assess their presentation, such dynamism delivers the datasets in the writing rapidly old and almost pointless. Besides, giving the ground truth to a huge measure of information is a tedious errand that is as yet done physically in most of cases.

1.3   1.3 Research Questions

Based on the above problem statement, there are a few research questions formed as displayed in Table 1.1.
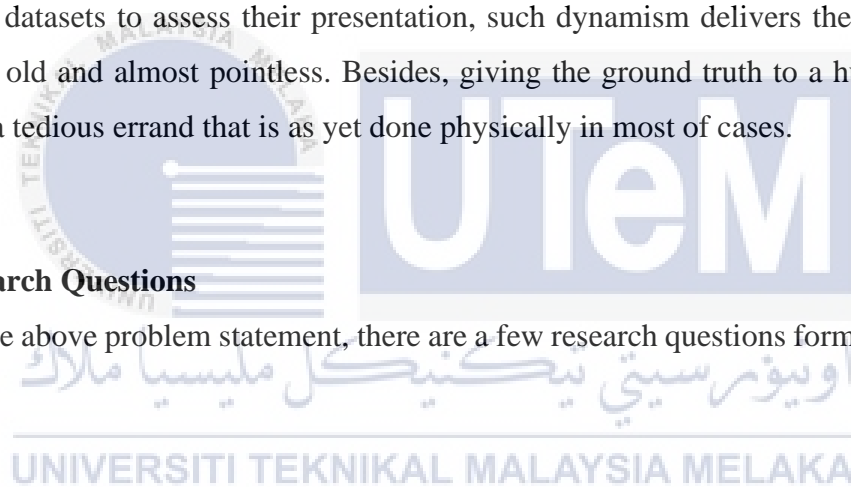
Table 1.1: Research Question

No.	Research Questions
1	Which analysis model is used to detect spam in Twitter?
2	Which model used is the most accurate to detect spam in Twitter?
3	What is the most accurate analysis model to detect spam in Twitter?

1.4   Research Objectives

Based on the research questions listed in Table 1.1, a couple of research objectives are revealed in Table 1.2 to solve the research questions from Table 1.1.

Table 1.2: Research Objectives

No.	Research Objectives
1	To analyze machine learning classification model such as Naïve Bayes, Support Vector Machine (SVM) and Random Forest.
2	To develop a comparison to measure the accuracy test for spam and non-spam tweets between machine learning models.
3	To propose the highest accuracy machine learning model in detecting Twitter spam.

1.5 Research Summary Matrix

The summary for research question and research objectives of the research is exhibited in Table 1.3.

Table 1.3 Summary of Research Question and Research Objectives

Research Questions	Research Objectives
Which analysis model is used?	To analyze machine learning classification model such as Naïve Bayes, Support Vector Machine (SVM) and Random Forest.
Which model that were applied is most accurate to detect spam in Twitter?	To develop a comparison to measure the accuracy test for spam and non-spam tweets between machine learning models.
What is the most accurate analysis model to detect spam in Twitter?	To propose the highest accuracy machine learning model in detecting Twitter spam.

1.6 Scope of the Research

In this study, three different machine learning classifier models are used to detect spam in Twitter. The main scope for using three different machine learning classifiers such as Naïve Bayes, Support Vector Machine (SVM) and Random Forest is due to lack of researchers comparing these three models in spam detection study despite their popularity and high prediction accuracy.

In machine learning, there are countless diverse forms of classification tasks that could be encountered, such as Naïve Bayes, Support Vector Machine and Random Forests. Naïve Bayes is a probabilistic algorithm centered on the Bayes Theorem that is applied to execute a wide scope of classification activities. The Bayes Theorem is a facile mathematical equation for computing restrictive probabilities. Support Vector Machine (SVM), alternatively, is a vigorous machine learning model that shows high precision with different classification issues and is commonly used in an assortment of entrenched applications. In a variety of cases and applications, SVMs have shown high classification precision ratios, outflanking other famous classification algorithms. Random forests (RF) is a versatile, user-friendly algorithm that consistently creates excellent results even without the presence of hyper-parameter tuning. Random Forests creates a "forest" out of an ensemble of decision trees, which are typically trained using the "bagging" method hence also called as ensemble or bagging method (Donges, 2021).

Python is another important tool in this study as it is used to implement the classifier models in code form. Python is a sophisticated beneficial programming language where its language builds and object-oriented approach are aimed to help developers recorded as a hard copy clear, consistent code for both little and enormous scope projects. Python is ideal for a wide array of machine learning (ML) and artificial intelligence (AI) projects because it is a stable, flexible, and simple programming language. In fact, there are numerous Python machine learning and AI libraries and packages available that will be used in this study to analyze machine learning classifiers such as Naïve Bayes, SVM, and Random Forest. The Python programming language is also used in this study for data visualization, with modules such as Pandas and Plotly generating a graph plot to measure the accuracy difference between the machine learning classifiers analyzed.

The parameters from the classification report result of machine learning models will be used to determine which model has the highest accuracy value. In this study, we will be focusing on precision and accuracy parameters in order to distinguish which machine learning models is the most accurate. Precision parameter will determine how many positive classes are predicted to be true while accuracy value will be generated from the total of spam and non-spam tweets predicted correctly.

1.6.1   Research Contribution

This research will attempt to aid a social media network or platform in detecting spam threats. This research will also benefit users by allowing them to detect and respond to potential spam threats progressively, resulting in a safer social networking exposure to users. Additionally, cyberlaw and forensic enforcement agencies can use the implemented method to identify behaviors and patterns in social media networks. Furthermore, manually categorizing the tweets extracted from the Twitter platform into Ham and Spam categories will produce more accurate data as an output. The system is trained and tested using the labelled datasets.

1.6.2   Keywords

This section emphasizes keywords that are related to or relevant to the research. Keywords are important phases, words, or concepts in research.

1. Twitter: Twitter, a social media networking web site established in 2006, can be utilized to get news, follow celebrities and organizations, or stay in contact with old acquaintances (Forsey, 2019). Twitter is also a combination of social media network such as Instagram and Facebook, as well as technologies such as instant messaging, to form chains of users who can interact anytime and anywhere with short messages known as tweets.

2. Machine Learning: Machine Learning is an artificial intelligence (AI) application that permits systems to consequently learn, create, and improve from training without having to do anything explicitly programmed (Varone M., 2020). Machine learning algorithms allow computers to practice or train on data inputs and afterward apply arithmetic analysis to output values that fall within a specific scale.

3. Twitter Spam: Twitter spam has become a major problem in recent years as spammers on Twitter tweet for a variety of reasons, including spreading advertisements, disseminating pornography, spreading viruses, phishing, or essentially subverting a system's status. If a tweet is not entirely composed of text, it is considered spam. Instead, it could incorporate a mention, an URL, a hashtag, or a graphic image. (Niddal Imam, 2019).

1.7   Report Organization

Each chapter of the report is summarized in this section. This report is divided into seven chapters, which are explained below.

1.7.1   Chapter 1: Introduction

Chapter 1 portrays how to detect spam on Twitter using a machine learning approach. This section likewise incorporates the project's problem statement, project question, project objective, project scope, and project contribution.

1.7.2   Chapter 2: Literature Review

Chapter 2 discusses some peer-reviewed papers on spam detection in social media using a machine learning approach. It includes existing machine learning classifying techniques, their strengths, weaknesses, and limitations, as well as proposed techniques and improvements to existing techniques.

1.7.3   Chapter 3: Project Methodology

Chapter 3 justifies the methodology and actions undertaken to carry out this research. This chapter also includes a milestone and a Gantt chart for the research to ensure that the tasks assigned are completed on time and smoothly.

1.7.4   Chapter 4: Implementation

This chapter focuses on the code and development of spam detection on Twitter using machine learning approaches. This chapter will also look at the system's expected outcome.

1.7.5   Chapter 5: Testing and Analysis

Chapter 5 sets the machine learning approach to spam detection to the test and analyses the results. A few tests and analyses will be performed, and the resulting results will be explained in this chapter.

1.7.6 Chapter 6: Research Conclusion

All research summarization, research contribution, and research limitation will be discussed in this section. At the same time, this section will discuss future work.

1.8 Conclusion

In brief, spam detection on Twitter via machine learning will benefit and efficiently assist those social media networks or platforms in detecting any spam threats. There are many different types of analyzing algorithms available, but studies show that the machine learning approach is superior to others. As a result, this research anticipates producing the expected output or result that will assist people in preventing any illegal act from occurring. The accompanying chapter will zero in on the literature review, which will review the studied papers on spam detection on Twitter using a machine learning approach.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section will assess some research or studies that are pertinent to the title spam detection on Twitter using machine learning. This review of the literature is based on some resources, such as journal and conference articles. This research is focused on the techniques and algorithms used, which will be discussed as the research domain. Furthermore, previous or existing techniques or methods, as well as their flaws or limitations, will be reviewed in this chapter. This section will talk about the comparison of techniques or methods used in previous research. This chapter will also show and explain a list of keywords that will be used in this research paper.

2.2 Related Work

This section will introduce and explain the domain that is relevant to the proposed research, as well as the various terms used in this research.

2.2.1 Twitter Spam

Spam is an advanced junk mail where spontaneous interchanges are sent in mass over the internet or through any electronic communication system (Belcic, 2020). Spam, as indicated by

the team behind the social media platform Twitter, is a sort of platform exploitation. Platform exploitation is an activity that is expected to contrarily affect individual's experiences on Twitter. This incorporates actions that are uninvited or repeated. Malignant mechanization and different types of platform exploitation, such as fake user accounts, can all be considered spam. As a result, Twitter is constantly improving their spam detection system to combat the spread of negative and inappropriate content. As spammers abuse Twitter bots, the number of spams has increased. Twitter bots, when misused, can likewise be intended for malevolent platform intimidation and exploitation, for example, getting out bogus news promotions, spamming, sock-pupetting, and disregarding others' confidentiality (Johansen, 2020).

As per the Twitter Blog, the Twitter Rules have stated a couple of instances of user actions that would disregard Twitter's anti-spam Rules. For instance, only tweeting or direct messaging links with no commentary. Duplicate or very comparable content across multiple accounts, as well as multiple and duplicate updates on a single account or the creation of duplicate or very similar accounts will be counted as the creation of fake accounts intended for spamming purposes. Alas, posting multiple updates to manipulate or undermine Twitter trends, as well as sending many unsolicited replies or mentions, are both viewed as spam. Similarly, buying or endeavoring to artificially increase account interactions just as utilizing third-party services or applications that claim to be able to get more followers, retweets, or likes, claim to be able to get topics to trend, are considered spams (Hinesley, 2019). The detection of URLs in tweets will be the main category of spam tested in this research project. Since a tweet on Twitter is limited to 280 characters, users will include URL(s) such as bit.ly to shorten the URL. Furthermore, a malevolent social bot might post abbreviated phishing URLs in the tweet. At the point when a user taps on an abbreviated phishing URL, the user's request is diverted to middle URLs related with servers filled with viruses, at that point redirects the user to vindictive web sites. Accordingly, the Twitter network is defenseless against variety of threats, including phishing attacks (Rout, et al., 2020).

Shockingly, in this new time, the advancement of social networks such as Twitter have turned into a definitive utilization for people in their everyday lives. As we can find in the present current world, more than 0.31 billion individuals use Twitter, and the number of users is yet

developing. Subsequently, individuals hope to share or impart their messages in a free from all harm way by means of Twitter Numerous heads of different nations and entertainers, as well as several businesspeople, are sharing their thoughts and messages through this microblogging site in this age. Twitter has turned into the most well-known social blog for many people, with more than 600 million tweets sent every day.

This signifies the large number of Twitter users, which encourages spammers to intervene in the form of unwanted messages, videos, images, and so on. Many users succumb victim to these spammers without acknowledging it. In 2013, an email similar to phishing is sent to the Australian Election Commission in response to spam messages sent to their account (N. Senthil Murugan, 2018).

2.2.2 TDF-IDF

The Term Frequency - Inverse Document Frequency (TF-IDF) method is utilized to convert a document into a structured format. In data retrieval and text mining, TF-IDF is commonly treated as a weighting component. It is a numerical representation of how significant a word is to a report in a compilation or corpus. The TF-IDF value builds relatively to the occasions a word shows up in the statistics but is balanced by the word or expression recurrence in the compilation, which supports in controlling for the way that several words or expressions are more recognizable than others. (Alomari and Shaalan, 2018). The output of a function of term frequency (ft,d) and a function of the inverse of document frequency ($1Nt$) are combined to calculate TF-IDF. The function of TF and IDF is highlighted in Table 1.4.

Table 2.1: Function of TF-IDF

Term Frequency (TF)	Inverse Document Frequency (IDF)
- Determines how frequently the word t appears in a document d by separating the quantity of events of any word t in d by	- Determines the importance of a word by evaluating the logarithm of the quanityt of documents in the collection divided by the number of

the maximum number of events of any word *t* in *d*. $$TF_{t,d} = \frac{Ft,d}{\max{(Ft,d)}}$$	documents in which a given word appear. $$IDF_{t,d} = log(\frac{N}{df_t})$$
The combination of the TF and IDF functions is shown as below, where N is the overall figure of tweets in the set N= |D|. Simultaneously, *df(t)* indicates the word frequency with which the word *t* shows in a tweet *d*. $$TF - IDF_{t,d} = TF_{(t,d)} * IDF_{t,d}$$	

2.2.3 Naïve Bayes (NB)

The Naïve Bayes (NB) classifier, according to (Joaquín Abellán, 2017), is an exceptionally straightforward and famous classification technique that generates great outcomes in a short processing timeframe. Thus, it is a fantastic classifier for extremely enormous datasets. The technique is heavily reliant on the relationships between the variables. Due to its simplicity, this classifier is well suited for exceptionally huge datasets. The capacity to deal with gigantic volumes of data is vital for data extraction. Arising technologies and applications can produce substantial amounts of data that can be utilised for more intensive data extraction. Supervised classification learning is an significant tool for decision support in the ground of machine learning.

Classification is a machine learning technique that predicts group participation for data instances. It has applications in medication, character detection, cosmology, banking, and different fields. A classifier can be addressed either by a Bayesian network, a neural network, a decision tree, or another kind of network.

2.2.3.1 Probability

Probability is the basis whereupon Naive Bayes was assembled, and it is associated with the essential parts of arithmetic that assist us with anticipating how conceivable an event X is to happen based on the result of potential outcomes. The positive events demonstrate the event for which you require the likelihood of occurrence. Probability is for the most part in the scope of 0 to 1. A value of 0 implies that there is no chance of that event happening, while a value of 1 implies that there is a 100 percent chance that it will happen. In Addition, probability can be construed in the ensuing equation in Figure 2.1:

Probability of an Event = Number of Positive Events / Total Number of Outcomes
0 <= Probability of an Event <= 1

Figure 2.1: Probability equation

2.2.3.2 Conditional Probability

Conditional Probability is a subset of Probability that constricts the theory of probability to produce a reliance on a particular event. For events with a probability of two or more, conditional probability is determined. Think about the accompanying two events: A and B. The conditional probability of event B is identified as the likelihood that event B will ensue given that event A has already ensued. It is implied as P(B|A), and accurately by the formula based on Figure 2.2.

P(B|A) = P(A and B) / P(A)

Figure 2.2: Conditional Probability Formula

2.2.3.3 Bayes Rule

The Bayes Rule is used throughout the theory of calculating a hypothesis (H) from the evidence provided (E). It associates two hypotheses: the probability of the hypothesis before obtaining evidence, P(H), and the probability of the hypothesis after obtaining evidence, P(H|E). Moreover, it is provided by the following equation in Figure 2.3.

$$P(H|E) = (P(E|H) * P(H)) / P(E)$$

Figure 2.3: Bayes Rule Equation

Based on the above figure,

P(H|E) = How frequent H happens given that E happens.

P(E|H) = How frequent E happens given that H happends.

P(H) = How frequent A happens.

P(E) = How frequent E happens.

2.2.3.4 Bayes Rule from a Machine Learning Aspect

The information is grouped into two categories: training data and testing data. The training data is applied to train the model, whereas the testing data is applied to appraise the model and generate new forecasts. If the input features work as evidence, then the labels act as outcomes in the training data. The conditional probability is employed to calculate P(Evidence|Outcome), which is the probability of the evidence provided the outcomes. The main target is to compute the P(Outcome|Evidence), which is the probability of an outcome based on the evidence. If X represents Evidence and Y represents Outcome, P(X|Y) and P(Y|X) are depicted in Figures 2.4 and 2.5.

$$P(X|Y) = (P(Y|X) * P(X)) / P(Y)$$
To be calculated from the training data

Figure 2.4: Formula to calculate from Training data

$$P(Y|X) = (P(X|Y) * P(Y)) / P(X)$$
To be calculated from the training data

Figure 2.5: Formula to calculate from Testing data

Simultaneously, there is a formula for determining the probability of output given the input, where Y represents the output and X represents the input. In real-life problems, there are numerous X variables, as opposed to the hypothetical estimation of having a single input feature. At the point when the features are independent, the Bayes Rule is reached to Naïve Bayes. Assuming that there are numerous inputs, for instance X1, X2, X3, and Xn, the outcome which is Y, is anticipated by making use of the Naïve Bayes equation, as shown in Figure 2.6.

$$P(Y=k \mid X1...Xn) = \frac{(P(X1 \mid Y=k) * P(X2 \mid Y=k) * P(X3 \mid Y=k) * .... * P(Xn \mid Y=k))* P(Y=k)}{P(X1)*P(X2)*P(X3)*P(Xn)}$$

Figure 2.6: Naïve Bayes Equation

Based on the above figure,

P(Y=k | X1...Xn) = The probability of the outcome given the evidence

P(X1 | Y=k) * P(X2 | Y=k) * ... P(Xn | Y=k) = The probability of the likelihood of evidence

P(Y=k) = The Prior Probability

P(X1)*P(X2)*P(Xn) = The probability of the evidence

2.2.4 Support Vector Machine (SVM)

The Support Vector Machine (SVM) is a meager core decision machine that form its learning model without computing subsequent probabilities. As a result of its mathematical foundation in statistical learning theory, SVM gives a principled style to deal with problems. SVM fabricates its resolution utilizing a subset of the training input. SVM has been broadly used in task similar to classification, regression, novelty detection, and feature reduction. SVMs are among the most powerful and robust classification and regression algorithms used in a comprehensive range of applications (Jair Cervantes, 2020). SVM creates a tool for classifying data into different classes

using an N-dimensional hyperplane that estimates based on a given training dataset. The SVM's algorithm will likely discover a hyperplane in N-dimensional space, where N is the number of features that clearly classify the data points.

2.2.4.1 Hyperplanes and Support Vectors

According to (Gandhi, 2018) stated that hyperplanes act as decision limitations that support classifying the data points. Data points on one or the other side of the hyperplane can be appointed to separate classes. Furthermore, the number of features define the size of the. According to Figures 2.7 and 2.8, the hyperplane is just a line if the number of input features is two. The hyperplane becomes a two-dimensional plane if the number of input features is 3. As soon as the number of features surpasses three, the prediction process becomes complicated.
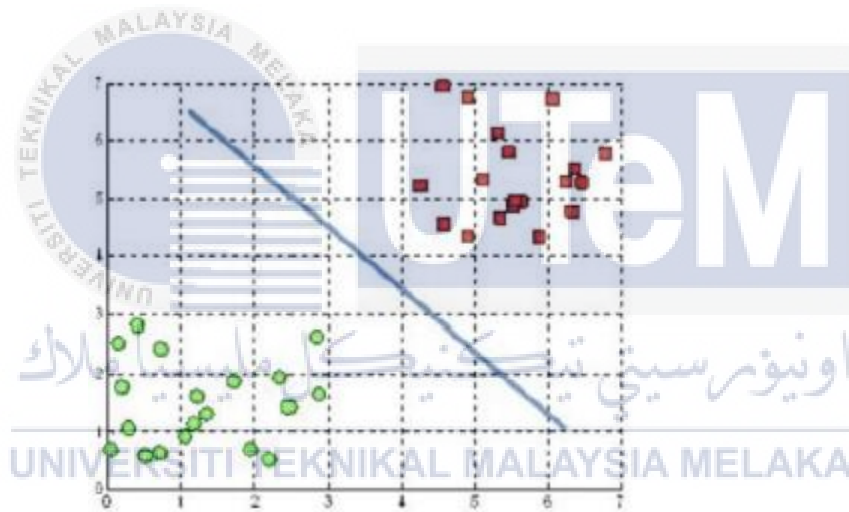
Figure 2.7: A hyperplane in R^2 is a line in 2D feature space
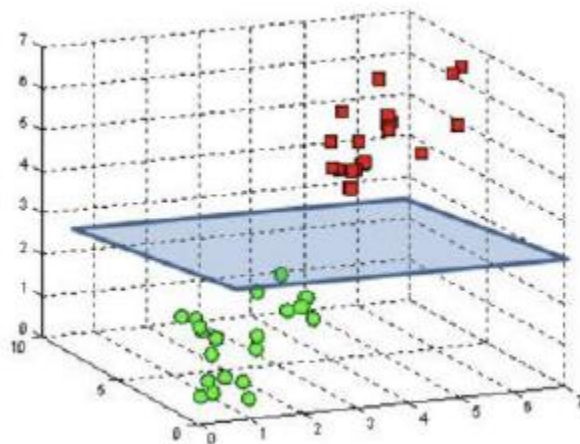
Figure 2.8: A hyperplane in R^3 is a plane in 3D feature space

Support vectors serve as data points that are nearer to the hyperplane and affect its position and direction. It can be used to augment the classifier's margin. If the support vectors are removed, the position of the hyperplane will change. As these are the important points that will help us in developing a stable SVM. Figure 2.9 depicts the support vectors with a small and large margin.
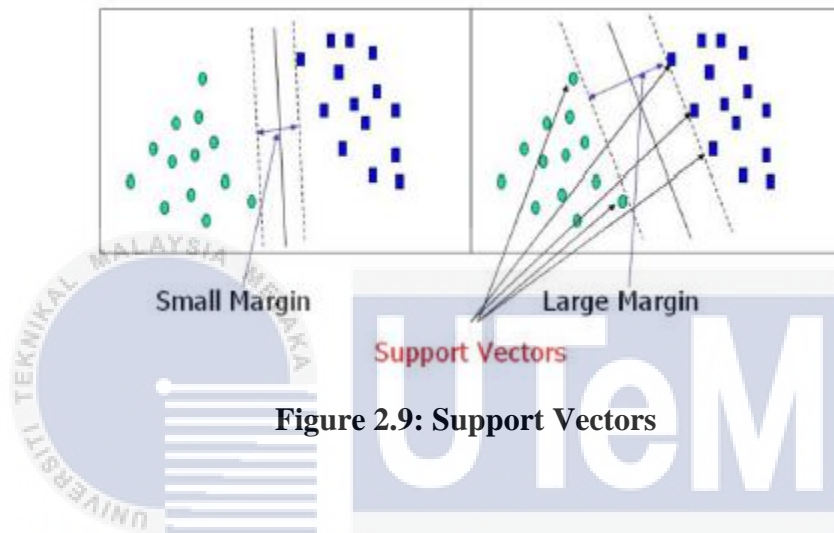
Figure 2.9: Support Vectors

2.2.4.2 Formulation of SVM

The formulation of SVM is shown in Figure 2.10.
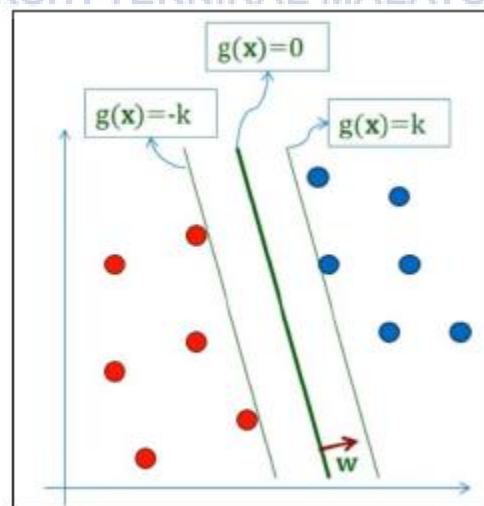
Figure 2.10: Formulation of SVM

$$g(x) = wTx + b$$

Maximize k such that:

$- wTx+b >= k$ for $di == 1$

$- wTx+b <= k$ for $di == -1$

Value of $g(x)$ based on $\|w\|$:

1. Keep $\|w\| = 1$ and maximize $g(x)$

2. $g(x) >= 1$ and minimize $\|w\|$

2.2.5   Random Forest (RF)

Random forest classification is a well-known machine learning method for creating prediction models in countless research settings, according to (Jaime Lynn Speiser, 2019). Random forests are a compilation of classification and regression trees, which are straightforward models that calculate results using binary splits on predictor variables. The ability towards handling datasets with many predictor variables is a significant advantage of using random forest for prediction modelling.

2.2.5.1 Random Forest Algorithm

The basis of Random Forest algorithm works in four steps. Firstly, Random Forest's algorithm will randomly select samples from a given dataset. Next, a decision tree is built for each of the sample that was randomly selected to get a prediction output from each of the constructed decision tree. Thirdly, the algorithm will perform a vote for each of the predicted results achieved in second step. Lastly, the final prediction is selected by filtering the prediction result with most votes in third step. These four important steps can be seen in Figure 2.11.
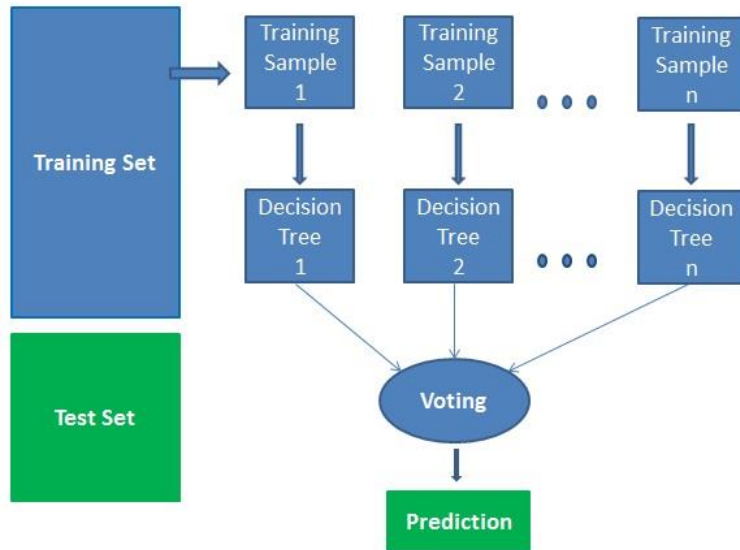
Figure 2.11: Algorithm of Random Forest

2.3   Critical review of existing algorithms/techniques, current problem justification

This section describes the machine learning algorithms or techniques, attributes, and programming languages used in existing works. Some comparisons will be made to demonstrate the differences between the techniques. Simultaneously, the comparison result's justification and conclusions will be presented, and a recommended solution will be discussed in the following section. This section describes the machine learning algorithms or techniques that will be used in the study. The data extricated from the chose studies included insights concerning the authors, year of publication, techniques applied, dataset used, tools and domains targeted is shown in Table 2.1.

Table 2.2: Summation of techniques and tools used in Machine Learning

No.	Author	Year	Techniques/ Methods	Dataset	Tools	Domain
1.	Aryo Pinandito, 2017	2017	K-nearest neighbors (kNN), Naïve Bayes (NB)	Collected tweets with trending keywords in	RStudio	General

				Indonesia from Twitter in 2019.		
2.	Surendra Sedhai, 2018	2018	Logistic Regression (LR), NB, RF	Collected tweets from Twitter from May 17th until 30th 2013.	Semi-Supervised Spam Detection (S3D) framework	News, Sports, Food, etc
3.	Hadi Tajalizadeh, 2019	2019	NB	Collected tweets from Twitter in JSON format from early 2019.	DenStream, Scikit-Learn	General
4.	Zulfikar Alom, 2020	2020	Decision Tree (DT), Neural Network (NN), NB	Social honeypot and $1KS - 10KN$ dataset from January until August 2020.	Keras, Tensorflow	Politics, News, etc
5.	Nan Sun, 2020	2020	DT, NB, NN, kNN	Collected real-time tweets from Twitter in 2020.	Stochastic gradient boosting machine (GBM), Boosted Logistic Regression (BLR)	General

2.4 Project Solution

This research offers a machine learning methodology to detecting Twitter spam on social media. Naive Bayes (NB), Support Vector Machine (SVM), and Random Forest (RF) are the techniques or algorithms that will be used in this research. Vicinitas.io will be used to extract relevant data or tweets. The relevant data or tweets will then be classified as spam or quality. The output of spam detection in Twitter using machine learning will be tested and analyzed. A comparison of the techniques or algorithms used will be performed to determine which algorithm has the highest accuracy.

2.5 Conclusion

To conclude, this chapter has demonstrated previous works on techniques or algorithms that have been used. The following chapter will go over the methodology that would be applied in this project.
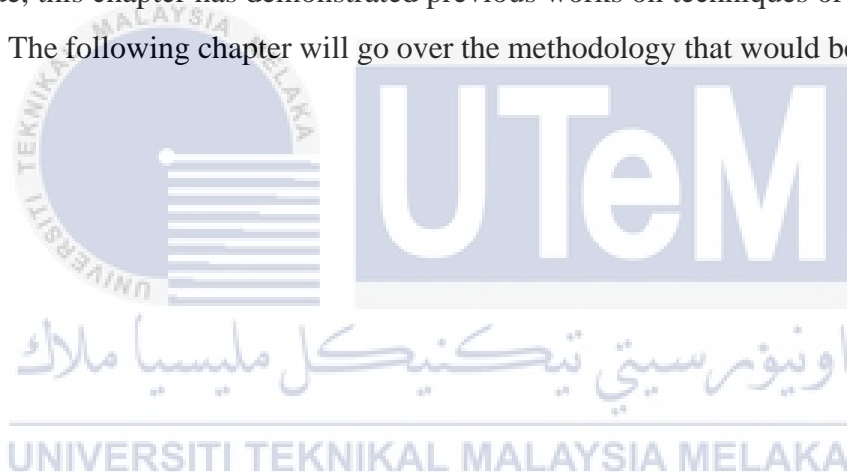
CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

An approach is characterized as the techniques and systems used to collect data, collect and verify information for research purposes. The methodology is a collection of plans, ideas, guidelines, or suggestions for moving forward with the preparation of a project or documentation. The goal of presenting a methodology is to ensure that the project is handled correctly with the activity flow.

In this chapter, a brief methodology along with the milestone and Gantt chart for this project duration will be shown and explained.

3.2   Methodology

Based on the flow chart diagram in Figure 3.1, the methodology of this study is shown. This study's methodology consists of three important steps which are data collection, tweets classification, followed by analysis and evaluation. The first process of the methodology begins by collecting data or datasets such as tweets from Twitter to be used in implementation. Then, the extracted tweets will be classified into testing and training dataset samples and labelled manually into spam or ham. Lastly, the datasets will be implemented into the system and used to generate results for each classifier to compare the accuracy of prediction and detection of spam.

Tweets Classification

- Gather relevant data or tweets in general across Twitter, a social media platform or microblogging website.

Data Collection

- From a list of datasets, filter and remove unrelated tweets extracted from Twitter.

- Related data from the datasets were extracted, then classified, and reviewed by comparing and distinguishing algorithm accuracy.

Analysis and Evaluation

Figure 3.1: Flowchart diagram of this study's methodology

3.3   Research Milestone

A project milestone denotes a significant progression of experiences or the completion of a project. It aids in the establishment of goals and the management of project development. The project milestone is a method of estimating how long it will take to complete a project. It accommodates determining whether the project is on track to ensure that the project is completed on time. Furthermore, the Gantt chart depicts project schedule information by scheduling project

activities to be completed in order to complete the project. For instance, a research milestone is presented in Table 3.1 while the Gannt chart is displayed in Table 3.2.

Table 3.1: Research Milestone

Week	Activity
1. Meeting 1 24 February – 19 March	- Proposal PSM: Discussion - Proposal Assessment & Verification
1. 22 March – 26 March	- Proposal Revision/Improvement - Verify the List of Supervisor/Project Title
2. 29 March – 2 April	- Proposal Presentation to Supervisor - Submission of Proposal via Ulearn - Start Report Chapter 1 (Initiate Research)
3. 5 April – 9 April	- Chapter 1 - Chapter 2
4. 12 April – 16 April	- Chapter 2 - Begin exploring dataset collection and extraction.

5. Meeting 2 19 April – 23 April	- Chapter 2 - Chapter 3
6. 26 April – 30 April	**MID SEMESTER BREAK**
7. Meeting 3 3 May – 7 May	- Chapter 3 - Discuss project progress and make changes to report.
8. 10 May – 14 May	- Chapter 3 - Chapter 4
9. 17 May – 21 May	- Chapter 4 - Start classifying datasets.
10. 24 May – 28 May	- Project Demo - Begin coding.
11. Meeting 4 31 May – 4 June	- Project Demo - Show progress and report discussion.
12. 7 June – 11 June	- Project Demo - PSM 1 Report

13. Meeting 5 14 June – 18 June	- Project Demo - PSM 1 Report
14. 21 June – 25 June	- Project Demo - Presentation power point slides
15. 28 June – 2 July	**FINAL PRESENTATION** **Final report submission and** **presentation** **REVISION WEEK**
16. 5 July – 16 July	**FINAL EXAMINATION WEEK**
17. 19 July – 23 July	- Begin making changes to project according to evaluator's comment during presentation.
18. 26 July – 30 July	- Document the new implementation and changes made in report.
19. 2 August – 6 August	- Make changes to report and citation.
20. 9 August – 13 August	- Find journal articles to support point in report.

21. 16 August – 20 August	- Project Demo - Show changes to supervisor for feedback.
22. 23 August – 27 August	- Make changes to report according to supervisor's feedback.
23. 30 August – 3 September	- Project Demo - Show supervisor report
24. 6 September – 10 September	- Show adjusted report to supervisor and discuss about presentation slide.
25. 14 September	**FINAL PRESENTATION** **Final report submission and presentation**

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16
Meeting and discussion with supervisor	■															
Proposal correction and improvement		■														
Proposal submission			■													
System Development				■												
Design the system					■											
Implementation of project						■	■	■	■							
System testing and analysis											■	■				
System maintanence												■	■			
Final report preparation														■	■	
Final report submission and presentation																■
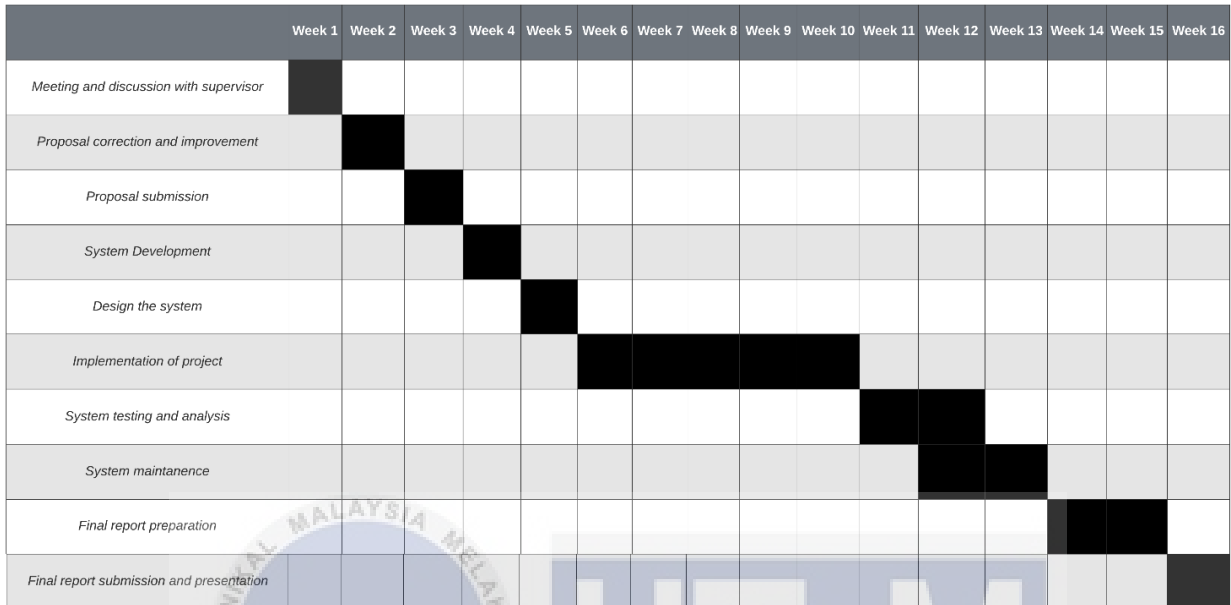
Figure 3.2: Gantt Chart for PSM 1 Milestone

	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26
System and report correction	■	■	■	■					
Proejct demo and meeting with supervisor					■				
Report correction						■			
Meeting with supervisor							■		
Report correction							■	■	
Meeting with supervisor								■	
Final report submission and presentation								■	
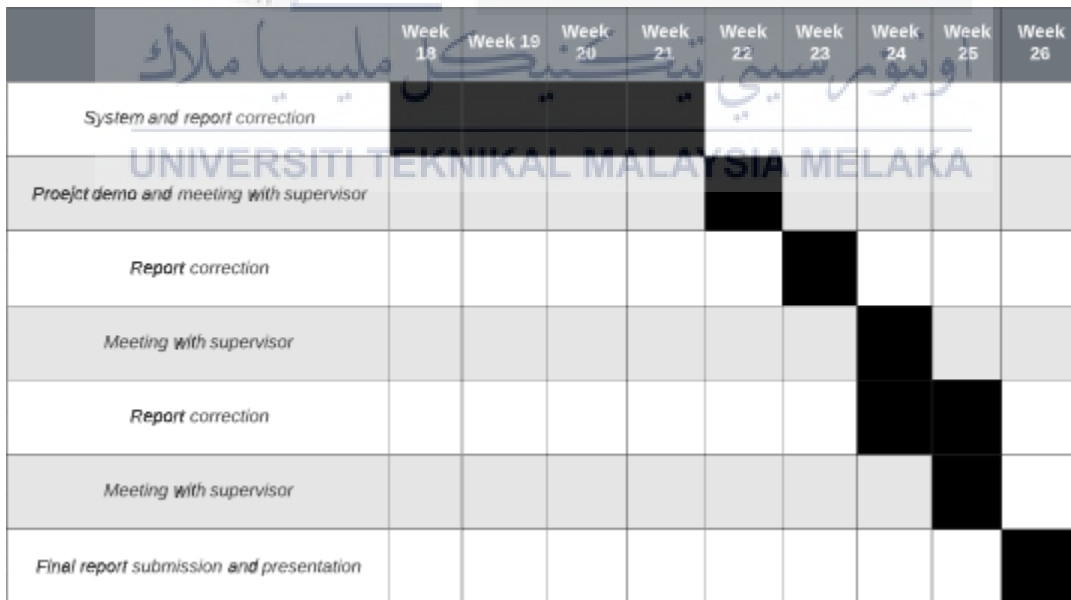
Figure 3.3: Gantt Chart for PSM 2 Milestone

3.4 Conclusion

The present chapter of this research has covered the methodology section. For this study, the machine learning approaches are implemented as the methodology. There is also an overview of the tools and features used. In addition, a project milestone and a Gantt chart are presented in this section to ensure that the research can be completed on time. At the same time, the following chapter will go over research implementation process.

CHAPTER 4: IMPLEMENTATION

4.1 Introduction

The previous chapter discussed the aspects of the research methodology. This chapter examines the implementation of various machine learning classifier models to detect spam tweets on a social network. Simultaneously, this chapter discusses the operators or features that are used

in the system. Following that, the procedures that must be followed are also explained in this chapter.

4.2 Environment Setup

There are four stages required in detecting spam tweets on social networks such as data collection, pre-processing, folding, automated training set classifier, extraction, tweets classification, analysis and evaluation as shown in Figure 4.1.
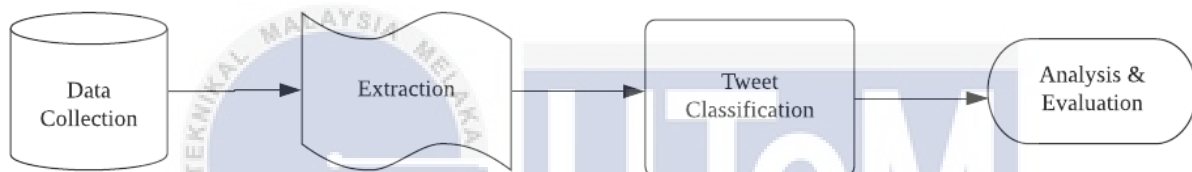
Figure 4.1: Recommended System Block Diagram

1. **Data Collection**

   This study collects relevant data from a social media social media network known as Twitter, using Vicinitas.io, as mentioned in the previous chapter. Before processing the data, Vicinitas.io requires permission from the user during the collection process. To do so, an authenticated Twitter account is required to gather information or tweets from Twitter smoothly. Figure 4.2 shows the gathering of data using keywords or hashtag as well as statistical information.
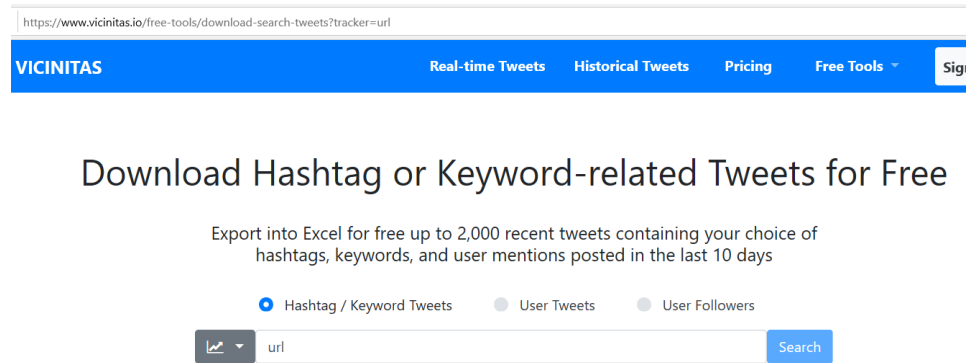
Figure 4.2: Data collection of tweets from Twitter

After the real-time tweets have been gathered, we will begin extraction process. Figure 4.3 shows the process of extracting the tweets from Twitter into an excel file. The tweets collected will be compiled and downloaded in an excel file to allow the data labelling process to be done easier.

Figure 4.3: Export tweets as data into Excel file

Once the tweets are exported successfully, we will open the excel file and review the sheet and see if there are any missing data. As seen in Figure 4.4, all data is intact, and tweets are also extracted nicely. If there are no missing data, we will proceed to the next step which is tweets classification.

16202612	8925920648 Why Your Business Should Do a Shot of Jägermeister http://ow.ly/166NN	10-02-21 18:06
16202612	8967808947 The Three Types of Business Owners - Which Type Are You? http://ow.ly/16m27	11-02-21 10:37
16202612	8968038328 @bizsugar I'd be right there with ya' if crazy was a category! =)	11-02-21 10:43
16202612	8970963810 Applying battlefield tactics to running a business http://ow.ly/16oJo	11-02-21 12:00
16202612	8998331714 RT @smallbizbee Why Your Business Should Do a Shot of Jägermeister http://bit.ly/cwap7B	12-02-21 0:44
16202612	9017044575 4 strategies for better bootstrapping http://ow.ly/16NLs	12-02-21 11:08
16202612	9026906731 Nearly up to 50 social networking sites for Biz owners and Entrepreneurs - who knew there were so many? http://ow.ly/16Uq1	12-02-21 15:40
16202612	9026927005 @MicheleTune You're the awesomenessest!! =)	12-02-21 15:40
16202612	9027869850 @inklesstales Very nice thought...and so true. To somebody you're the #1 person in their life, even if you don't know it.	12-02-21 16:07
16202612	9027894408 Seven Things Your Brand Is Not - And One That It Is http://ow.ly/16V1k	12-02-21 16:08
16202612	9067686299 RT @kikolani Fetching Friday - Resources Mashup & Mean Kitty - Kikolani http://bit.ly/cqWytM	13-02-21 13:43
16202612	9068471196 @georgeangus Hey buddy, thanks for all those RT's! Have a good weekend.	13-02-21 14:08
16202612	9077610570 @slashcareer I don't know, maybe...what's a "slasher"	13-02-21 19:07
16202612	9077805744 @BLKMGK01 Thanks man, nice to meet you.	13-02-21 19:13
16202612	9077835728 Currently reading http://www.writersroundabout.com/2021/02/what-do-your-business-cards-say-about-you.html @laffarsmith	13-02-21 19:13
16202612	9077892368 @slashcareer Got it...guilty then.	13-02-21 19:15
16202612	9078058152 RT @the_gman 2 Bottles of Wine +Some Books + Greeting Cards=Outside the Box Marketing http://ow.ly/1oz6sx	13-02-21 19:20
16202612	9101571548 RT @kikolani Social Networking, Social Bookmarking, and Sharing - Kikolani http://bit.ly/bUIy8l	14-02-21 9:31
16202612	9149907600 Turn negative reviews into positive buzz http://ow.ly/17AfU	15-02-21 12:07
16202612	9157888159 Win a HP iPaq Glisten From Smallbizbee ($390 Value!) http://ow.ly/17EIS	15-02-21 16:00
16202612	9171180013 RT @smashingapps 10 Free Tools For Effective Project Management @ SmashingApps http://bit.ly/bOuWIt	15-02-21 22:36
16202612	9171347469 RT @kikolani Becoming Overwhelmed? Get Organized! Twitter, Facebook, StumbleUpon, RSS, & Email Tips - Kikolani http://bit.ly,	15-02-21 22:41
16202612	9191734035 Win a HP iPaq Glisten From Smallbizbee ($390 Value!) http://ow.ly/17THu	16-02-21 10:37
16202612	9192921720 A 20-point checklist for would-be entrepreneurs http://ow.ly/17UCt	16-02-21 11:08
16202612	9206409919 @mickey169 Thank you! Stop by and say hi once in a while.	16-02-21 17:01
16202612	9208206658 10 Twitter Applications For Small Businesses http://ow.ly/183pF	16-02-21 17:47
16202612	9208236744 10 Twitter Applications For Small Businesses http://ow.ly/183qt	16-02-21 17:48
16202612	9208272983 10 Twitter Applications For Small Businesses http://ow.ly/183ri	16-02-21 17:49

Figure 4.4: Data exported from Vicinitas.io into Excel

2.   **Tweets Classification**

Once the tweets or datasets have been collected from Vicinitas.io, we will divide them into two categories: testing data and training data. One of the methods used is to gauge the accuracy of the models is to train or test. The method is called Train or Test because the dataset is separated into two sets, the training set and the testing set. 80% of the dataset is employed for training, while the remaining 20% is employed for testing. The models are trained by applying the training set as opposed to the testing set. Figure 4.5 shows the folders for testing and training data.
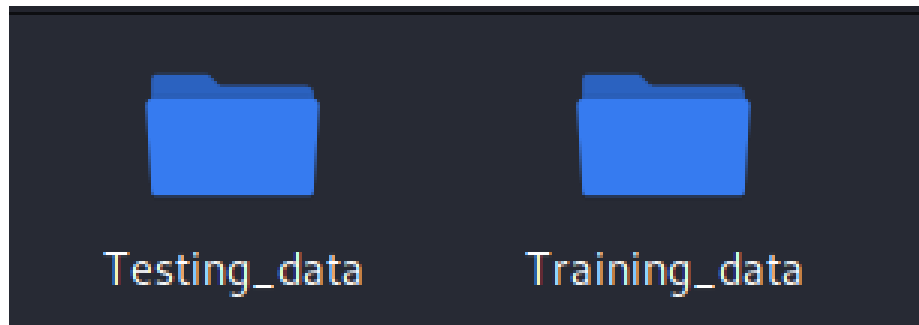
Figure 4.5: Folders created to store Testing and Training data

After creating the Testing and Training folder, we will proceed to manually classify the dataset samples into spam and non-spam. In this study, spam tweets will be labelled as Spammer Tweets while ham tweets are labelled as Legitimate Tweets. The entire dataset extracted from Vicinitas.io will be reviewed one by one and assigned manually into their own respective folder. In Figure 4.6, the file that contains Legitimate Tweets sample and Spammer Tweets sample is shown.
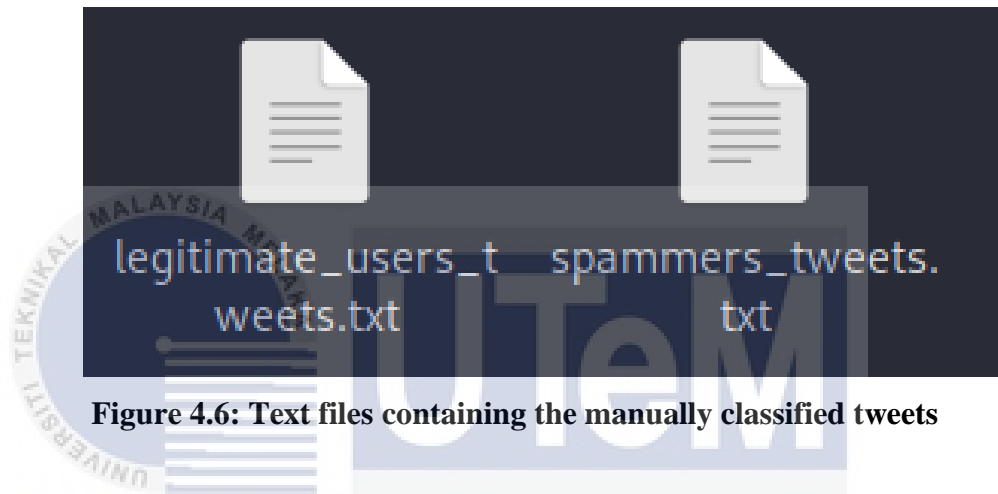
Figure 4.6: Text files containing the manually classified tweets

The legitimate tweets in the Testing and Training data folder represent HAM tweets, indicating that they are not spam. Legitimate tweets in this context refer to data that does not contain any hashtags or website URLs. As a result, Spammer Tweets in the Testing and Training data folder refers to data containing hashtags or website URLs. According to (Ratul Chowdhury, 2020), spam tweets frequently contain uniform resource locators (URLs) with site links that are either adult contemporary or unseemly for the situation. Spammers use these URLs to direct users to malicious websites that contain viruses. The screenshots in Figure 4.6 through Figure 4.9 show an example of tweets or data.

- Testing Data – Legitimate Tweets

- The tweets shown in Figure 4.6 are extracted and classified into legitimate tweets in Testing Data folder as it does not contain any spam keyword which is an URL of website.
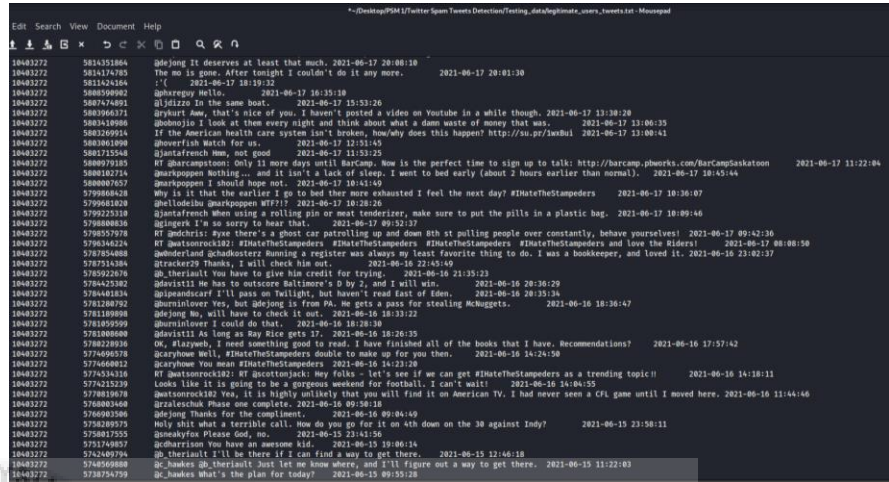
Figure 4.7: Legitimate tweets in Testing data folder

- Testing Data – Spammer Tweets
  - The tweets shown in Figure 4.7 are extracted and classified into spammer tweets in Testing Data folder as it contains spam keyword which is an URL of website.

Figure 4.8: Spammer tweets in Testing data folder

- Training Data – Legitimate Tweets

- The tweets shown in Figure 4.8 are extracted and classified into legitimate tweets in Training Data folder as it does not contain spam keyword which is an URL of website.
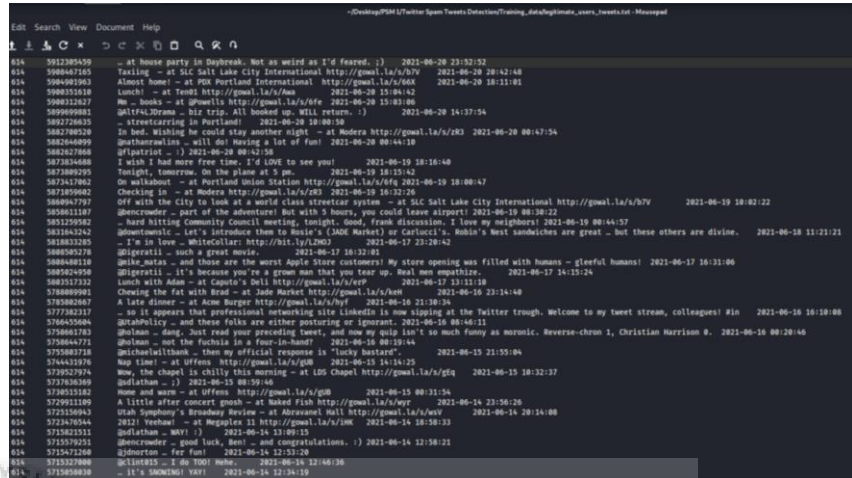
Figure 4.9: Legitimate tweets in Training data folder

- Training Data – Spammer Tweets
  - The tweets shown in Figure 4.9 are extracted and classified into spammer tweets in Training Data folder as it contains spam keyword which is an URL of website.

Figure 4.10: Spammer tweets in Training data folder

3. **Analysis and Evaluation**

We will use the datasets that we divided into training and testing sets for analysis and evaluation. To accomplish this, we will use Python code to assist machine learning models in producing output for analysis and evaluation. Machine learning modules such as sklearn and matplotlib.pyplot are used to import features for analyzing the detected spam tweets. The screenshots in Figures 4.10–4.16 show the code that is used to generate the table and graph for further analysis and evaluation.

In Figure 4.10, a new class named *class TwitterUser* is created to store the data of a Twitter user as well as their tweets. All the relevant data will be stored accordingly into their respective parameters. The purpose of creating this new class is to make sure all the data is stored correctly into the system so that it will be easier to call the stored data again when training and testing dataset.

```python
##############################################################
#
# TwitterUser class for storing info. about user and his tweets
#
##############################################################
class TwitterUser:

    def __init__(self, idd, created, collected, followings,
                 followers, tweets_num, length_name, length_description):
        self._user_id = idd
        self._created_at = created
        self._collected_at = collected
        self._numb_followings = followings
        self._numb_followers = followers
        self._numb_tweets = tweets_num
        self._name_length = length_name
        self._description_length = length_description
        self._tweets = []

        self._tfidf = []
        self._ratio_follower_following = 0.0
        self._count_http = 0
        self._count_at = 0

    @property
    def user_id(self):
        return self._user_id

    @user_id.setter
    def user_id(self, value):
        self._user_id = value

    @property
    def created_at(self):
        return self._created_at

    @created_at.setter
    def created_at(self, value):
        self._created_at = value

    @property
    def collected_at(self):
```

Figure 4.11: Code to store Twitter user info and tweets

In Figure 4.11, *def import_user_data* is used to import all the data or dataset samples from text files such as Excel file and store it into the new class that

we have previously created – *class TwitterUser*. Once we have successfully import the dataset into the system and store it together with the user data, we will use the *return twitter_users* command to return a list of all the stored data in the new class.

```python
############################################################
#
# Imports data from text files, stores it into TwitterUser object
# and finally return a list TwitterUser objects.
#
############################################################
def import_user_data(user_file, tweet_file):
    twitter_users = []
    with open(user_file) as f1:
        all_user_info = f1.readlines()
        for user_info in all_user_info:
            twitter_user_ob = TwitterUser(re.split(r'\t+', user_info)[0], re.split(r'\t+', user_info)[1],
                                          re.split(r'\t+', user_info)[2], float(re.split(r'\t+', user_info)[3]),
                                          float(re.split(r'\t+', user_info)[4]), float(re.split(r'\t+', user_info)[5]),
                                          float(re.split(r'\t+', user_info)[6]), float(re.split(r'\t+', user_info)[7][:-1]))
            twitter_users.append(twitter_user_ob)

    with open(tweet_file, encoding='utf-8') as f2:
        all_user_tweets = f2.readlines()
        for line_tweets_info in all_user_tweets:
            for twitter_user in twitter_users:
                if twitter_user.user_id == re.split(r'\t+', line_tweets_info)[0]:
                    tweets = twitter_user.tweets
                    tweets.append(re.split(r'\t+', line_tweets_info)[2])
                    twitter_user.tweets = tweets

    return twitter_users
```

Figure 4.12: Code to import the dataset file

In Figure 4.12, *def calculate_features* is used to calculate the various features derived from the existing data types of the new class. For example, the feature calculated is TF-IDF and it will be added to the *twitter_users* object. This step will also calculate the number of times the keyword appeared in a tweet.

```python
############################################################
#
# Calculates various features derived from the existing data types
# of the TwitterUser object, and add those calculated features back
# to the object.
#
############################################################
def calculate_features(twitter_users):
    for user in twitter_users:

        try:
            tfidf = TfidfVectorizer(min_df=1).fit_transform(user.tweets)
            pairwise_similarity = tfidf * tfidf.T
            user.tfidf = csr_matrix.mean(pairwise_similarity).item()
        except Exception:
            user.tfidf = 0.0
            pass

        if user.numb_followings > 0:
            user.ratio_follower_following = user.numb_followers / user.numb_followings
        else:
            user.ratio_follower_following = 0
        at_count = 0
        http_count = 0
        for tweet in user.tweets:
            at_count += tweet.count("@")
            http_count += tweet.count("http")
        user.count_at = at_count
        user.count_http = http_count
```

Figure 4.13: Code to calculate the specific features from datasets

In Figure 4.13, *def build_feature_matrix* is used to convert the features calculated in Figure 4.12 into numpy array or matrix and normalize it. The created array will be displayed in the result as reference for the graph output.

```
#############################################################
#
# Converts the features into numpy arrray / matrix and normalizes it
#
#############################################################
def build_feature_matrix(twitter_users):
    features_matrix = []

    for user in twitter_users:
        features_matrix.append([user.name_length, user.description_length, user.count_http,
                                user.count_at, user.ratio_follower_following, user.tfidf])

    features_matrix_np = np.array(features_matrix)
    features_matrix_normalized = features_matrix_np / features_matrix_np.max(axis=0)

    return features_matrix_normalized
```

Figure 4.14: Code to convert the features calculated into matrix for normalization

In Figure 4.14, a few commands are used to import the dataset files while creating a train and test features along with labels. Firstly, the dataset sample files will be imported into the system then by using *pickle* function, we will load the files into their respective folders such as training and testing. This step will allow us to check whether the datasets have been trained and tested successfully before running the system.

```
#############################################################
# Importing files / creating training & testing features + labels
#############################################################
predictUsers = []
def appendToUsers(predictThis):
    for i in predictThis:
        predictUsers.append(i.user_id)


def reformat_new_lines(filename):
    print(filename)
    with open(filename, "rt", encoding='utf-8') as fh:
        content = fh.read().replace('\r', '')
    print(content[:3])
    with open(filename + '_new', "wt", encoding='utf-8') as fh:
        fh.write(content)
    print('OK!')

if os.path.isfile("training_labels.dat") and os.path.isfile("training_features_matrix.dat") and os.path.isfile("testing_labels.dat") and os.path.isfile("testing_features_matrix.dat"):
    # for filename in ["training_labels.dat", "training_features_matrix.dat",
    #                  "testing_labels.dat", "testing_features_matrix.dat"]:
    #     reformat_new_lines(filename)

    training_labels = pickle.load(open("training_labels.dat_new", "rb"), encoding = 'bytes')
    training_features = pickle.load(open("training_features_matrix.dat_new", "rb"), encoding = 'bytes')
    testing_labels = pickle.load(open("testing_labels.dat_new", "rb"), encoding = 'bytes')
    testing_features = pickle.load(open("testing_features_matrix.dat_new", "rb"), encoding = 'bytes')
    testing_legit = import_user_data("Testing_data/legitimate_users1.txt", "Testing_data/legitimate_users_tweets.txt")
    testing_spammers = import_user_data("Testing_data/spammers1.txt", "Testing_data/spammers_tweets.txt")
    appendToUsers(testing_legit)
    appendToUsers(testing_spammers)
else:
    training_spammers = import_user_data("Training_data/spammers.txt", "Training_data/spammers_tweets.txt")
    calculate_features(training_spammers)
    training_spammers_feature_matrix = build_feature_matrix(training_spammers)

    training_legit = import_user_data("Training_data/legitimate_users.txt", "Training_data/legitimate_users_tweets.txt")
    calculate_features(training_legit)
```

Figure 4.15: Code to import the dataset files in both Training and Testing folder to create training and testing features

In Figure 4.15, a command is used to configure the plot appearance as well as display the label correctly on both axes. The array done in Figure 4.13 will be displayed accordingly after the plot appearance is correctly configured.

```python
##################################################################
#
# Configuring plot appearance and labels
#
##################################################################
def plot_confusion_matrix(cm, title='Confusion matrix', cmap=plt.cm.BuPu):
    plt.imshow(cm, interpolation='nearest', cmap=cmap)
    plt.title(title)
    plt.colorbar()
    tick_marks = np.arange(2)
    plt.xticks(tick_marks, ["Spammer", "Non-Spammer"], rotation=45)
    plt.yticks(tick_marks, ["Spammer", "Non-Spammer"])
    plt.tight_layout()
    plt.ylabel('True label')
    plt.xlabel('Predicted label')
```

Figure 4.16: Code to generate plot appearance and labels for graph output

In Figure 4.16, a few commands are used to build, test and evaluate the three different machine learning models. Both training and testing features will be called in this function to implement it in each model's algorithm. Then, the classification table will be created after each model is successfully run.
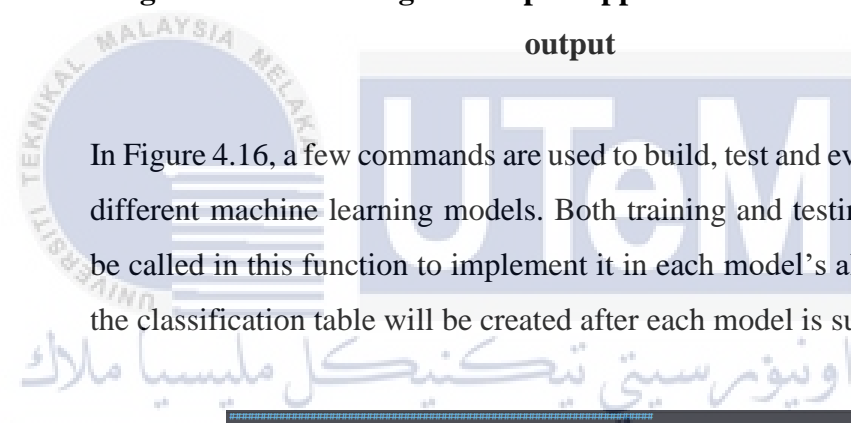
```python
##################################################################
#
# Building, testing and evaluating various Machine Learning models.
#
##################################################################
def select_classifier(algo, label):
    model = algo
    print(training_features)
    print(training_labels)
    model.fit(training_features, np.array(training_labels))
    expected = testing_labels
    predicted = model.predict(testing_features)
    count = 0
    for predict in predicted:
        count+=1
        if(predict == 0):
            print(predictUsers[count - 1]),
            print("is a spammer")
        else:
            print(predictUsers[count - 1]),
            print("is a not spammer")
    print("-------------------------------------")
    print("|           Classification Report           |")
    print("-------------------------------------")
    print(metrics.classification_report(expected, predicted))
    print("")

    print("-------------------------------------")
    print("|              Confusion Matrix              |")
    print("-------------------------------------")
    print(metrics.confusion_matrix(expected, predicted))
    print("")

    cm_list = metrics.confusion_matrix(expected, predicted).tolist()
    list_total = float(sum(sum(x) for x in cm_list))

    print("-------------------------------------")
    print("|        False Positives and Negatives        |")
    print("-------------------------------------")
    print ("False Positive: ", cm_list[1][0] / list_total)
    print("")
    print ("False Negative: ", cm_list[0][1] / list_total)
```

Figure 4.17: Code to build, test and evaluate the machine learning classifier models

4.3   Conclusion

This chapter has outlined the aspects of the Twitter Spam Detection Using Machine Learning Approach implementation. This chapter has presented the parts of the system setup. In addition, this current chapter deliberated how to set up the data mining framework. In the following chapter, the system for detecting spam tweets on Twitter will be tested and analyzed.

CHAPTER 5: TESTING AND ANALYSIS
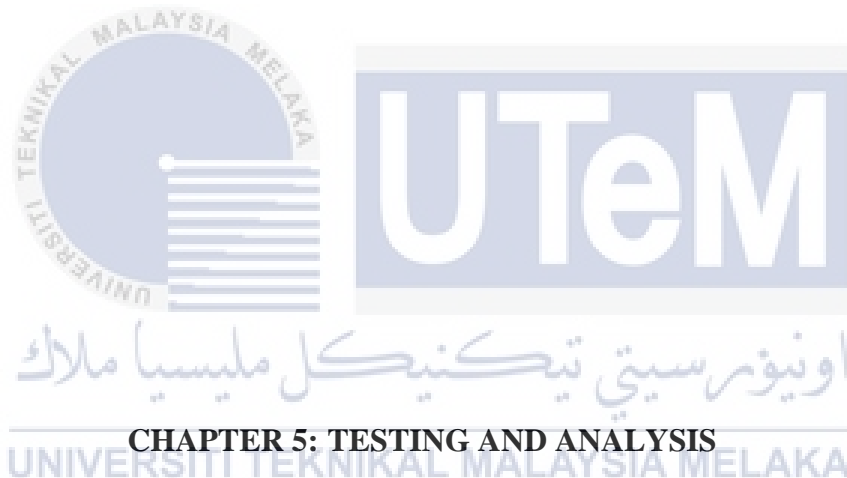
5.1   Introduction

The preceding chapter examined the development of spam detection particularly in Twitter platform through machine learning approach. Thus, in this chapter, the system is tested and analyzed. The testing phase is carried out by running different classifying models/algorithms on the test data to verify the accuracy and competence of each classifiers when the division is

identified. The accuracy of the classifiers that will be discussed in this phase, including class precision and class recall of non-spam and spam tweets.

The outcomes of the accuracy analysis, as well as graphs, will be shown and explained in this chapter.

5.2   Results and Analysis

Because the terms class precision and class recall will be used frequently in this chapter, they will be defined ahead of time for clarity. At the point when the objective is to diminish the number of real-time tweets classified as spam, the term class precision is used, whereas class recall is used to minimize the number of spam tweets classified as ham, also known as non-spam tweets (Ferreira, 2018).

For testing purpose, the dataset is categorized into a few categories such as 100, 200, 300, 500 and 1000 samples. Each of these samples will be tested using the three machine learning models to distinguish the difference in accuracy. The results of the samples for each machine learning models will vary; thus, a comparison table and graph figure will be constructed for further analysis.

5.2.1   Comparison of Machine Learning Classifier Model Analysis

The table below shows that the Naïve Bayes classifier outperforms the other two machine learning classifier models, Support Vector Machine and Random Forest. 15 tweets come about selected from the 1000 extracted tweets to illustrate the differences in classification results in three machine learning classifier models. In general, Naïve Bayes predicted 11 correct tweets out of 15 sample tweets, Support Vector Machine (SVM) predicted 9 correct tweets out of 15 tweets, and Random Forest predicted 8 correct tweets out of 15 tweets. Please refer to the Appendices section to see the full list of 1000 sample tweets.

Table 5.1: Sample prediction analysis of three machine learning classifier models

Tweets	SPAM/HAM	Naïve Bayes	Support Vector Machine (SVM)	Random Forest

Landing Page Makeover Clinic #20: TantricSexforBusyCouples.com http://ow.ly/DHNU #sitereview #usability #conversion	Spam	Spam	Ham	Spam
Airports are the best places to people watch.....so many characters here	Ham	Spam	Ham	Spam
20 Ways To Make Your Website Crap: http://ow.ly/DCZ5 #webdesign	Spam	Spam	Spam	Spam
I have also had a lot of time to observe people and noticed that people in suits used blackberries 80% of the time.....go blackberry!	Ham	Ham	Ham	Spam
What's the one thing you should be doing right now but aren't? #gtd #productivity	Spam	Spam	Ham	Spam
Twitter Analytics - A burst of imagination that has changed how we view stats: http://ow.ly/FwVq #twitter #analytics #occamsrazor	Spam	Spam	Spam	Spam
10 Definitive Tips for Writing Captivating Emails: http://ow.ly/DD06 #email #emailmarketing #marketing	Spam	Spam	Spam	Spam
@CaptOptamicus: I just RSVPed to a #VotingRightsMarch event! On August 28th, I'll be joining democracy advocates across the country to protect voting rights. Join me at the March On for Voting Rights. https://t.co/8aWTWPYhn1	Ham	Spam	Spam	Spam
15 brilliant infographics that should inspire your designs: http://ow.ly/DI0r #infographic #design	Spam	Spam	Spam	Spam
I have had this one guy on all 3 of my flights and he has no bags no coat and he hasn't said a word	Ham	Ham	Ham	Spam
"RT @AGoblinLife : Woah a https://t.co/2ZYAMPRwB9 build~ > Added text! Made my own voxel font. > New URL! https://t.co/pIrk7Mt7D3! #opensource	#solodev	#vr	#voxel https://t.co/paSXazcMum"	Spam	Spam	Spam	Spam
Swimmer Abbas Karimi is currently the only Afghan athlete competing at the Paralympics. I spoke to him about	Ham	Ham	Ham	Spam

his journey from Kabul to refugee camps in Turkey to the U.S., and now, Tokyo. https://t.co/Xs04gWO3ri				
On the plane headed to Chicago....its been a fun couple day adventure. Excited to see what the future holds after all this	Ham	Spam	Spam	Spam
When you get on th scales & they go back round to zero, does that mean you get to start with a clean slate? #exercise	Ham	Spam	Spam	Spam
A Subscriber received 25 #Mortgage Results for £100,000 over 25 years: https://t.co/1gUbb5dyz1 https://t.co/WhOzARbyah	Spam	Spam	Ham	Spam
Prediction (Correct)		11	9	8
Prediction (Incorrect)		4	6	7

5.2.2   Testing of 100 tweets

The first testing sample is 100 tweets. The purpose of testing 100 sample tweets is to make sure that the system is functioning well as well as training data was implemented nicely. If any errors occur while testing 100 sample tweets, problem will be solved first before proceeding with bigger sample.

5.2.2.1   Naïve Bayes

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.1. As we can see from Figure 5.1, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of Naïve Bayes for testing 100 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is also ideal as it is not above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.2 for a more graphic analysis of this result.

```
                        Classification Report                          |

                  precision     recall   f1-score     support

            0        0.67         0.89      0.76           9
            1        0.80         0.50      0.62           8

      accuracy                              0.71          17
     macro avg       0.73         0.69      0.69          17
  weighted avg       0.73         0.71      0.69          17


|                       Confusion Matrix                              |

[[8 1]
 [4 4]]


|                  False Positives and Negatives                      |

False Positive:   0.23529411764705882

False Negative:   0.05882352941176470
```

Figure 5.1: The accuracy report for Naïve Bayes

In Figure 5.2, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Naïve Bayes has successfully predicted most of the sample tweets correctly.

Figure 5.2: The graph figure report for Naïve Bayes

5.2.2.2 SVM

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.3. As we can see from Figure 5.3, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 100 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is borderline ideal as it is above 0.1%.

The confusion matrix can be used to refer the graph in Figure 5.4 for a more graphic analysis of this result.
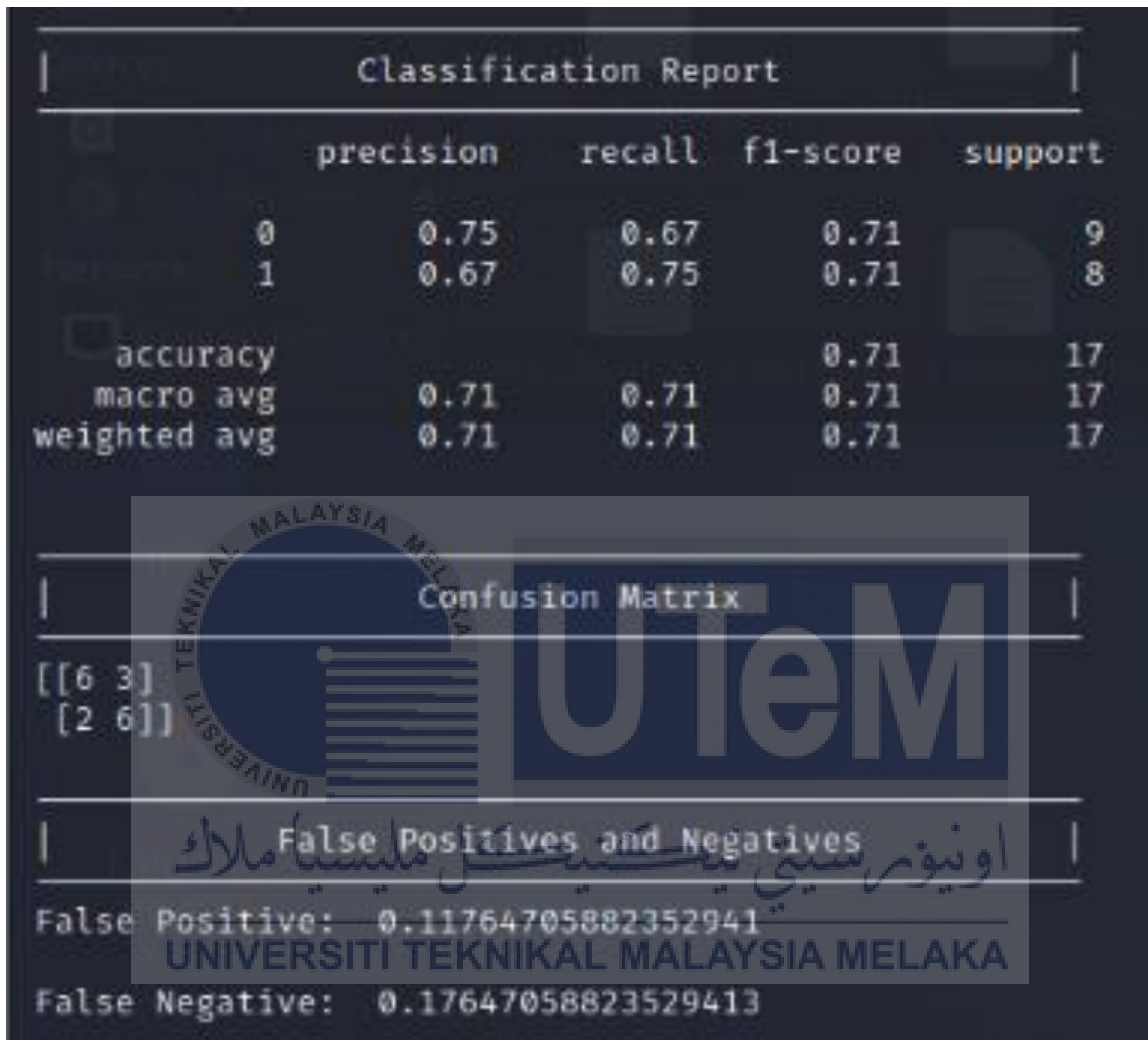
Figure 5.3: The accuracy report for SVM

In Figure 5.4, we can see that the True Positive and True Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive and True Negative means that SVM has successfully predicted most of the sample tweets as spam and ham correctly.

Figure 5.4: The graph figure report for SVM

5.2.2.3 Random Forest

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.5. As we can see from Figure 5.5, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 100 samples is 0.59 which is considered high accuracy. By looking at the False Positive, it is above the ideal value that we want, 0.4 is very high for False Positive as we want the value to be as low as possible – and False Negative is too perfect as it is 0.0% indication there are no

imperfections. The confusion matrix can be used to refer the graph in Figure 5.6 for a more graphic analysis of this result.
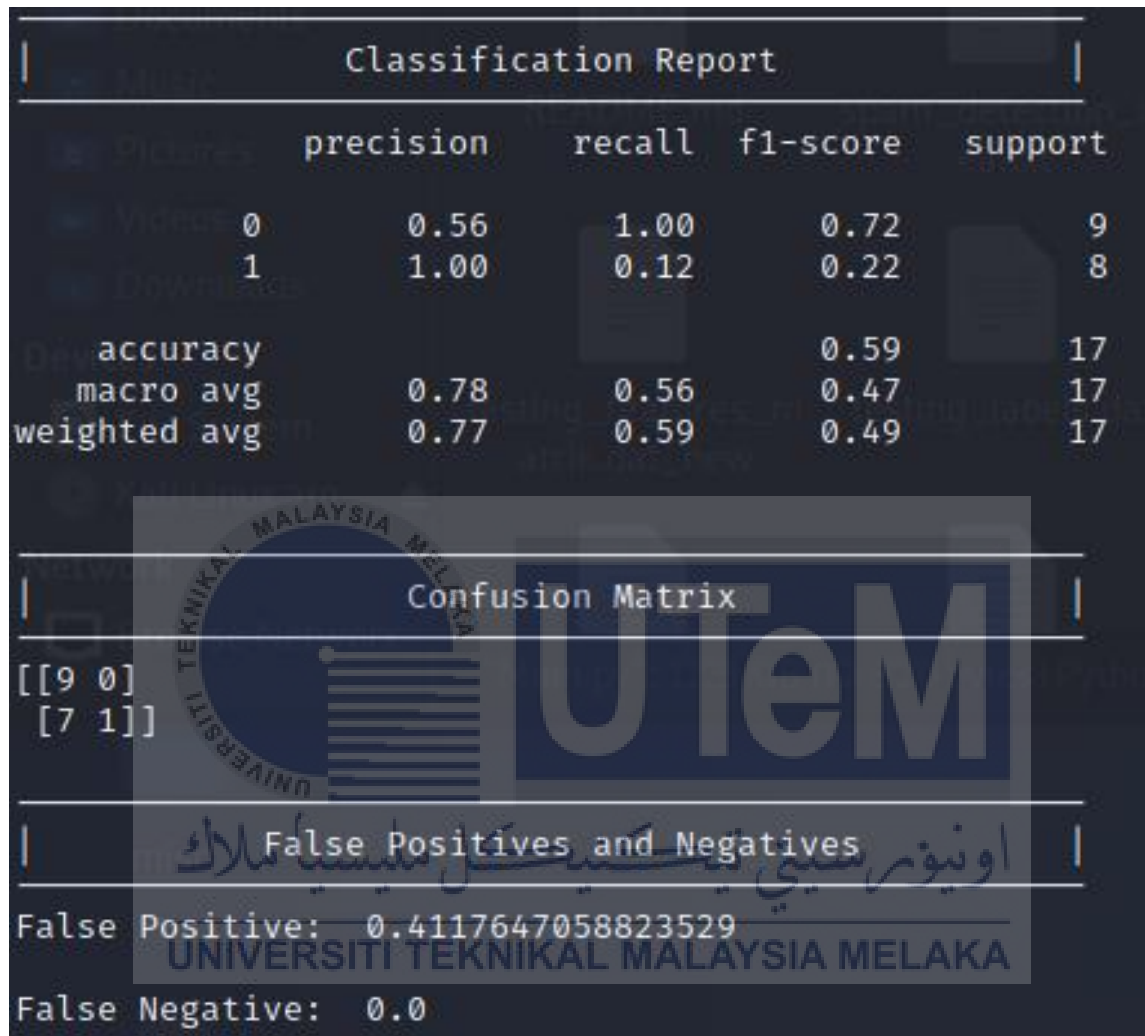
Figure 5.5: The accuracy report for Random Forest

In Figure 5.6, we can see that the True Positive box is purple color indicating it is 9 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Random Forest has successfully predicted most of the sample tweets correctly. However, the False Positive box is almost white color – which means 0 in Confusion Matrix. It is unlikely for a low accuracy prediction model to have a perfect score in Confusion Matrix, therefore the result for Random Forest in testing 100 samples show inaccuracies.

Figure 5.6: The graph figure report for Random Forest

5.2.3 Testing of 200 tweets

The second testing sample is 200 tweets. The purpose of testing 200 sample tweets is to compare the results obtained and compare it to the results of 100 sample to see if there are any difference despite using same model but different sample.

5.2.3.1 Naïve Bayes

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.7. As we can see from Figure 5.7, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive

calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of Naïve Bayes for testing 200 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is also ideal as it is not above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.8 for a more graphic analysis of this result.

```
|                    Classification Report                    |

                 precision      recall   f1-score     support

         0          0.67         0.89       0.76           9
         1          0.80         0.50       0.62           8

  accuracy                                  0.71          17
 macro avg          0.73         0.69       0.69          17
weighted avg        0.73         0.71       0.69          17


|                     Confusion Matrix                        |

[[8 1]
 [4 4]]


|                 False Positives and Negatives               |

False Positive:   0.23529411764705882

False Negative:   0.05882352941176470 5
```

Figure 5.7: The accuracy report for Naïve Bayes

In Figure 5.8, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Naïve Bayes has successfully predicted most of the sample tweets correctly

Figure 5.8: The graph figure report for Naïve Bayes

5.2.3.2   SVM

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.9. As we can see from Figure 5.9, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM

for testing 200 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is borderline ideal as it is above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.10 for a more graphic analysis of this result.

```
                    Classification Report

                precision    recall   f1-score    support

            0       0.75       0.67      0.71          9
            1       0.67       0.75      0.71          8

     accuracy                            0.71         17
    macro avg       0.71       0.71      0.71         17
 weighted avg       0.71       0.71      0.71         17


                    Confusion Matrix

[[6 3]
 [2 6]]


              False Positives and Negatives

False Positive:   0.11764705882352941

False Negative:   0.17647058823529413
```

Figure 5.9: The accuracy report for SVM

In Figure 5.10, we can see that the True Positive and True Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive and True Negative means that SVM has successfully predicted most of the sample tweets as spam and ham correctly.

Figure 5.10 The graph figure report for SVM

5.2.3.3 Random Forest

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.11. As we can see from Figure 5.11, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 200 samples is 0.47 which is considered low accuracy. By looking at the False Positive,

it is above the ideal value that we want, 0.4 is very high for False Positive as we want the value to be as low as possible – and False Negative is too perfect as it is 0.0% indication there are no imperfections. The confusion matrix can be used to refer the graph in Figure 5.12 for a more graphic analysis of this result.
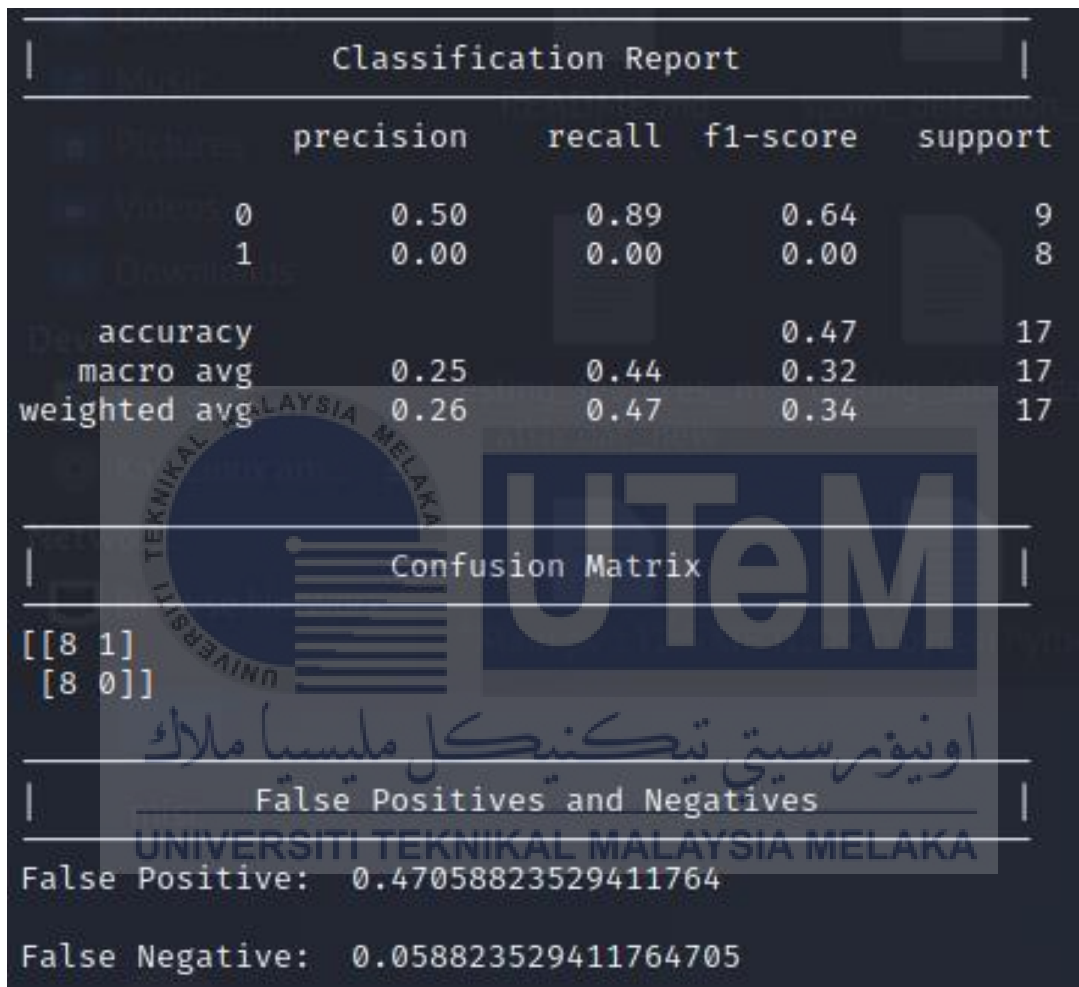
Figure 5.11: The accuracy report for Random Forest

In Figure 5.12, we can see that the True Positive and False Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Random Forest has successfully predicted most of the sample tweets correctly. However, the False Negative box is also high which means the result for Random Forest in testing 200 samples show inaccuracies.

Figure 5.12: The graph figure report for Random Forest

5.2.4 Testing of 300 tweets

The third testing sample is 300 tweets. The purpose of testing 300 sample tweets is to compare the results obtained and compare it to the results of 100 and 200 sample to see if there are any difference despite using same model but different sample.

5.2.4.1 Naïve Bayes

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.13. As we can see from Figure 5.13, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate

the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of Naïve Bayes for testing 300 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is also ideal as it is not above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.14 for a more graphic analysis of this result.
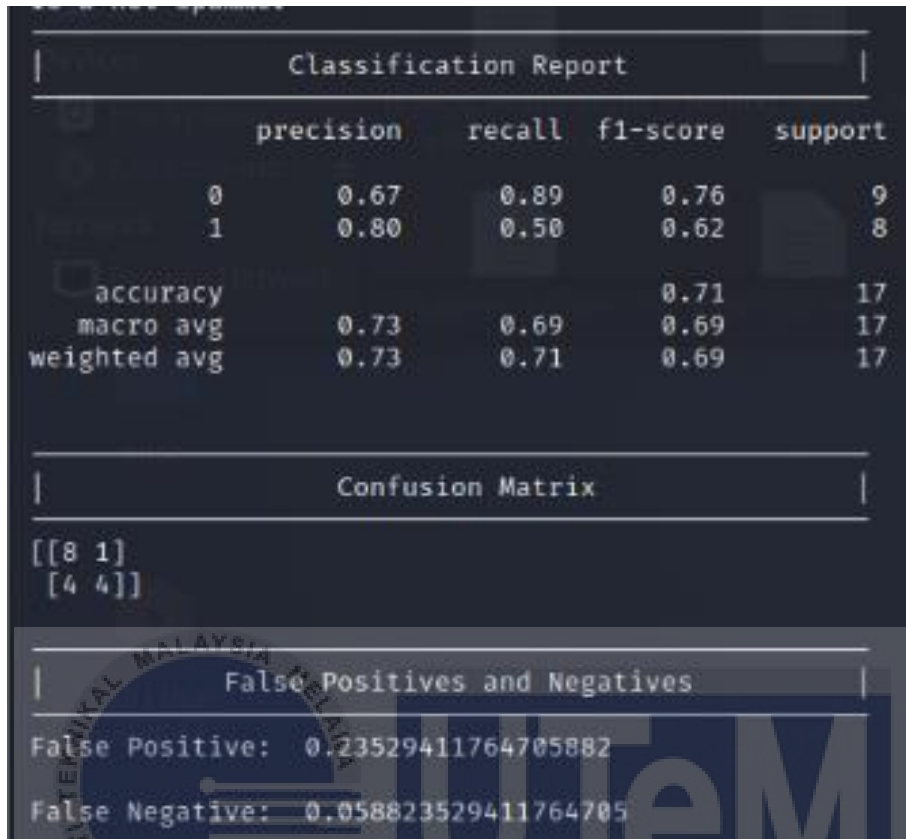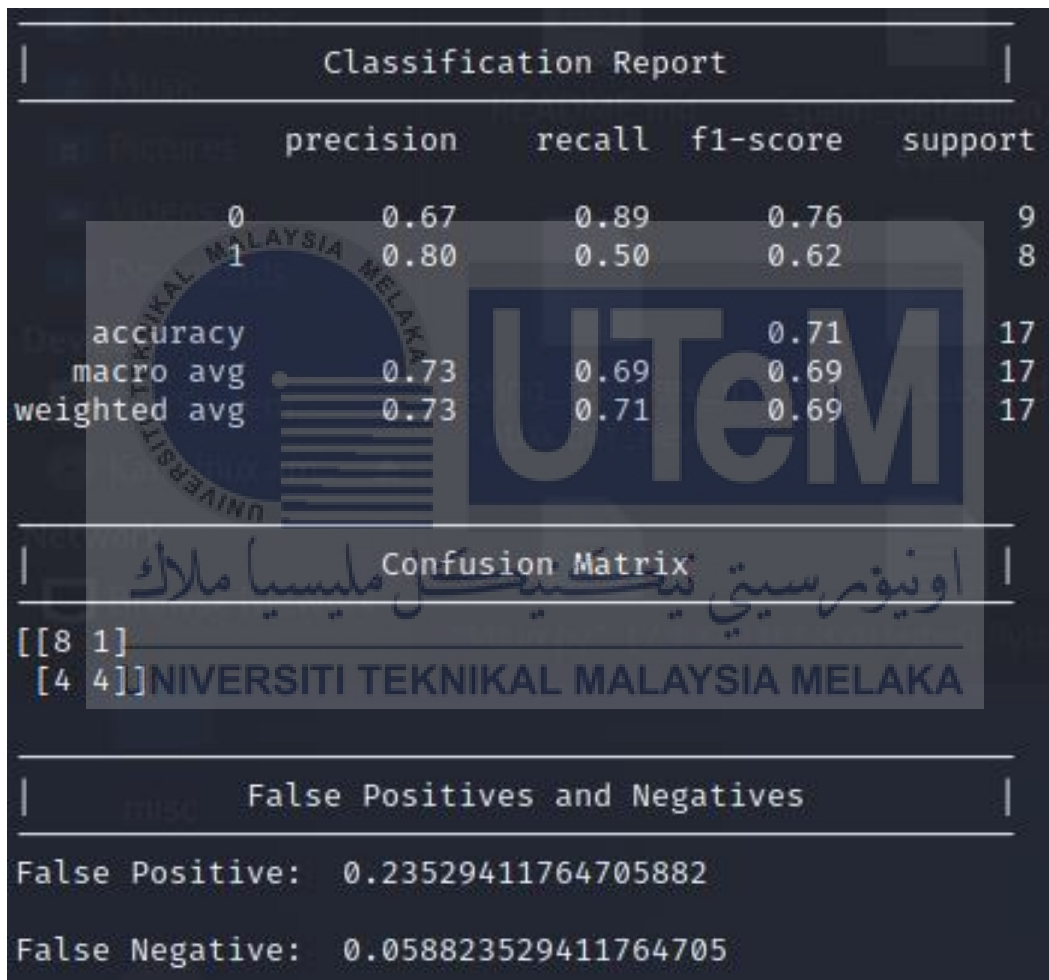

Figure 5.13: The accuracy report for Naïve Bayes

In Figure 5.14, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Naïve Bayes has successfully predicted most of the sample tweets correctly.
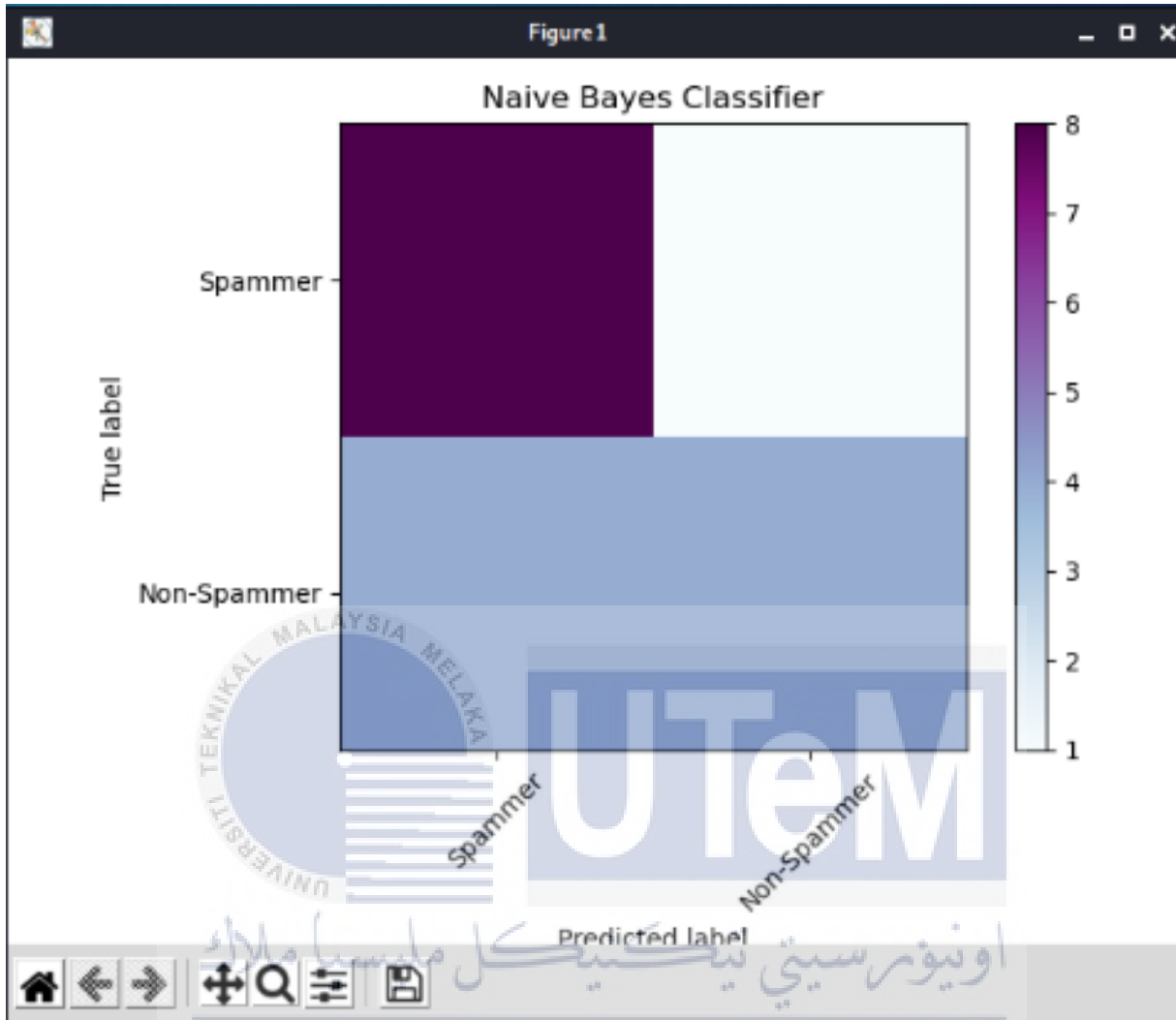
Figure 5.14: The graph figure report for Naïve Bayes

5.2.4.2 SVM

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.15. As we can see from Figure 5.15, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 300 samples is 0.71 which is considered high accuracy. By looking at the False Positive,

it is also higher than False Negative – and False Negative is borderline ideal as it is above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.16 for a more graphic analysis of this result.

```
|                Classification Report                |

                precision    recall   f1-score    support

          0        0.75       0.67      0.71          9
          1        0.67       0.75      0.71          8

   accuracy                             0.71         17
  macro avg        0.71       0.71      0.71         17
weighted avg       0.71       0.71      0.71         17


|                  Confusion Matrix                   |

[[6 3]
 [2 6]]


|            False Positives and Negatives            |

False Positive:   0.11764705882352941

False Negative:   0.17647058823529413
```

Figure 5.15: The accuracy report for SVM

In Figure 5.16, we can see that the True Positive and True Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive and True Negative means that SVM has successfully predicted most of the sample tweets as spam and ham correctly.
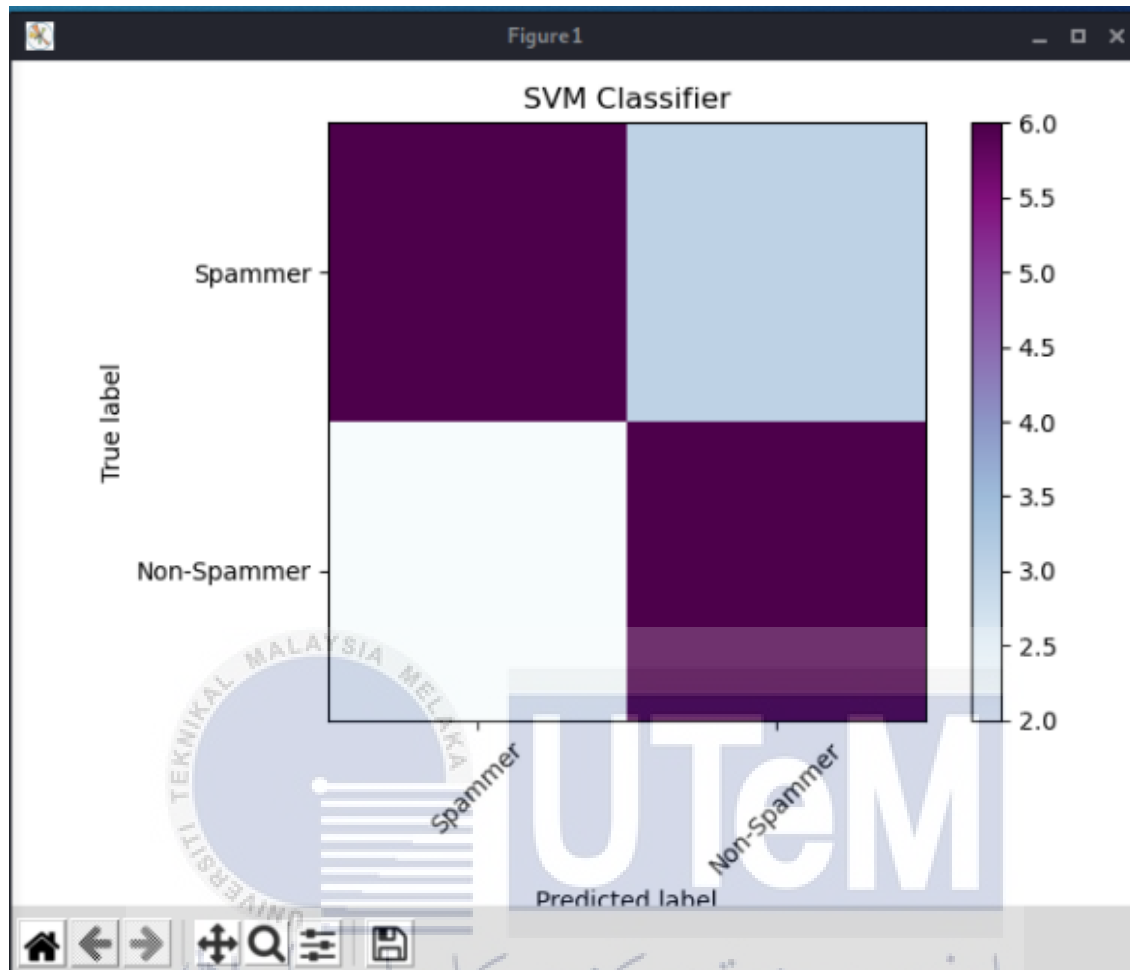
Figure 5.16: The graph figure report for SVM

5.2.4.3 Random Forest

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.17. As we can see from Figure 5.17, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 300 samples is 0.47 which is considered low accuracy. By looking at the False Positive, it is above the ideal value that we want, 0.4 is very high for False Positive as we want the value to be as low as possible – and False Negative is too perfect as it is 0.0% indication there are no

imperfections. The confusion matrix can be used to refer the graph in Figure 5.18 for a more graphic analysis of this result.



```
|                    Classification Report                    |

                precision      recall   f1-score     support

          0         0.50        0.89       0.64           9
          1         0.00        0.00       0.00           8

   accuracy                                 0.47          17
  macro avg         0.25        0.44       0.32          17
weighted avg        0.26        0.47       0.34          17


|                     Confusion Matrix                        |

[[8 1]
 [8 0]]


|              False Positives and Negatives                  |

False Positive:   0.47058823529411764

False Negative:   0.05882352941176470
```

Figure 5.17: The accuracy report for Random Forest

In Figure 5.18, we can see that the True Positive and False Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Random Forest has successfully predicted most of the sample tweets correctly. However, the False Negative box is also high which means the result for Random Forest in testing 300 samples show inaccuracies.
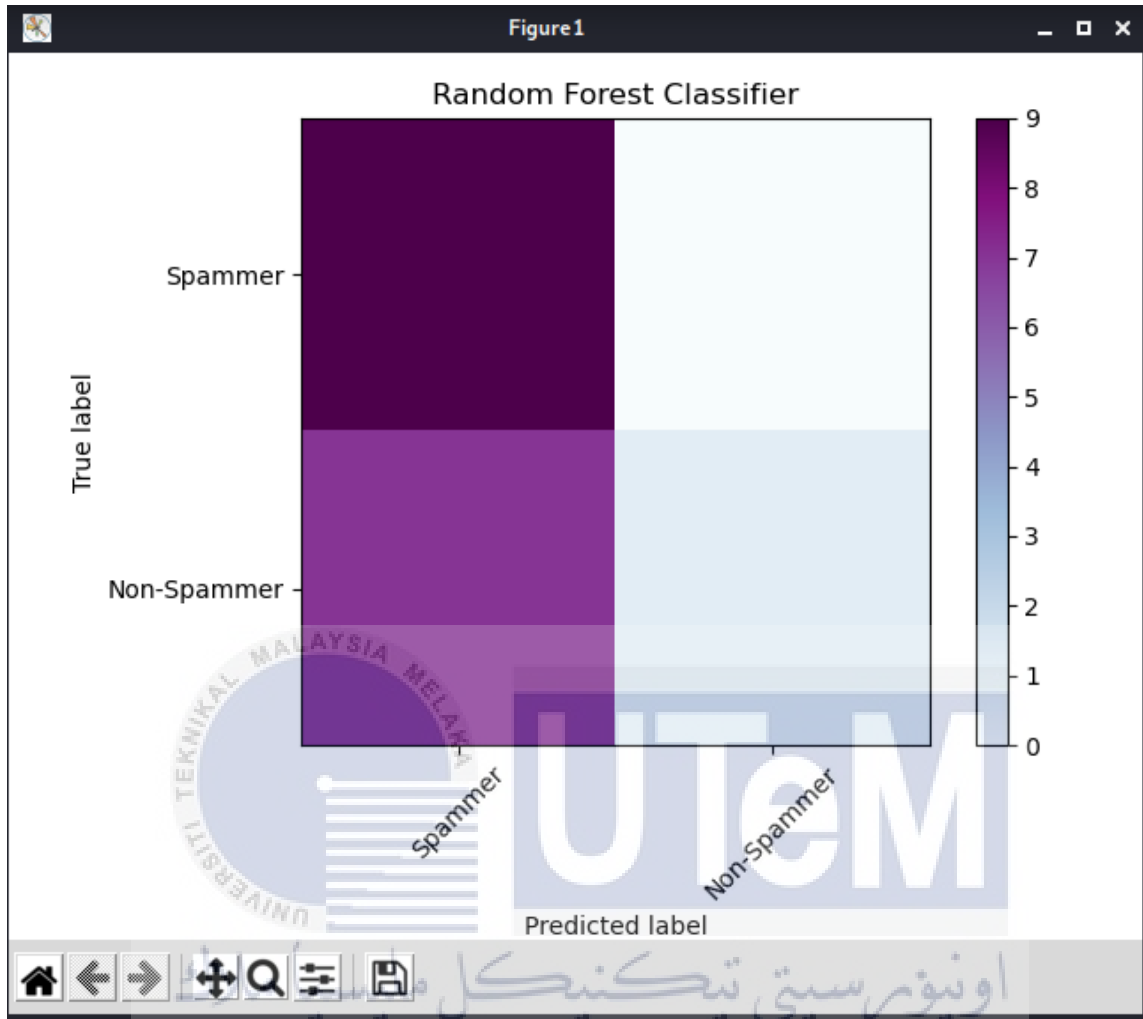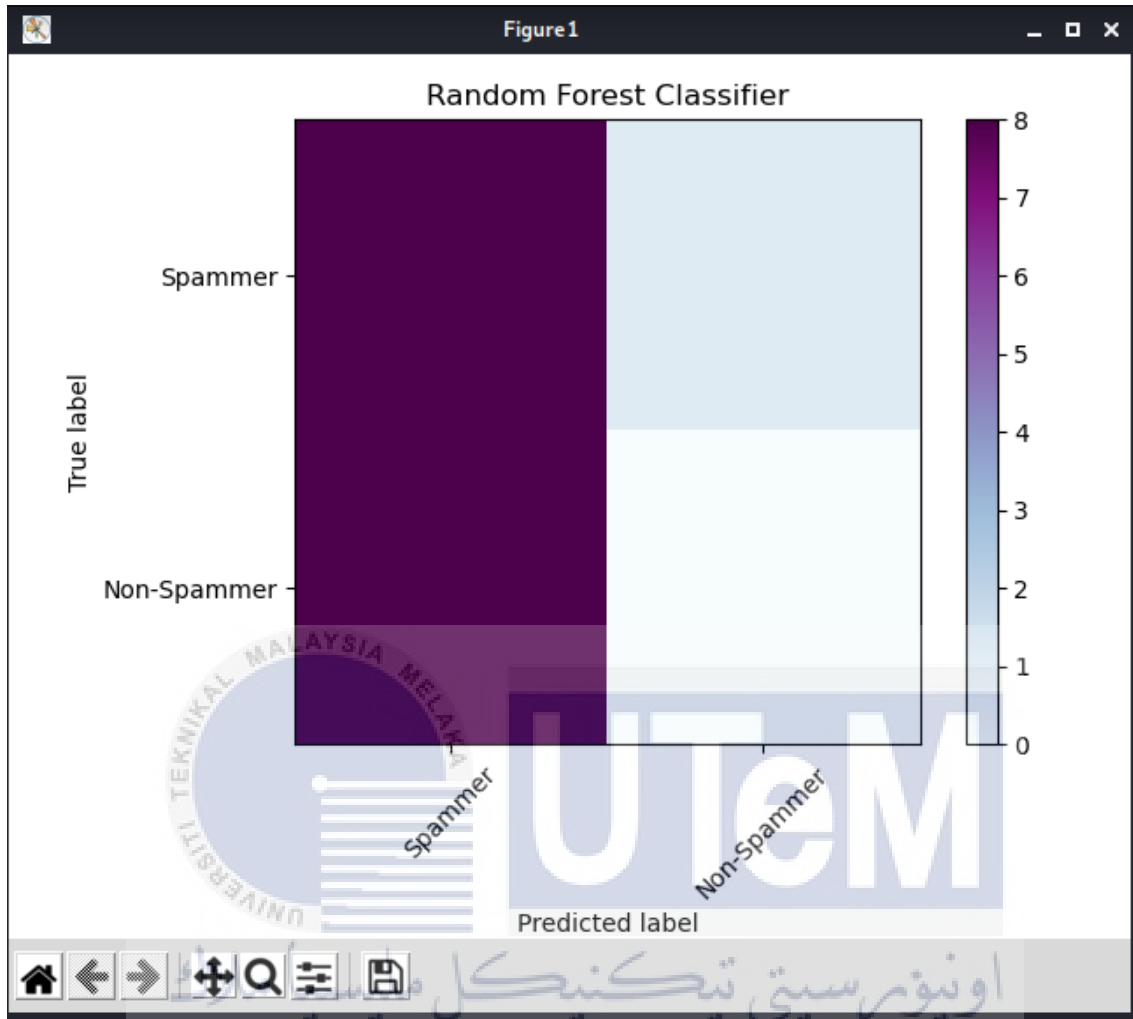
Figure 5.18: The graph figure report for Random Forest

5.2.5   Testing of 500 tweets

The third testing sample is 500 tweets. The purpose of testing 300 sample tweets is to compare the results obtained and compare it to the results of 100, 200 and 300 sample to see if there are any difference as the previous samples all almost had same results.

5.2.5.1   Naïve Bayes

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.19. As we can see from Figure 5.19, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate

the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of Naïve Bayes for testing 500 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is also ideal as it is not above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.20 for a more graphic analysis of this result.
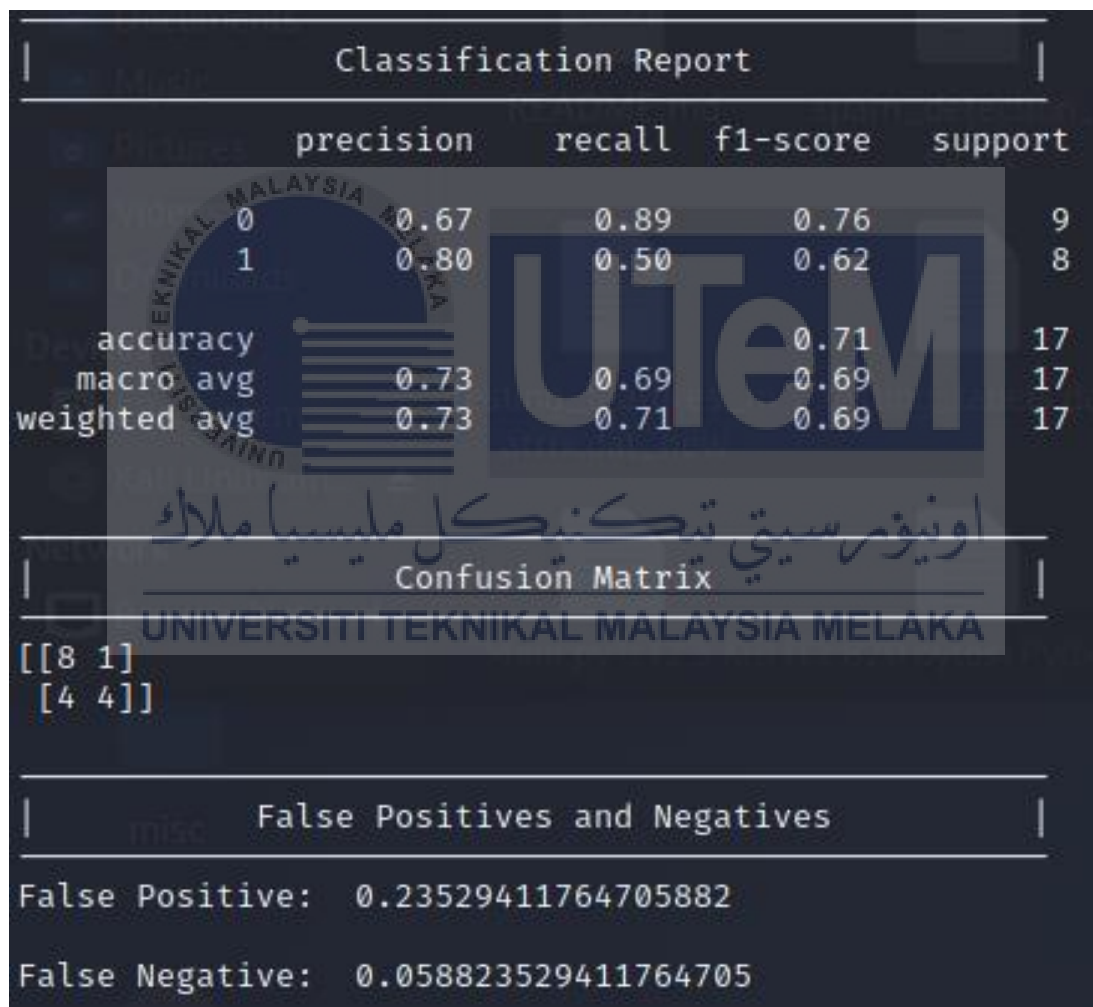
```
|                  Classification Report                  |

                 precision      recall   f1-score     support

           0        0.67        0.89       0.76           9
           1        0.80        0.50       0.62           8

    accuracy                               0.71          17
   macro avg        0.73        0.69       0.69          17
weighted avg        0.73        0.71       0.69          17


|                    Confusion Matrix                     |

[[8 1]
 [4 4]]

|               False Positives and Negatives             |

False Positive:   0.23529411764705882

False Negative:   0.05882352941176470
```
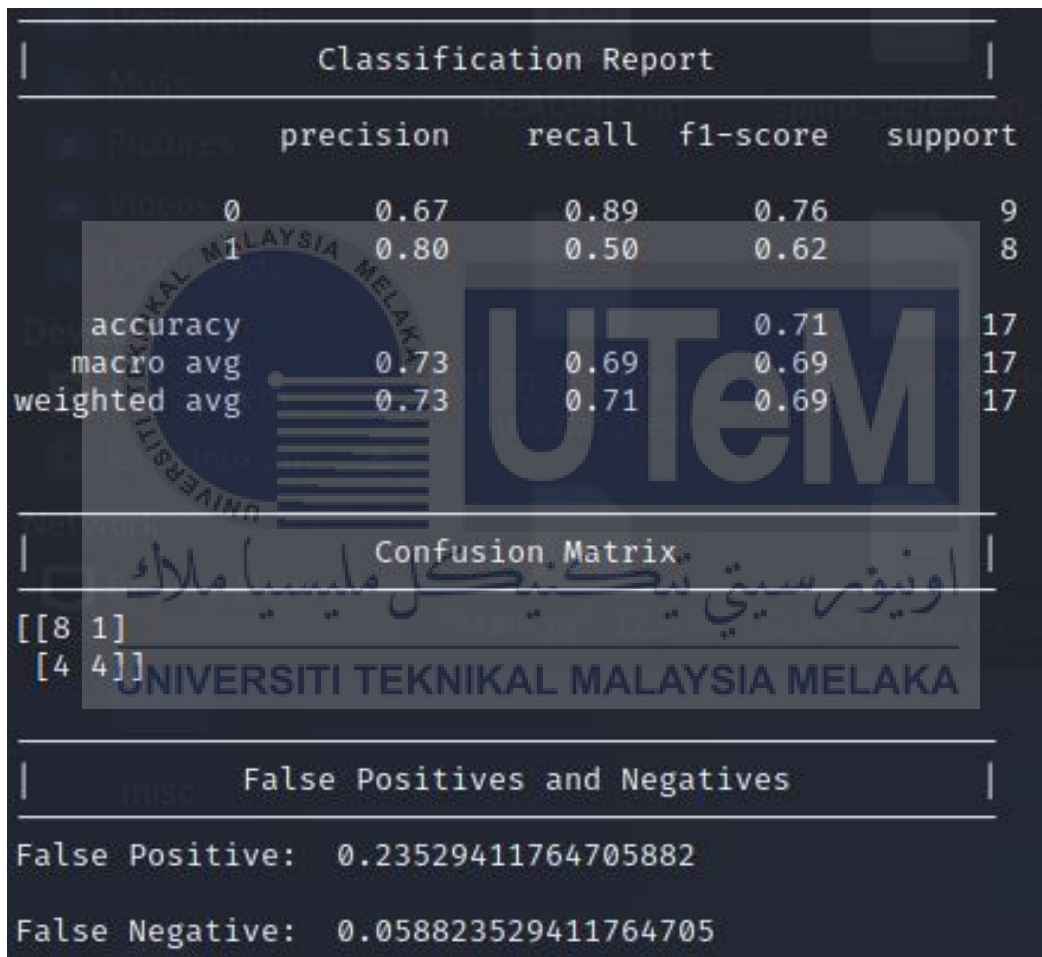
Figure 5.19: The accuracy report for Naïve Bayes

In Figure 5.20, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Naïve Bayes has successfully predicted most of the sample tweets correctly.
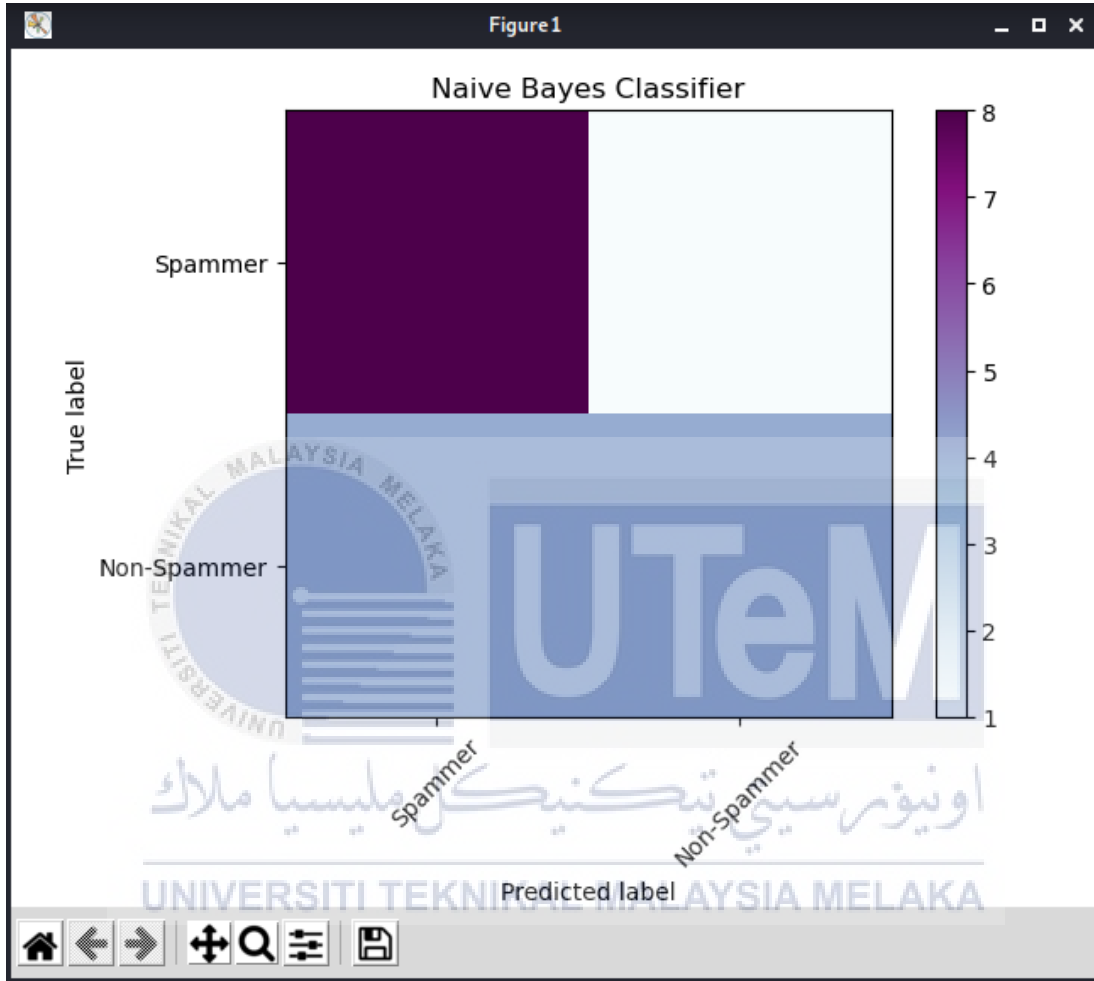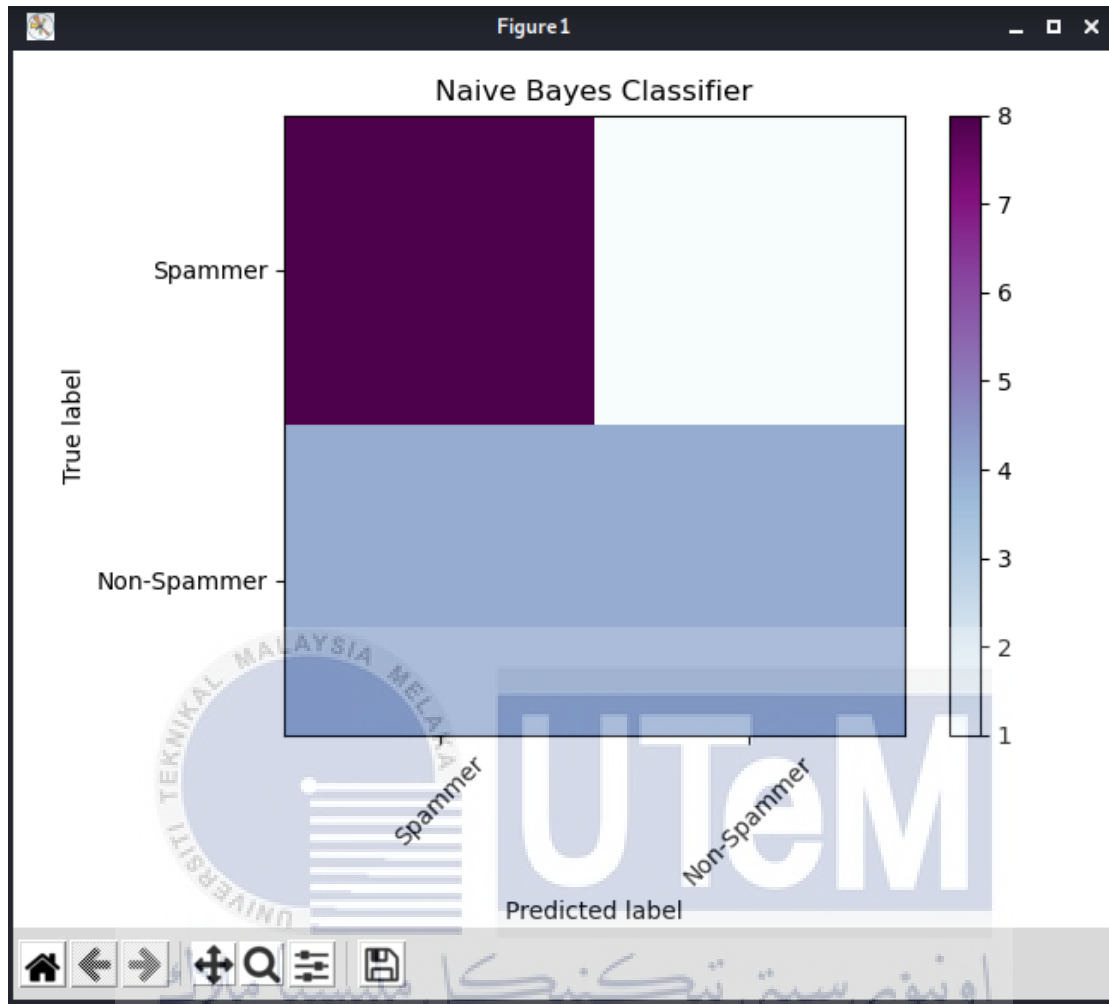
Figure 5.20: The graph figure report for Naïve Bayes

5.2.5.2 SVM

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.21. As we can see from Figure 5.21, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 500 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is borderline ideal as it is above 0.1%.

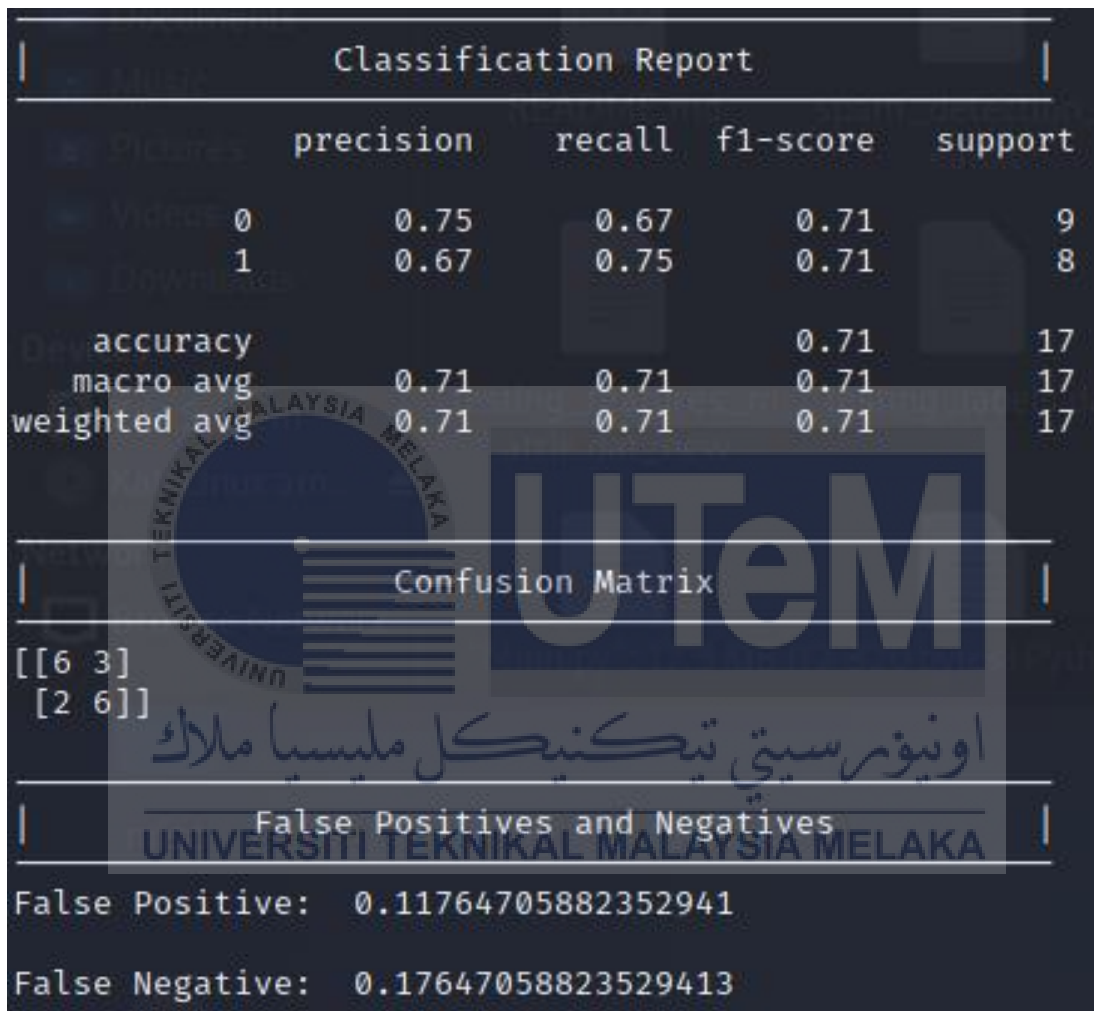The confusion matrix can be used to refer the graph in Figure 5.22 for a more graphic analysis of this result
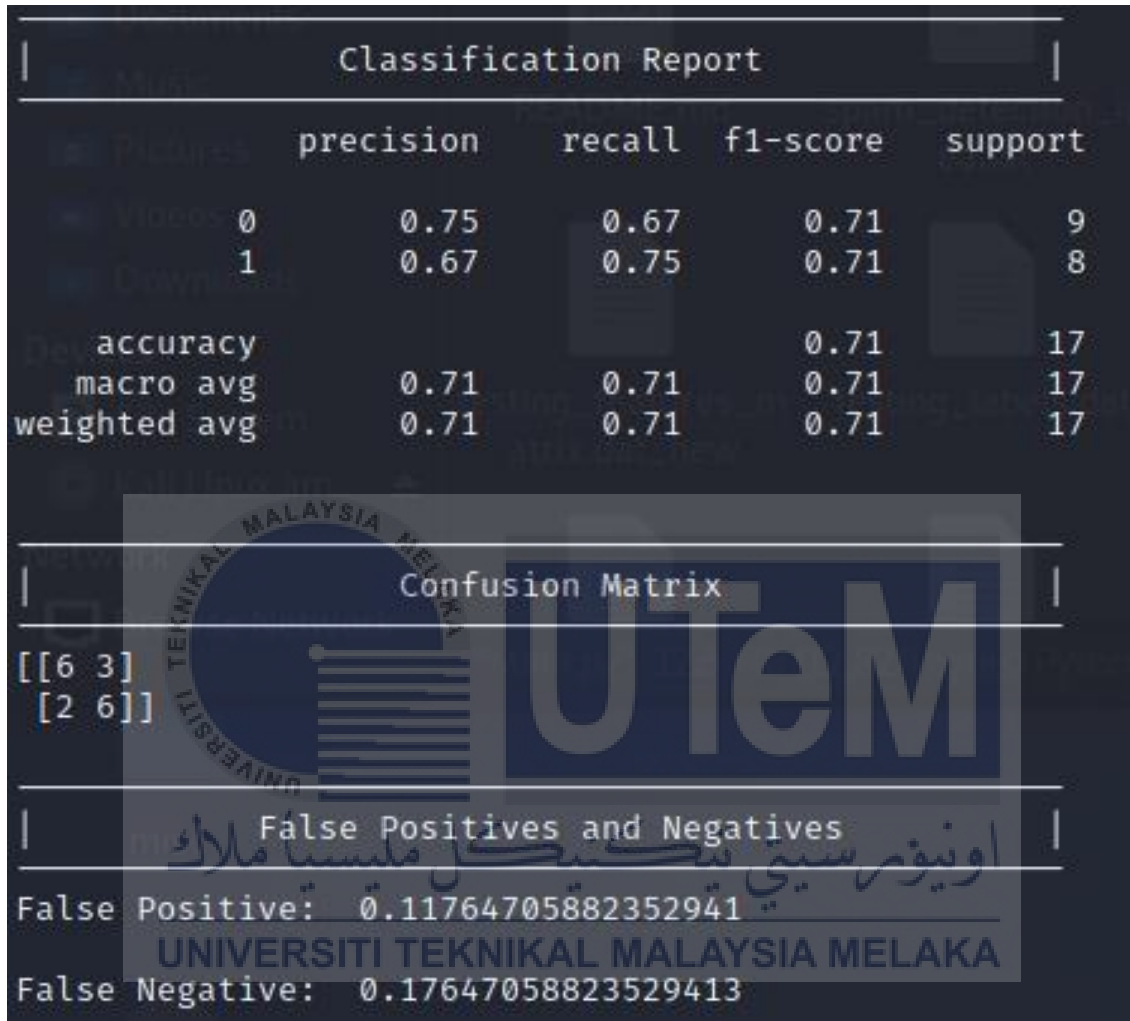
Figure 5.21: The accuracy report for SVM

In Figure 5.22, we can see that the True Positive and True Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive and True Negative means that SVM has successfully predicted most of the sample tweets as spam and ham correctly.
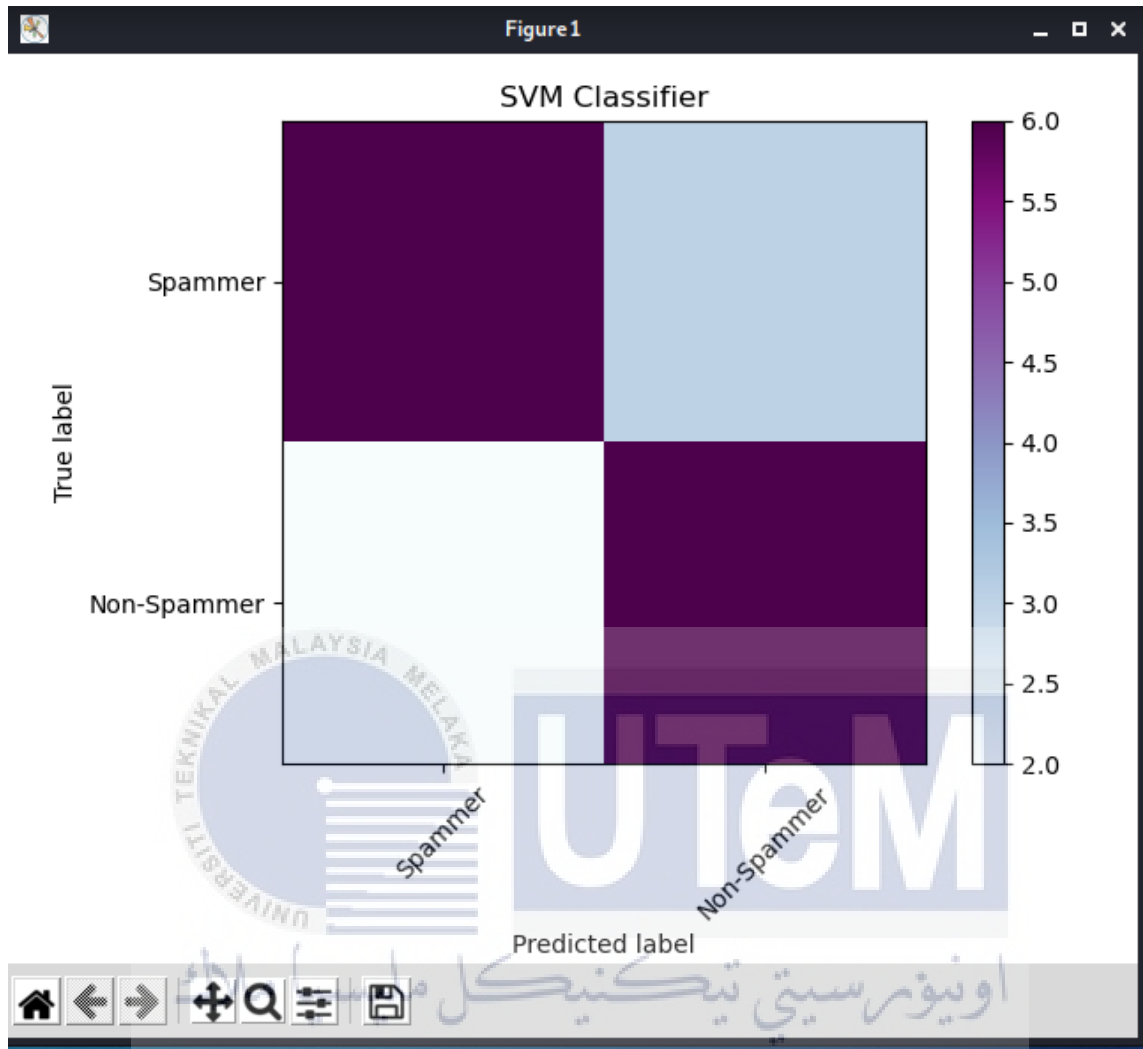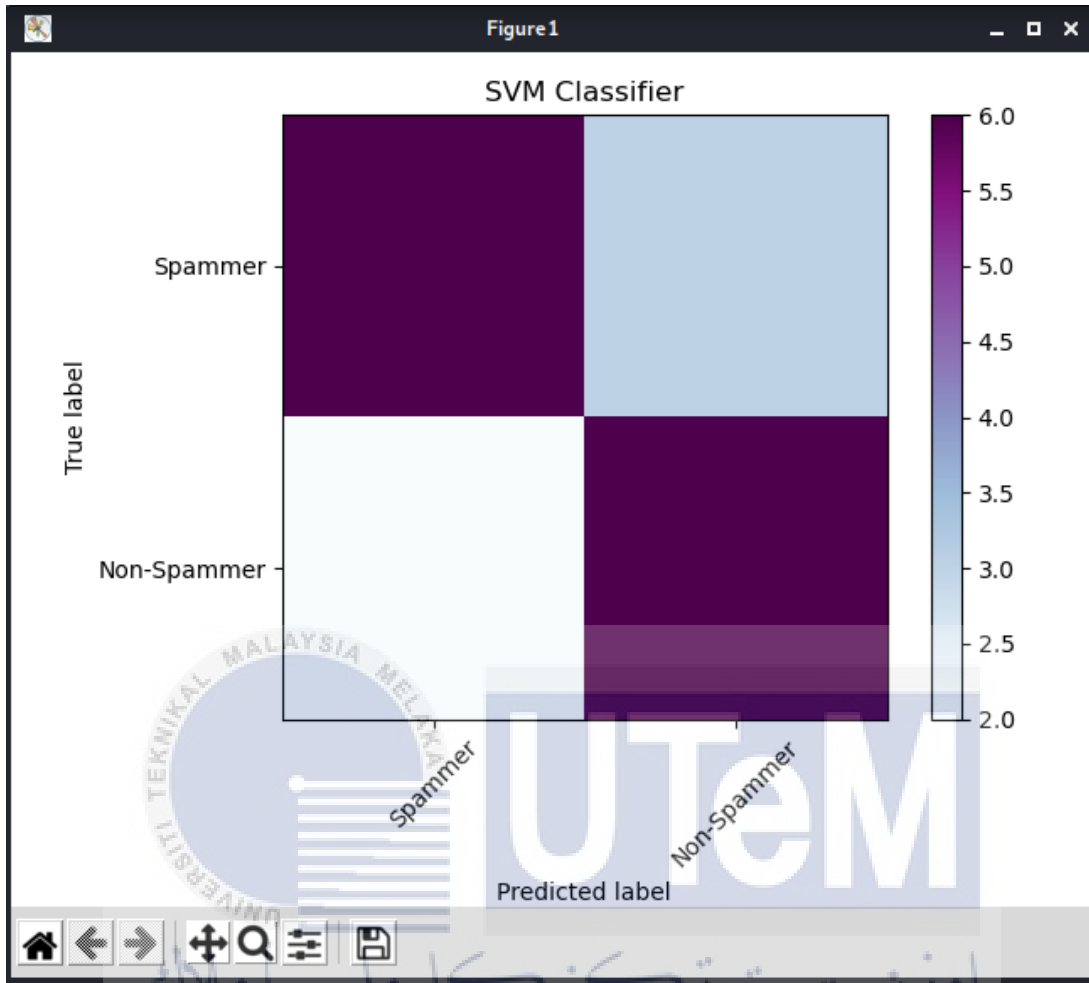
Figure 5.22: The graph figure report for SVM

5.2.5.3 Random Forest

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.23. As we can see from Figure 5.23, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 500 samples is 0.47 which is considered low accuracy. By looking at the False Positive, it is above the ideal value that we want, 0.4 is very high for False Positive as we want the value to

be as low as possible – and False Negative is too perfect as it is 0.0% indication there are no imperfections. The confusion matrix can be used to refer the graph in Figure 5.24 for a more graphic analysis of this result.



```
|                       Classification Report                       |

                  precision      recall  f1-score      support

            0         0.50        0.89      0.64            9
            1         0.00        0.00      0.00            8

     accuracy                               0.47           17
    macro avg         0.25        0.44      0.32           17
 weighted avg         0.26        0.47      0.34           17


|                        Confusion Matrix                        |

[[8 1]
 [8 0]]


|                 False Positives and Negatives                 |

False Positive:  0.47058823529411764

False Negative:  0.058823529411764705
```
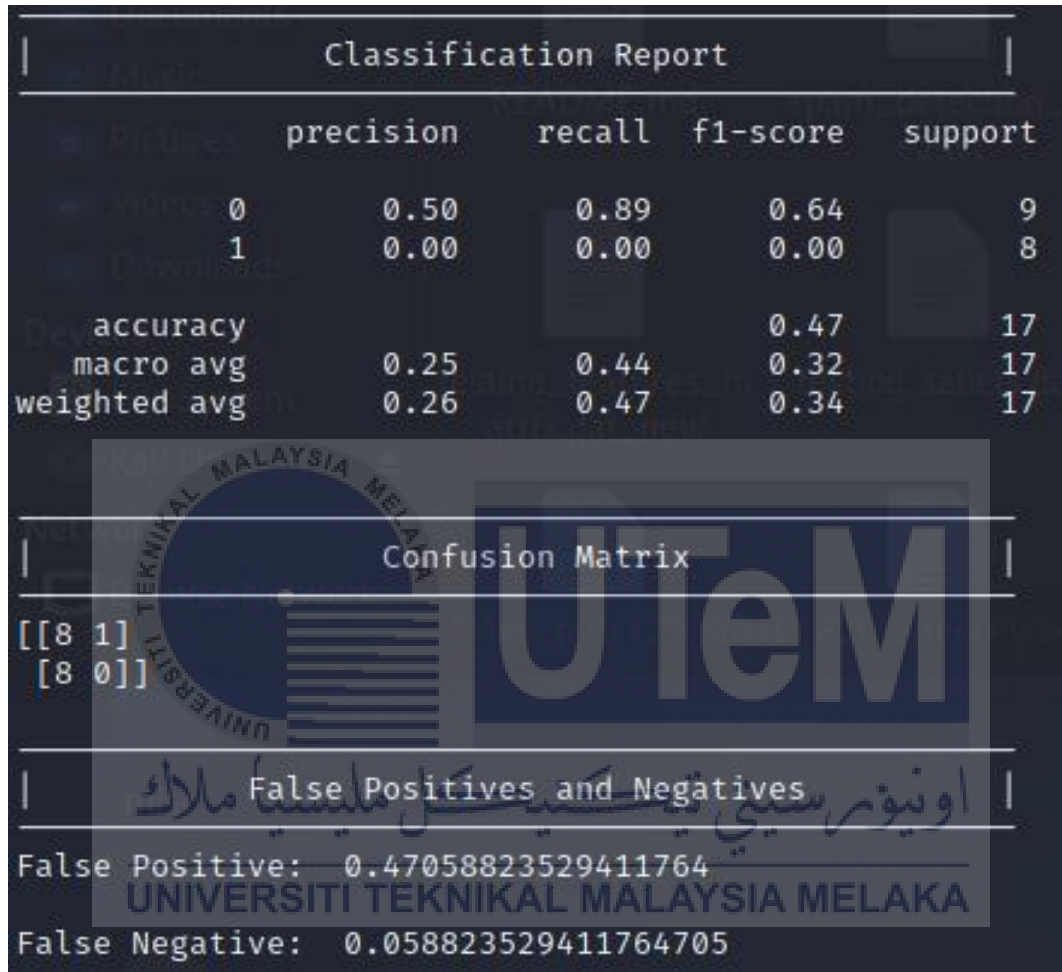
Figure 5.23: The accuracy report for Random Forest

In Figure 5.24, we can see that the True Positive and False Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Random Forest has successfully predicted most of the sample tweets correctly. However, the False Negative box is also high which means the result for Random Forest in testing 500 samples show inaccuracies.
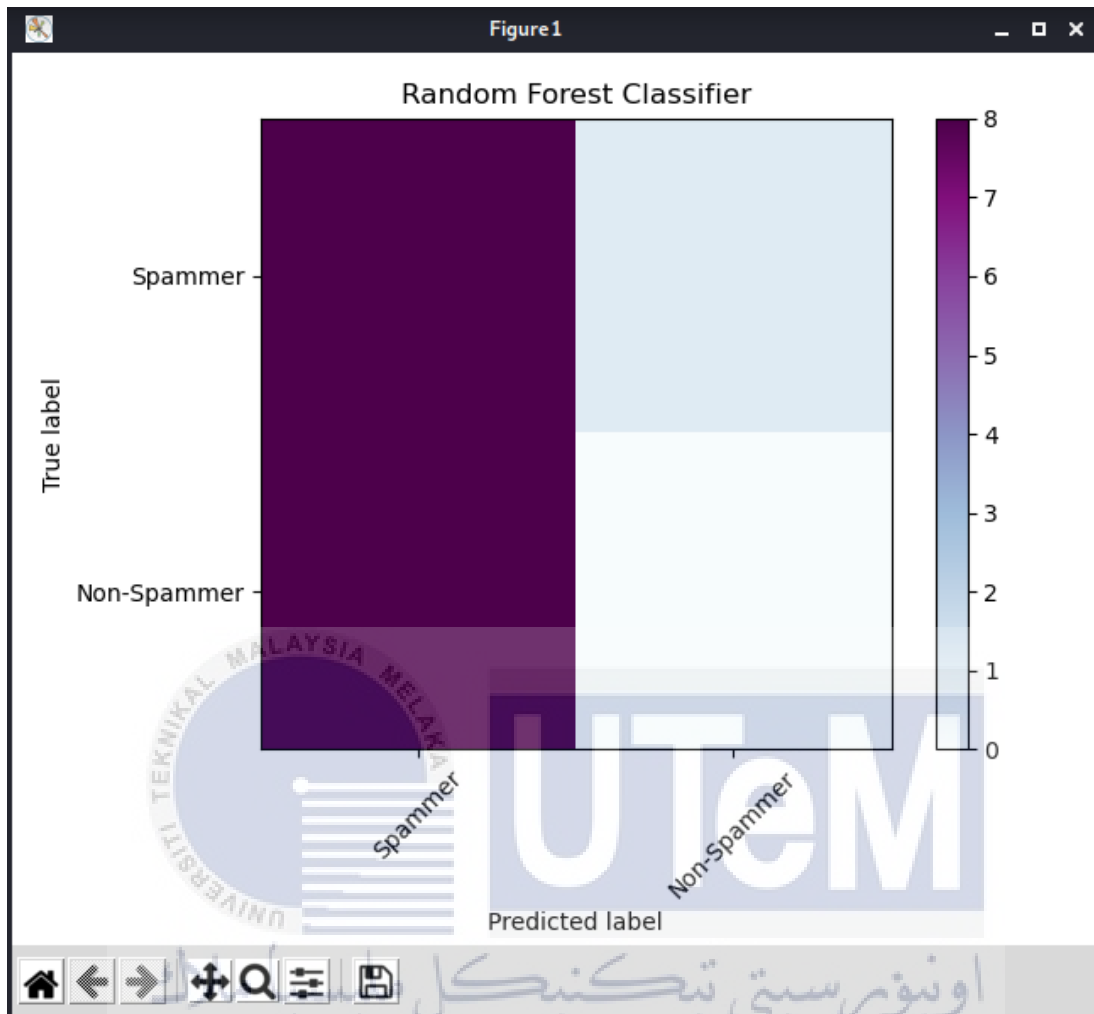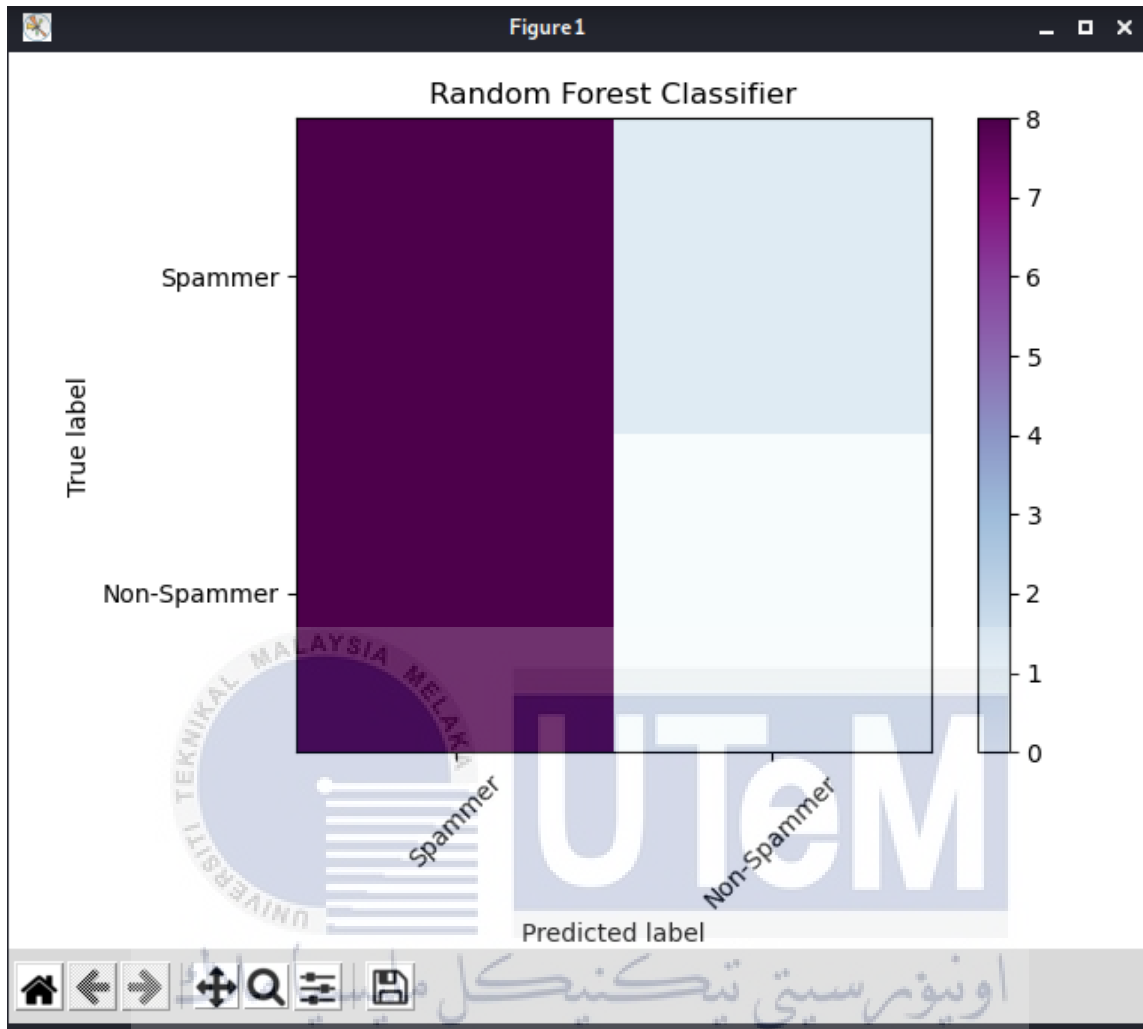
Figure 5.24: The graph figure report for Random Forest

5.2.6 Testing of 1000 tweets

The third testing sample is 1000 tweets. The purpose of testing 1000 sample tweets is to compare the results obtained and compare it to the results of 100, 200, 300 and 500 sample to see if there are any difference despite using same model but different sample. As all the previous sample results computed almost the same results, a bigger sample was used to test the difference.

5.2.6.1 Naïve Bayes

The accuracy of class precision, class recall of non-spam and spam tweets is shown in Figure 5.25. As we can see from Figure 5.25, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive

calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of Naïve Bayes for testing 1000 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is also ideal as it is not above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.26 for a more graphic analysis of this result



```
                    Classification Report

                 precision      recall    f1-score    support

           0        0.67         0.89        0.76          9
           1        0.80         0.50        0.62          8

    accuracy                                 0.71         17
   macro avg        0.73         0.69        0.69         17
weighted avg        0.73         0.71        0.69         17


                    Confusion Matrix

[[8 1]
 [4 4]]


              False Positives and Negatives

False Positive:  0.23529411764705882

False Negative:  0.05882352941764705
```
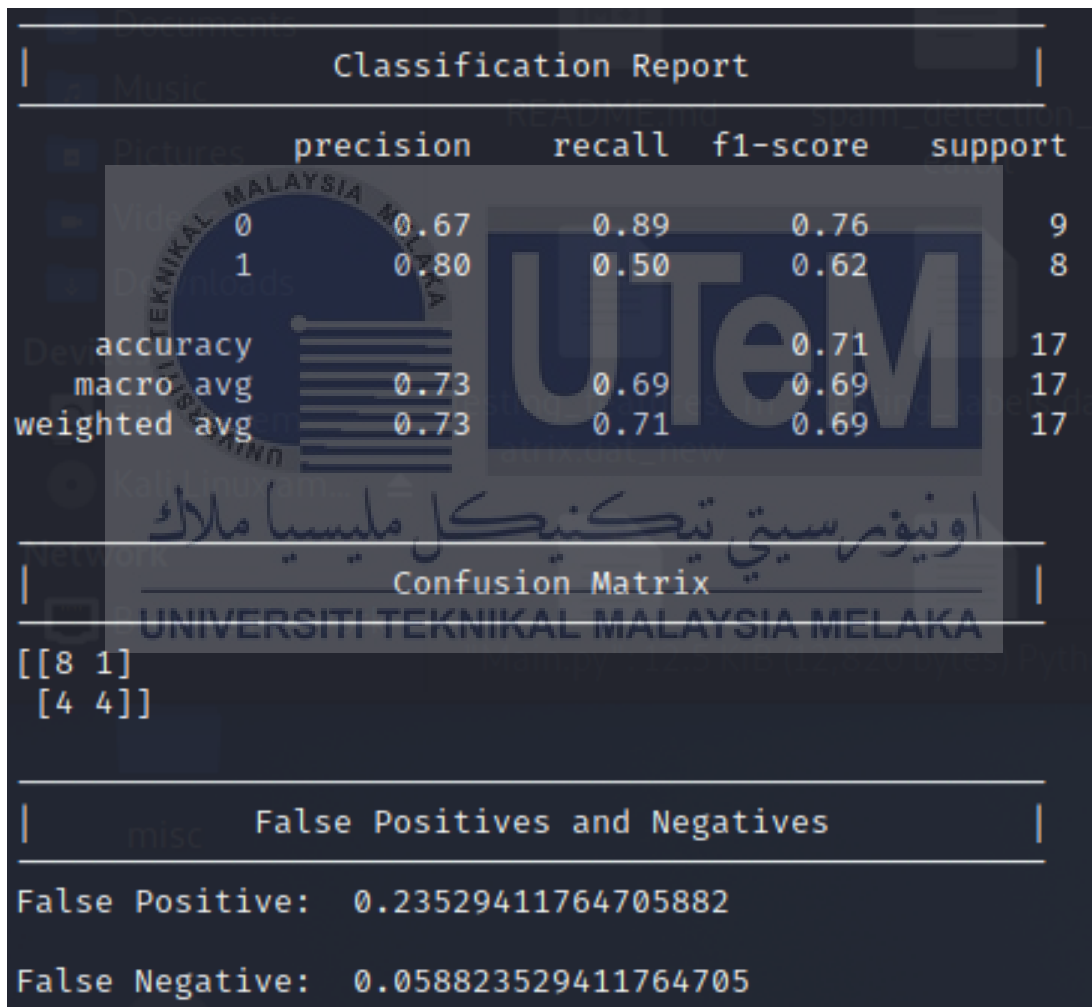
Figure 5.25: The accuracy report for Naïve Bayes

In Figure 5.26, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Naïve Bayes has successfully predicted most of the sample tweets correctly.
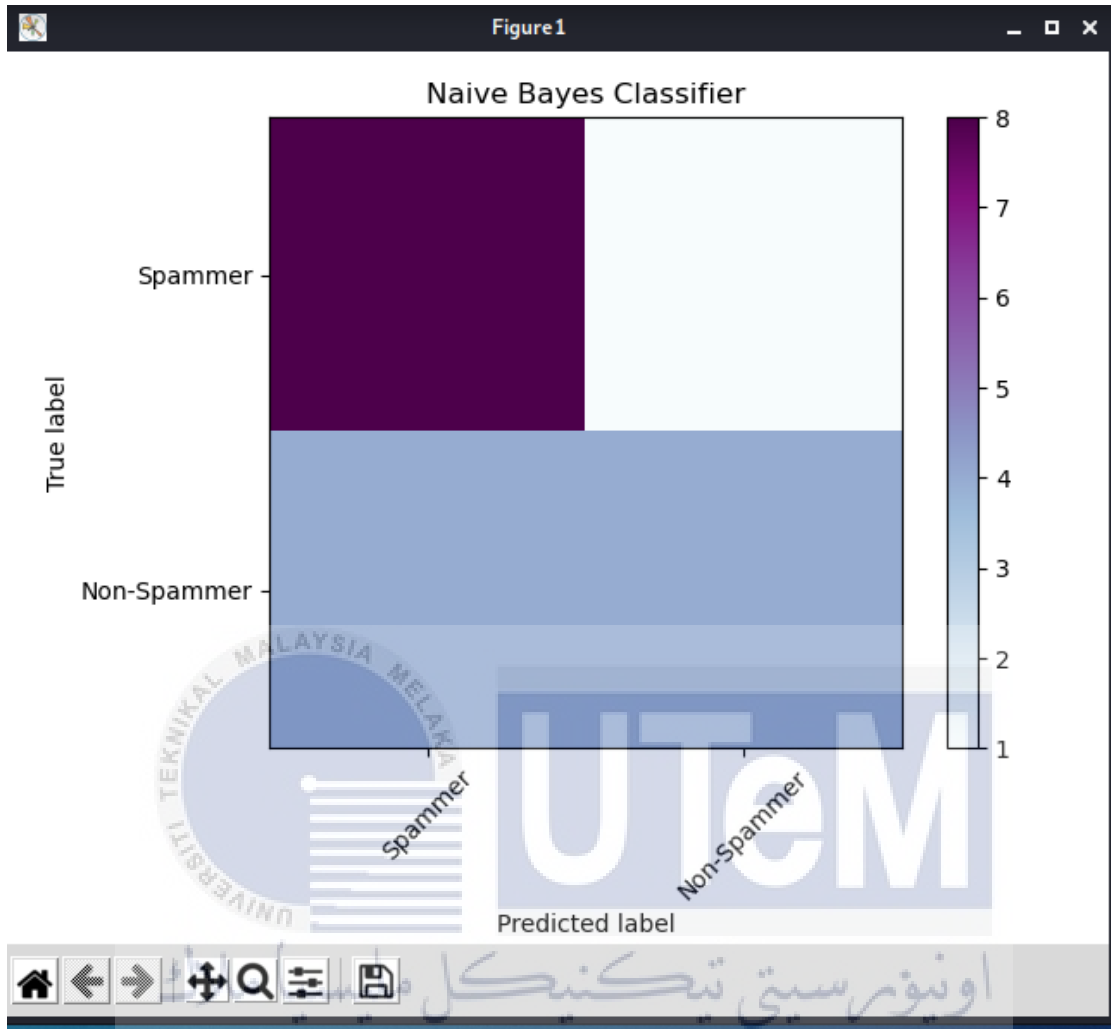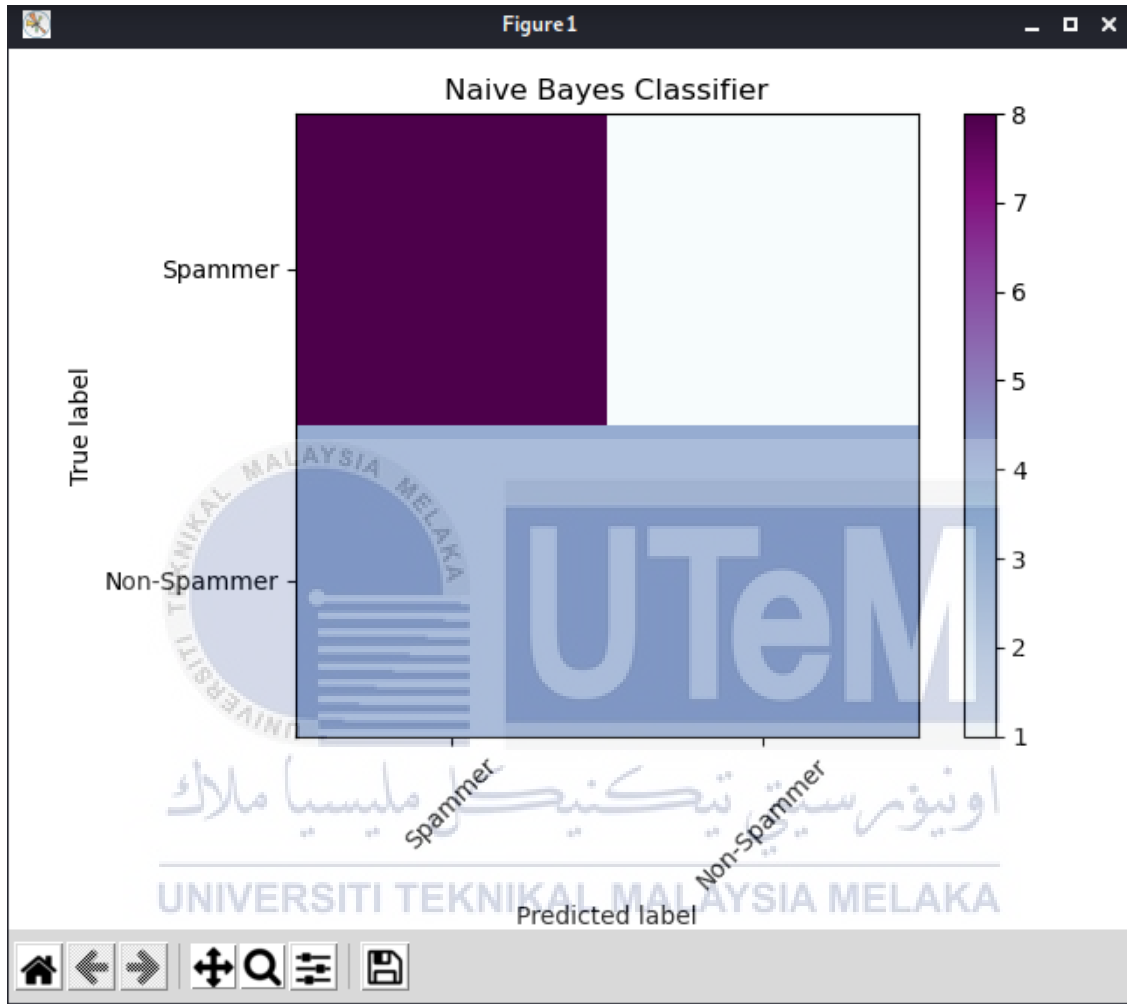

Figure 5.26: The graph figure report for Naïve Bayes

5.2.6.2 SVM

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.27. As we can see from Figure 5.27, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the

percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 1000 samples is 0.71 which is considered high accuracy. By looking at the False Positive, it is also higher than False Negative – and False Negative is borderline ideal as it is above 0.1%. The confusion matrix can be used to refer the graph in Figure 5.28 for a more graphic analysis of this result.
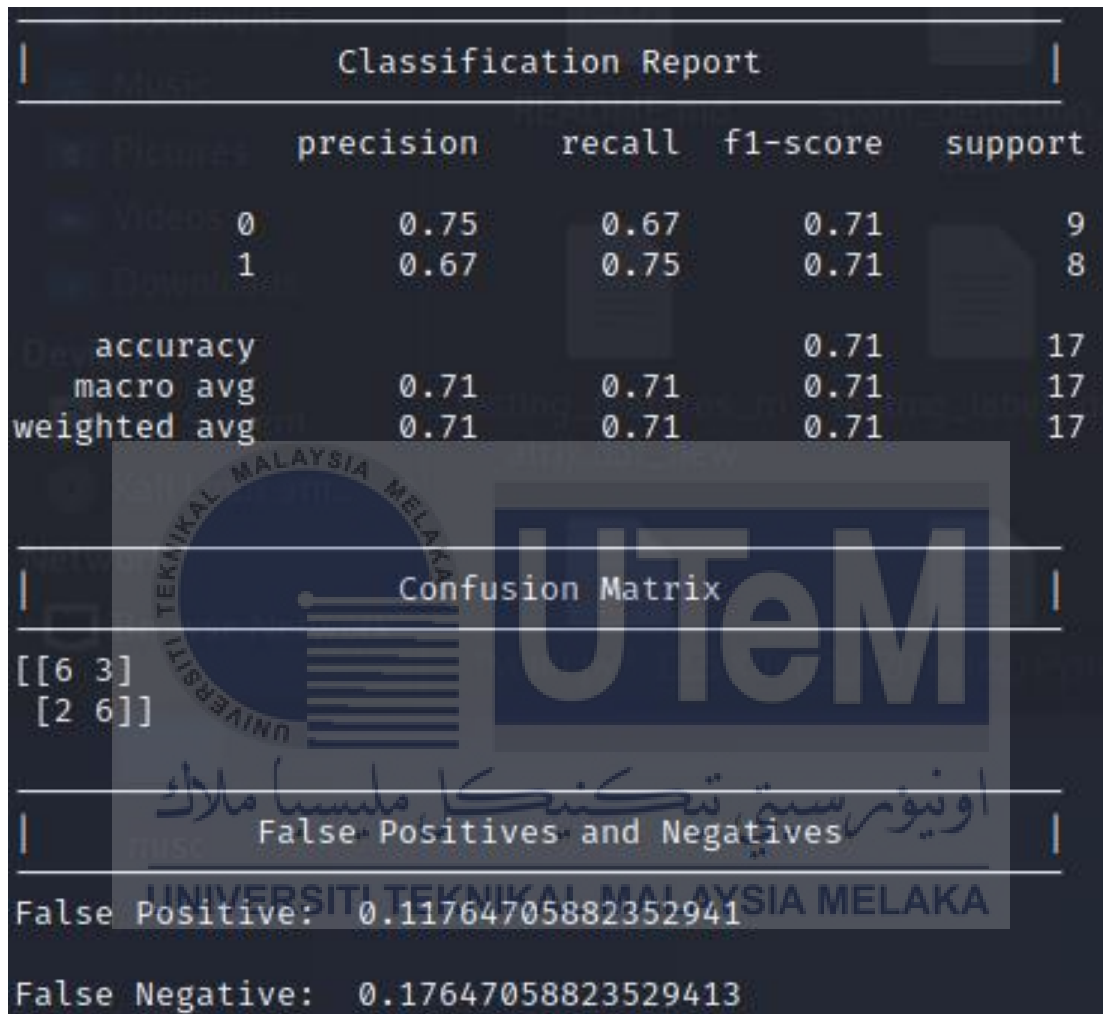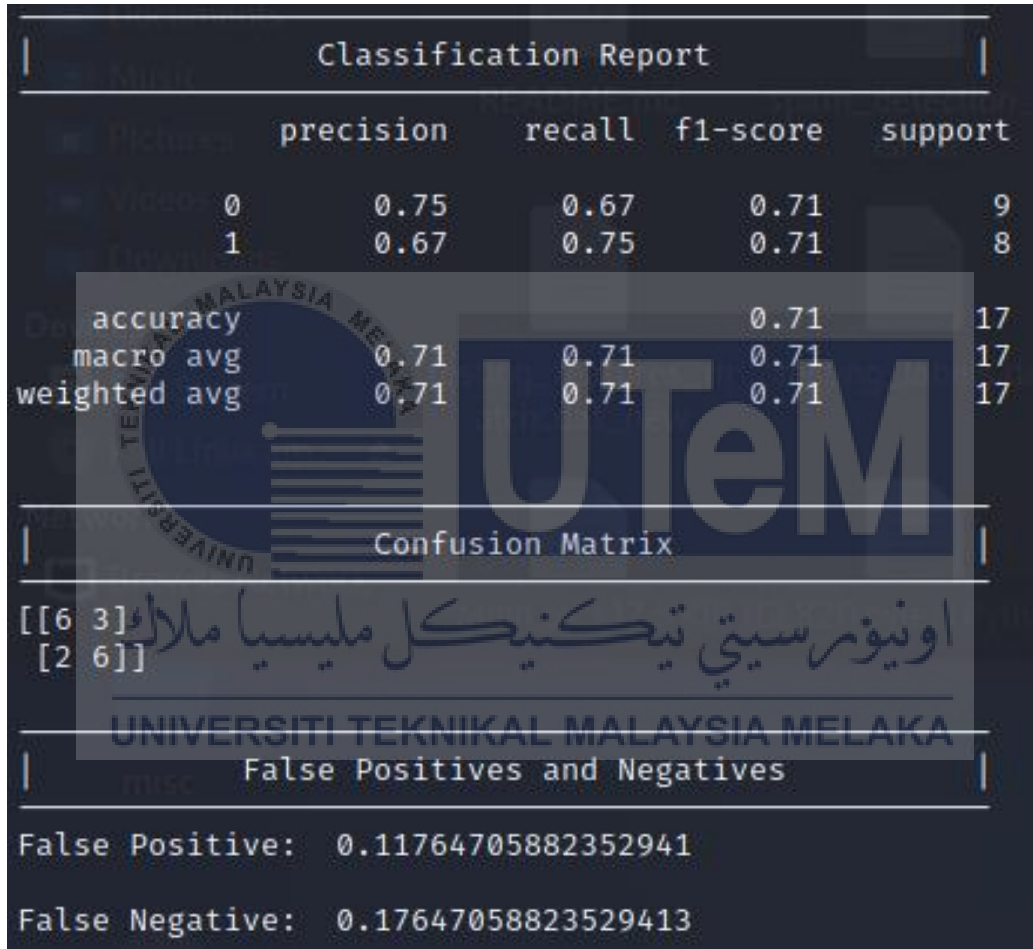

Figure 5.27 The accuracy report for SVM

In Figure 5.28, we can see that the True Positive and True Negative box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive and True Negative means that SVM has successfully predicted most of the sample tweets as spam and ham correctly.
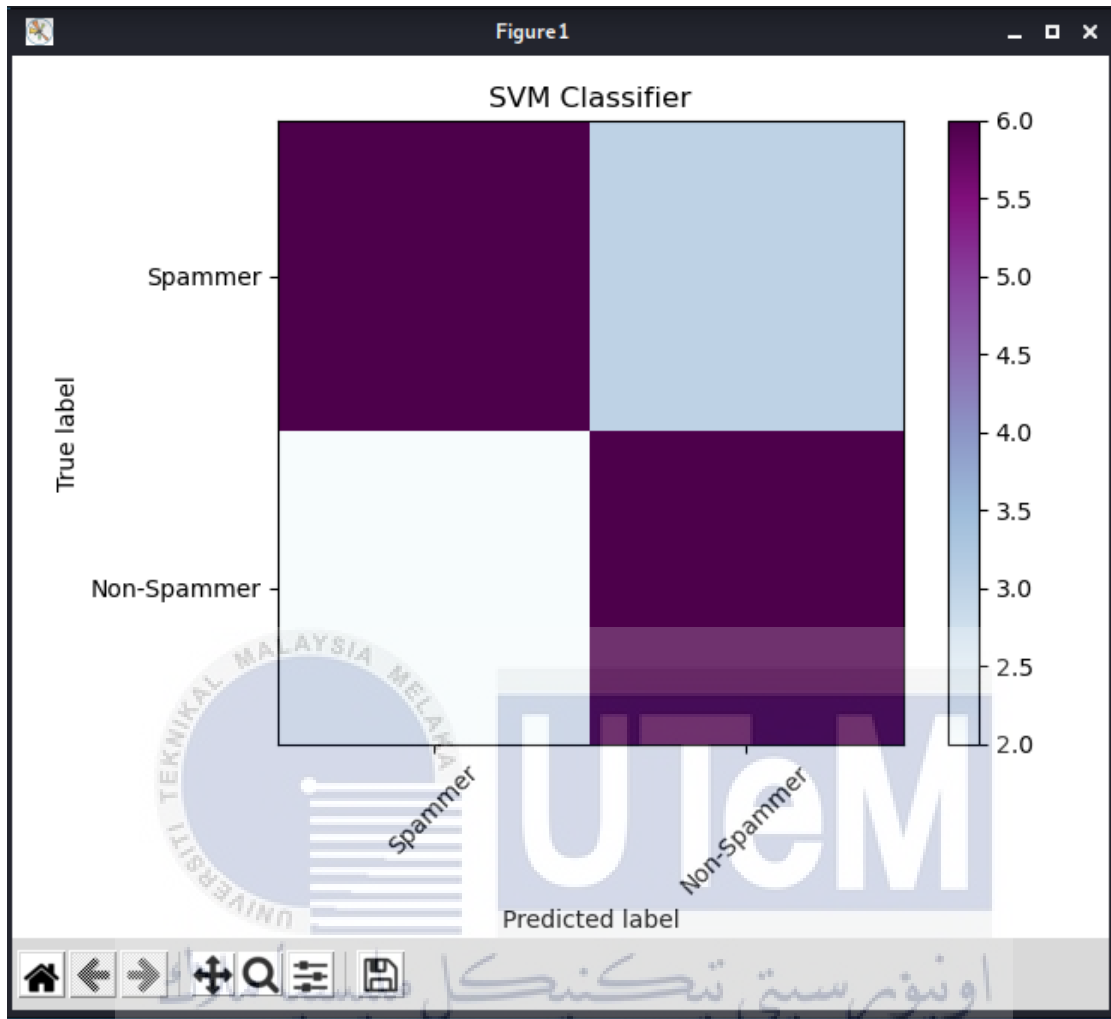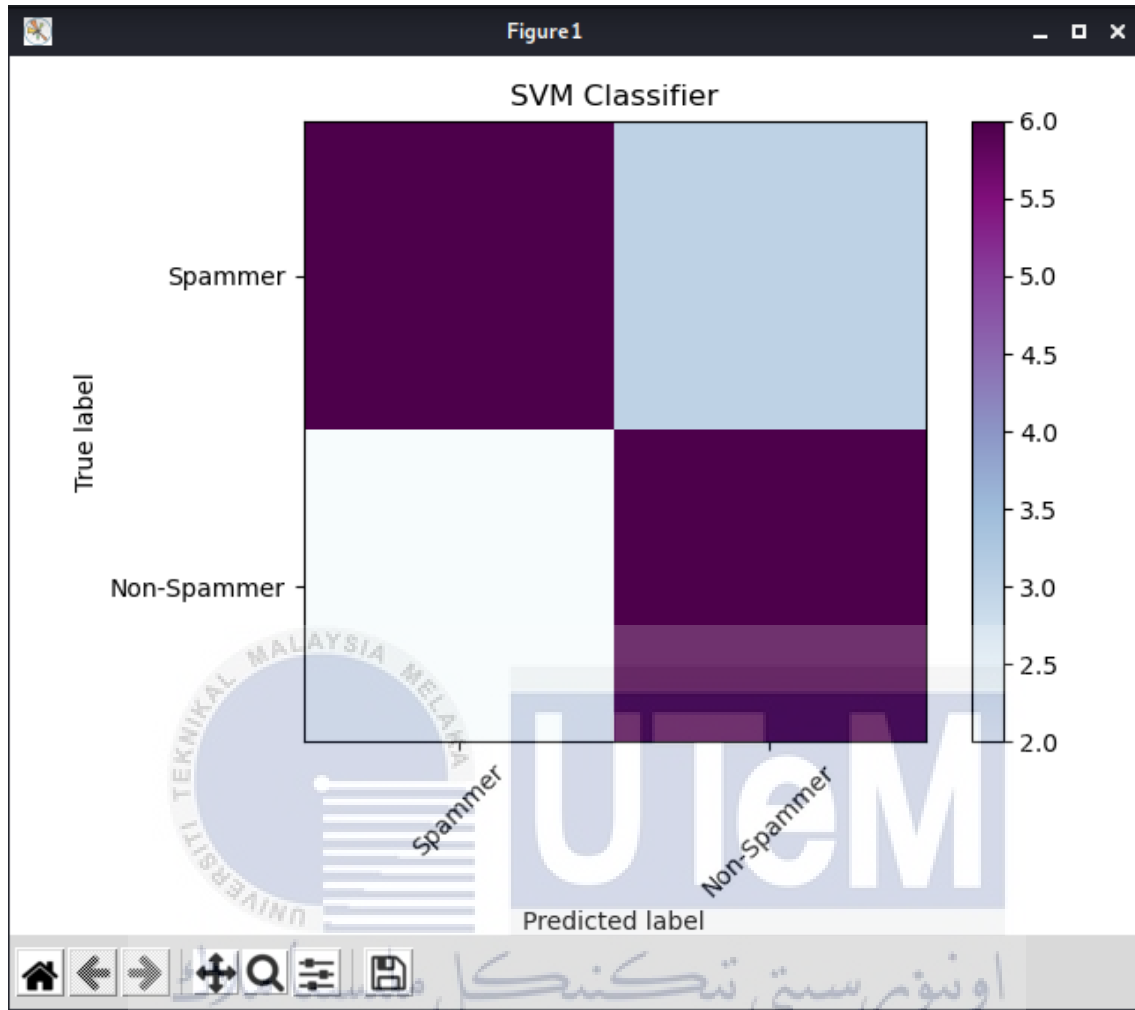
Figure 5.28: The graph figure report for SVM

5.2.6.3 Random Forest

The accuracy of the class precision, class recall of spam and non-spam tweets is shown in Figure 5.29. As we can see from Figure 5.29, 0 represents the Negative while 1 represents the Positive. In this study, we will focus on Positive of Precision and Recall. The precision for positive calculates the total of spam from the predicted spam tweets. The higher the total, the more accurate the result. Recall indicates the total of spam tweets predicted correctly, therefore the higher the percentage we get, the better our results. F1-score represents the average of both precision and recall; hence we would also need it to be as high as possible. As we can see, the accuracy of SVM for testing 1000 samples is 0.53 which is considered average accuracy. By looking at the False Positive, it is above the ideal value that we want, 0.4 is very high for False Positive as we want the value to be as low as possible – and False Negative is too perfect as it is 0.0% indication there are

no imperfections. The confusion matrix can be used to refer the graph in Figure 5.30 for a more graphic analysis of this result.
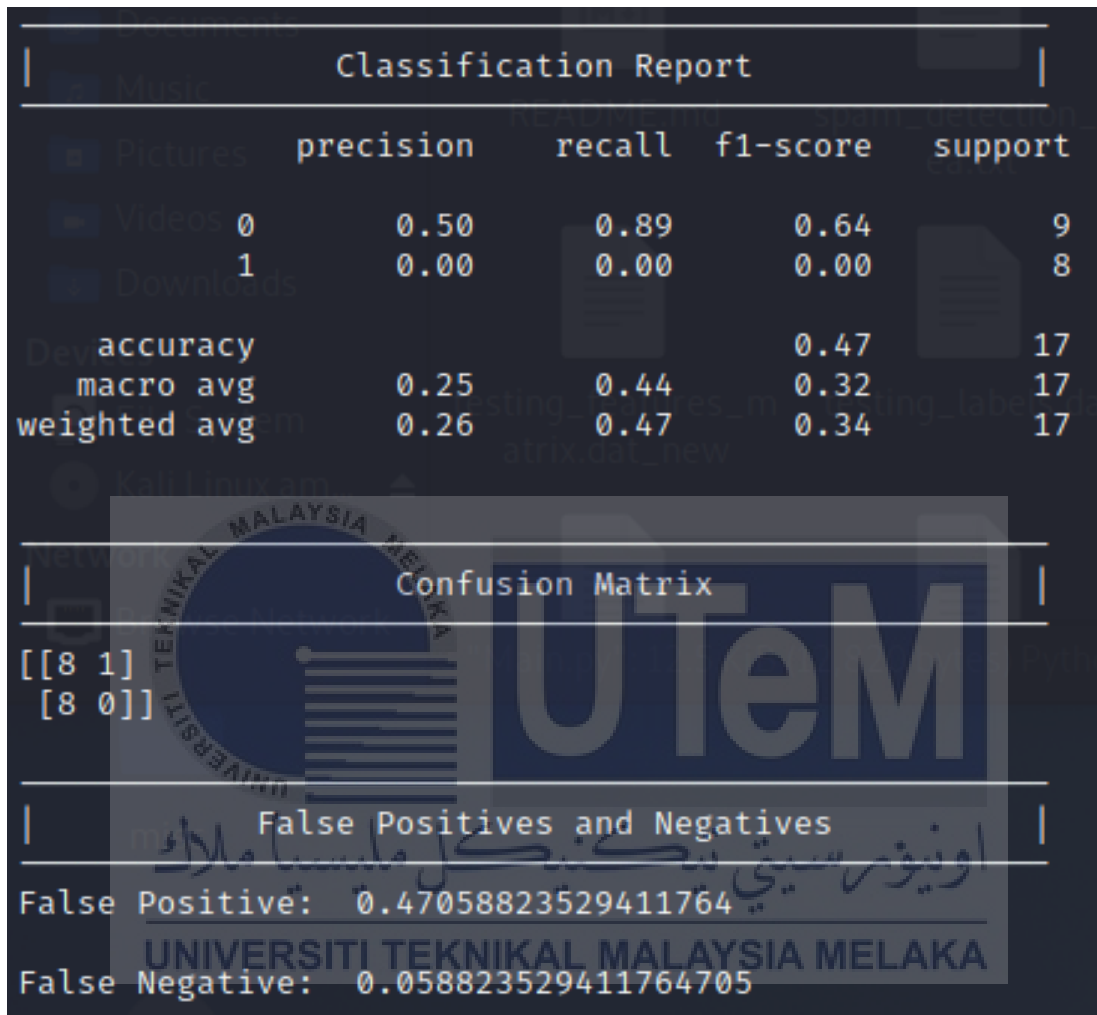


```
|                Classification Report              |
                precision    recall  f1-score   support

            0        0.53      0.89      0.67         9
            1        0.50      0.12      0.20         8

     accuracy                            0.53        17
    macro avg        0.52      0.51      0.43        17
 weighted avg        0.52      0.53      0.45        17


|                  Confusion Matrix                 |

[[8 1]
 [7 1]]


|            False Positives and Negatives          |

False Positive:  0.4117647058823529

False Negative:  0.05882352941176470
```
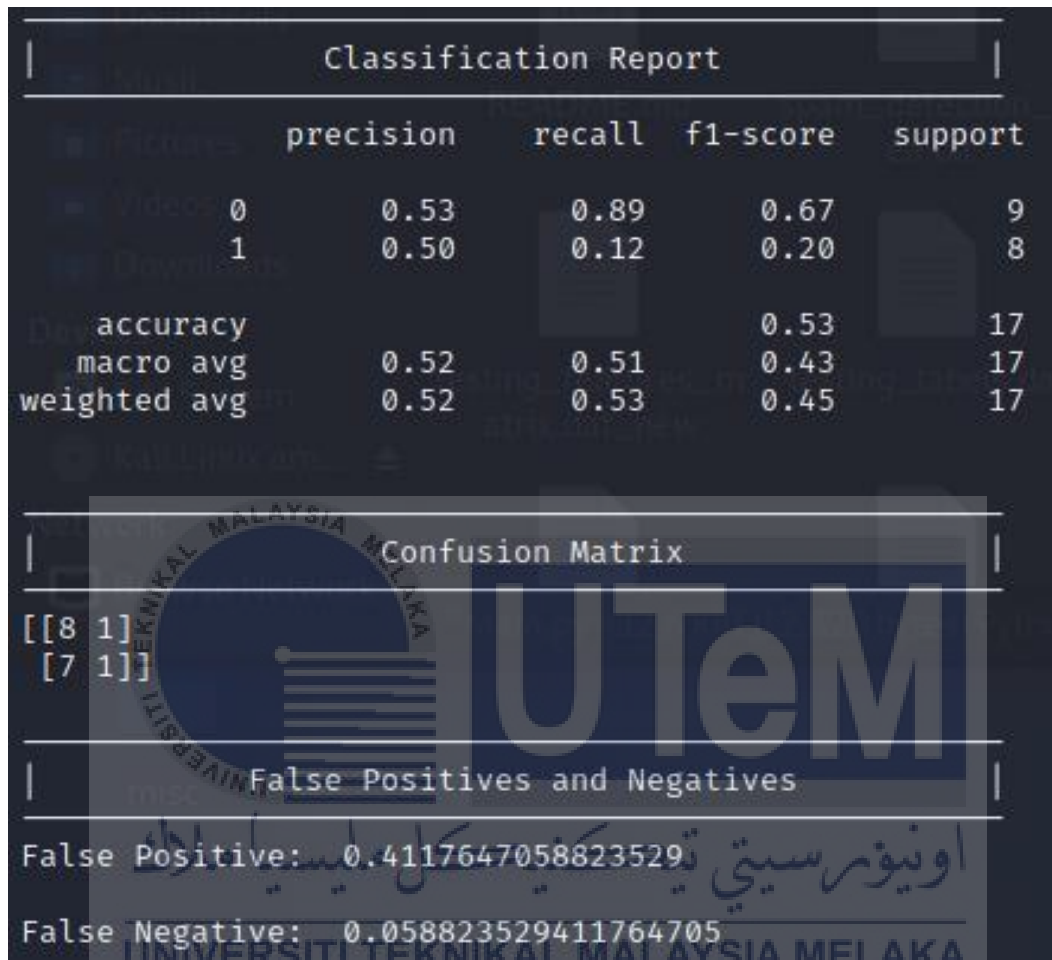
Figure 5.29: The accuracy report for Random Forest

In Figure 5.30, we can see that the True Positive box is purple color indicating it is 8 – as indicated in the Confusion Matrix. The high indicator for True Positive means that Random Forest has successfully predicted most of the sample tweets correctly. However, the False Positive box is almost white color – which means 0 in Confusion Matrix. It is unlikely for a low accuracy prediction model to have a perfect score in Confusion Matrix, therefore the result for Random Forest in testing 1000 samples show inaccuracies.
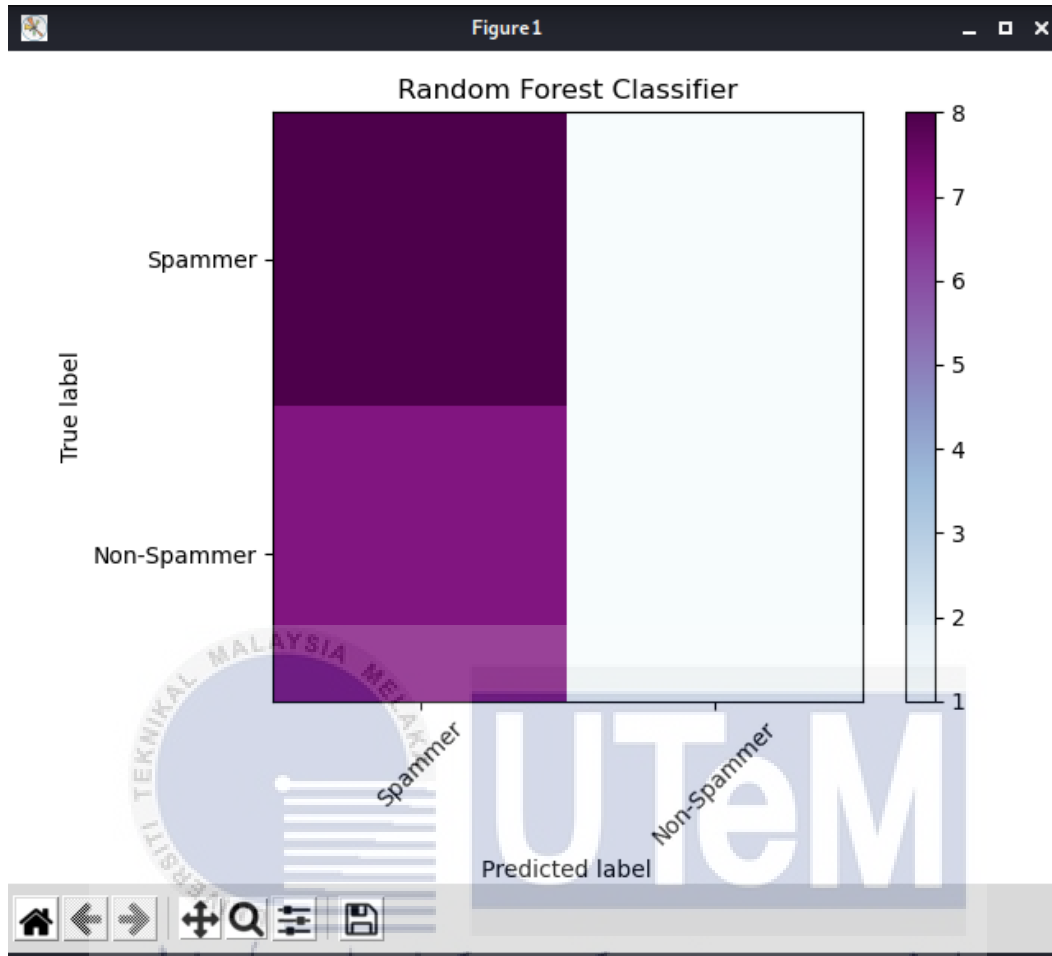
Figure 5.30: The graph figure report for Random Forest

5.2.7 Comparison of the three machine learning classifier models

Based on the Table 5.2, both Naïve Bayes and Support Vector Machine (SVM) are tied in overall accuracy while Random Forest has the lowest accuracy value. However, if we were to compare the precision, recall and F1-score for both Naïve Bayes and SVM, we can conclude that Naïve Bayes is slightly more accurate in predicting the spam tweets compared to SVM. The precision, recall and F1-score is used to calculate the average accuracy of classifier methods used, in this case we can see that SVM is slightly lower than Naïve Bayes by only 0.05% which makes it a worthy opponent of Naïve Bayes. While taking every value into consideration, SVM is close to being the most accurate classifier if not for the high false negative value. False negative is the value that determines the number of tweets incorrectly detected, which SVM's value is higher than Naïve Bayes therefore making Naïve Bayes has the highest accuracy in predicting spam tweets. Furthermore, Random Forest had the lowest accuracy value despite getting a perfect value for

precision at 0.0%. The reason why Random Forest had the lowest accuracy value is likely due to its dependency on only randomization with always predicting average values seen before and not expanding the testing values outside of training range. Thus, Random Forest cannot extrapolate the values and unable to discover new trends that would allow it in predicting new values outside of the training set.

Table 5.2: Summary of parameter comparison between three classifiers

Sample	Comparison Parameters	Naïve Bayes	Support Vector Machine (SVM)	Random Forest
100	Precision	0.80	0.67	1.00
	Recall	0.89	0.67	1.00
	F1-Score	0.76	0.71	0.72
	False Positive	0.235	0.118	0.412
	False Negative	0.059	0.176	0.0
	Overall accuracy	**0.71 (Best)**	**0.71 (Good)**	**0.59 (Worst)**
200	Precision	0.80	0.67	0.00
	Recall	0.89	0.67	0.89
	F1-Score	0.76	0.71	0.64
	False Positive	0.235	0.118	0.471
	False Negative	0.059	0.176	0.059
	Overall accuracy	**0.71 (Best)**	**0.71 (Good)**	**0.47 (Worst)**
300	Precision	0.80	0.67	0.00
	Recall	0.89	0.67	0.89
	F1-Score	0.76	0.71	0.64
	False Positive	0.235	0.118	0.471
	False Negative	0.059	0.176	0.059
	Overall accuracy	**0.71 (Best)**	**0.71 (Good)**	**0.47 (Worst)**
500	Precision	0.80	0.67	0.00
	Recall	0.89	0.67	0.89
	F1-Score	0.76	0.71	0.64

	False Positive	0.235	0.118	0.471
	False Negative	0.059	0.176	0.059
	Overall accuracy	0.71 (Best)	0.71 (Good)	0.47 (Worst)
1000	Precision	0.80	0.67	0.50
	Recall	0.89	0.67	0.89
	F1-Score	0.76	0.71	0.67
	False Positive	0.235	0.118	0.412
	False Negative	0.059	0.176	0.059
	Overall accuracy	**0.71 (Best)**	**0.71 (Good)**	**0.53 (Worst)**

As we can see, both Naïve Bayes and SVM classifier models' results are not affected by the change of sample size. The results and accuracy remain consistent throughout every sample size testing. This is because Naïve Bayes uses class independence assumption where it can learn fast in using high dimensional features with limited training data whereas Random Forest's result is affected with each different sample. The reason Random Forest's accuracy result is inconsistent is due to the dependence of its algorithm on random assumptions. Lastly, SVM did fairly well and was also consistent with its' accuracy result for each sample, however, SVM works better when all samples have the same length in feature vector. Thus, SVM's ability to predict samples is slightly lower than Naïve Bayes. As defined in scope, the reason why Naïve Bayes has better accuracy compared to Support Vector Machine is due to the precision parameter. Naïve Bayes has a higher value for precision at 0.80 percent while Support Vector Machine is only at 0.67 percent.

5.3 Testing and analysis results in graph formats

Testing that have been done will be compiled and generated into a graph figure for further analysis.

5.3.1 Testing of 100, 200, 300, 500 and 1000 tweets

All the samples' results that were tested will be compiled and generated into a graph figure for final analysis. This way, we can clearly see the trend of prediction accuracy for each classifier model.
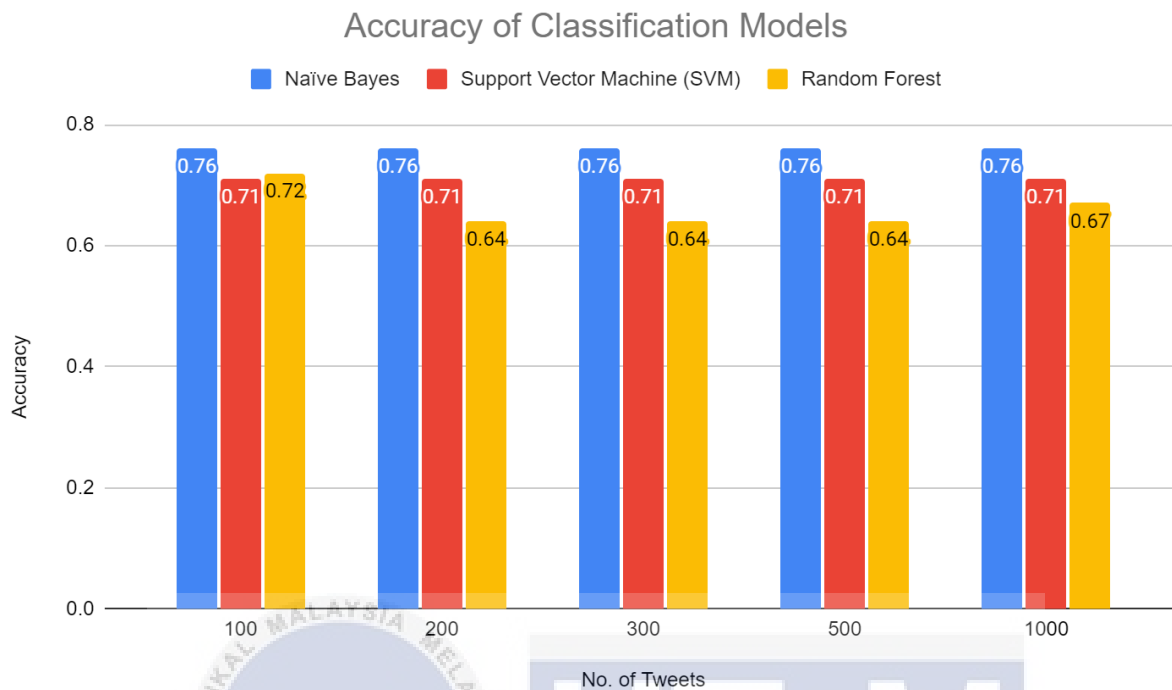
Figure 5.31: Accuracy comparison of three machine learning classifier models

According to Figure 5.33, Naïve Bayes has the highest accuracy result among all classifier models in every category of data testing – 100, 200, 300, 500, and 1000 tweets at 76 percent, respectively. Aside from that, Support Vector Machine (SVM) is the second highest with a consistent 71 percent in all categories. Random Forest, on the other hand, has the lowest accuracy result with inconsistencies in every category, with 72 percent for 100 testing tweets, 64 percent for 200, 300, and 500 tweets, and 67 percent for 1000 tweets. The inconsistency of results ranging from high to low and high again demonstrates that Random Forest is simply randomizing the detection mechanism rather than testing the data based on the training samples.

5.3.4 Summary of Testing Results

In a nutshell, the Naïve Bayes model outperforms both Support Vector Machine (SVM) and Random Forest classifier models. That could be due to Random Forest's large model size, which is frequently not built consistently, resulting in overfitting, and forcing Random Forest to

rebuild the forest for every change. The use of tokens – typically in forms, words, or phrases – with spam and non-spam tweets is how Naïve Bayes classifiers work. Based on Twitter's Help Centre (Hinesley, 2019), URLs are likely to appear in tweets as spam activities. Because the filter does not know these probabilities, it must first be trained to build them up. Following training, the word probabilities will compute the likelihood that a tweet with a URL falls into either category. The posterior probability is the name given to this contribution, and it is calculated using Bayes' theorem. When incorrect software judgements, such as false positives or false negatives, are identified, the initial training can usually be refined. Using the Bayes theorem to calculate the likelihood that the tweets are or are not spam. Because of the variety of collected data or tweets, the performance of the Support Vector Machine (SVM) model may be lower than that of the Naïve Bayes model. Because the maximum tweet length is only 280 words, users have insufficient space to write syntactically and properly. Meanwhile, some users use URL shortening and intentionally disguise the link as a word.

5.4 Conclusion

The testing datasets are tested using different classification algorithms in this chapter, including Naïve Bayes, Support Vector Machine (SVM), and Random Forest. Simultaneously, the test and analysis results are shown in this chapter via figures, graphs, and tables to further demonstrate the comparison and difference obtained for each classifier used. As a conclusion to this research, the following chapter will explain summary, contribution, limitation and future improvements of project.

CHAPTER 6: RESEARCH CONCLUSION

6.1 Introduction

The dataset for testing has been tested, and the results of class precision, class recall, and accuracy of spam and non-spam tweets in three different classification models are shown in the previous chapter. As a result, this chapter serves as the final stage in summarizing, completing, and presenting the research's conclusion. In addition, the summary and contribution of this project are reviewed in this chapter, which highlights several limitations as well as future work to improve the operation or system.

6.2 Research Summarization

The purpose of this research is to examine machine learning models based on the Naïve Bayes, Support Vector Machine, and Random Forest classifier models. Furthermore, the objective of this study is to evaluate the accuracy and precision of machine learning classifiers in detecting spam and ham. The research objectives are met, and the project is completed smoothly. Based on this research, the detection of spam in the Twitter platform using a machine learning approach is carried out using the Kali Linux Virtual Machine. This study makes use of five sets of tweets, with a total of 1000 datasets retrieved from Twitter via Vicinitas.io. The datasets are then divided into two distinct datasets which are called training and testing. These two datasets are split into an 8:2 ratio. The training datasets are then labelled manually and used to train the classifier models, before allowing the testing datasets to classify and predict the results. Following that, the test and accuracy results for each classifier model are recorded, analyzed, and displayed in the form of figures and graphs. All of the objectives in this study are achieved and can be referred to in Chapter 5.

6.2.1 Strengths

This research has a number of secure and efficient strengths. The data retrieval process is safe and secure because only a few procedures must be followed before data can be collected and extracted from Twitter as a legitimate Twitter user. Furthermore, the large datasets used to train and test in this study are completed smoothly because the platform used, Kali Linux Virtual Machine, can process Python code.

6.2.2 Weaknesses

The research's weakness is the content's structure. Tweets containing harmful URL redirecting to malicious websites are used to identify spam on Twitter. However, embedded links in a tweet could be a picture, such as an image or gif, which does not make the tweet spam. Because there is an extension of various medias that a user can add in a tweet, removing keywords from only the URL becomes complicated. The size of the data set used is also a weakness, as this study only used 1000 datasets. The Bayes Theory in the Naïve Bayes classifier model requires a large data set to produce reliable and accurate predictions of the probability of each class.

6.3 Research Contribution

This study can help the social media network – Twitter – or any other similar platform detect spam activities. Furthermore, this research will benefit users by assisting them in detecting and becoming more aware of spam tweets in real-time by forming a more protective and secured social network experience. Furthermore, manually categorizing the tweets extracted from the Twitter platform into Ham and Spam categories will produce more accurate data as the output. Another contribution to this project is the manual classification that was performed after the data was extracted from the Twitter platform. The datasets used to train and test the system are manually labelled as spam or ham by labelling each tweet.

6.4   Research Limitations

This research is limited in its ability to detect spam accounts and is time consuming. This study is primarily concerned with detecting tweets containing URLs – particularly malicious links – but there are other keywords, such as 'free followers' and 'free retweets,' that are infested with spam accounts. As a result, the accuracy of the results may be compromised. At the same time, this study spends a significant amount of time manually categorizing and labelling the datasets into two distinct categories.

6.5   Future Works

The goal of this spam detection research on Twitter platform is to identify and reduce the potential of spam tweets to overcome standard patrolling works on Twitter. Although the objectives for this study is met and could also be considered successful, there are further improvements that be done in future studies from other researchers. As this study only comprises three machine learning classifier models and test up until 1000 sample tweets, other research can refer to this study by using different classifier models and even larger samples to test and compare the results. Additionally, future studies can also include the results of users that are predicted to be spammers in a comparison analysis so that the study can have a more concrete result for detailed analysis study.

6.6   Conclusions

This study introduced the implementation of machine learning approaches in spam detection from a social network platform using various classifiers. As a result, the system can detect spam using three classifier models. The highest accuracy result is obtained by Naïve Bayes, followed by Support Vector Machine (SVM), and finally by Random Forest. Aside from that, a significant dataset of spam tweets was extracted and advised subsequently a methodology was evaluated for fair data classification comparison. After the code is programmed, the test will be run repeatedly to determine the most accurate and reliable results. The analysis will then be presented, complete with graphs and figures. The research can be used as a reference for future projects.

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LIST OF APPENDICES

Appendix A: 1000 sample tweets used to test the classifier models.

Tweets	SPAM/ HAM	Naïve Bayes	Support Vector Machine (SVM)	Random Forest
Landing Page Makeover Clinic #20: TantricSexforBusyCouples.com http://ow.ly/DHNU #sitereview #usability #conversion	Spam	Spam	Ham	Spam
Airports are the best places to people watch.....so many characters here	Ham	Spam	Ham	Spam
20 Ways To Make Your Website Crap: http://ow.ly/DCZ5 #webdesign	Spam	Spam	Spam	Spam
I have also had a lot of time to observe people and noticed that people in suits used blackberries 80% of the time.....go blackberry!	Ham	Ham	Ham	Spam
What's the one thing you should be doing right now but aren't? #gtd #productivity	Spam	Spam	Ham	Spam
Twitter Analytics - A burst of imagination that has changed how we view stats: http://ow.ly/FwVq #twitter #analytics #occamsrazor	Spam	Spam	Spam	Spam
10 Definitive Tips for Writing Captivating Emails: http://ow.ly/DD06 #email #emailmarketing #marketing	Spam	Spam	Spam	Spam
@CaptOptamicus: I just RSVPed to a #VotingRightsMarch event! On August 28th, I'll be joining democracy advocates across the country to protect voting rights. Join me at the March On for Voting Rights. https://t.co/8aWTWPYhn1	Ham	Spam	Spam	Spam
15 brilliant infographics that should inspire your designs: http://ow.ly/DI0r #infographic #design	Spam	Spam	Spam	Spam
I have had this one guy on all 3 of my flights and he has no bags no coat and he hasn't said a word	Ham	Ham	Ham	Spam
"RT @AGoblinLife : Woah a https://t.co/2ZYAMPRwB9 build~ > Added text! Made my own voxel font. > New URL! https://t.co/pIrk7Mt7D3! #opensource | #solodev | #vr | #voxel https://t.co/paSXazcMum"	Spam	Spam	Spam	Spam
Swimmer Abbas Karimi is currently the only Afghan athlete competing at the Paralympics. I spoke to him about his journey from Kabul to refugee camps in Turkey to the U.S., and now, Tokyo. https://t.co/Xs04gWO3ri	Ham	Ham	Ham	Spam
On the plane headed to Chicago....its been a fun couple day adventure. Excited to see what the future holds after all this	Ham	Spam	Spam	Spam
When you get on th scales & they go back round to zero, does that mean you get to start with a clean slate? #exercise	Ham	Spam	Spam	Spam

Text				
A Subscriber received 25 #Mortgage Results for £100,000 over 25 years: https://t.co/1gUbb5dyz1 https://t.co/WhOzARbyah	Spam	**Spam**	Ham	**Spam**
@RochelleVeturis And I am still doing the SEO for @GuyKawasaki 's Alltop website.	Ham	Spam	Spam	**Ham**
@RochelleVeturis The M&Y program has graduates such as Jack Canfield, Tony Robbins, Robert Kiyosaki, and many others	Han	Spam	Spam	Spam
@RochelleVeturis Actually, JavaFit is very new (ask me!), but check out http://www.excellerated.com It is the Money & You program'	Spam	**Spam**	**Spam**	**Spam**
@CraigTeich I like this book and its title: The 168 Hour Week: Living Life Your Way 24/7	Ham	Spam	**Ham**	**Ham**
@RochelleVeturis Social Media, JavaFit, and organic SEO, what else? LOL	Ham	Spam	**Ham**	**Ham**
RT @KingofHappyHour: Saturday Happy Hour info for Carlsbad: http://bit.ly/jZTaX	Ham	Spam	**Ham**	**Ham**
RT @jantallent: click daily & help 6 worthy causes 4 FREE, sponsors make donations, we just click! http://www.thehungersite.com PLZ RT	Spam	**Spam**	Ham	Ham
RT @ducttape: Good stuff I found this week - Word Spy, Wordpress help, Twitter Times http://su.pr/1oqh0E nice Flint Hills photo too	Spam	**Spam**	Spam	Ham
RT @findingDulcinea: Fun and Wacky Online Museums: Food, Technology, and Play http://bit.ly/3sFE0W	Spam	**Spam**	Spam	Ham
Just nominated @BrentSpiner for Best Actor/Actress to Follow http://mashable.com/owa #openwebawards	Spam	**Spam**	Spam	Ham
RT @mashable: #openwebawards nominations END in less than 48hrs. Last chance to nominate this weekend: http://mashable.com/owa	Ham	Spam	Spam	**Ham**
Just nominated @ChrisBrogan for Best Blogger to Follow http://mashable.com/owa #openwebawards	Ham	Spam	Spam	Spam
Just nominated HootSuite for Best Twitter App http://mashable.com/owa #openwebawards	Ham	Spam	Spam	Spam
Whoops! All Amazon book links I sent out today are my affiliate links (Disclosure)	Ham	Spam	Spam	Spam
RT @SonnyAhuja: The hardest part about business is minding your own. #funsat	Ham	Spam	Spam	**Ham**
RT @iamkhayyam: RT @KrisColvin: LOVE THIS! RT @TweetRightBrain 250+ words (or phrases) that rock my right brain http://bit.ly/1J24uT	Spam	**Spam**	**Spam**	Ham
RT @SugarJones: RT @SanDiego_News: Judge: Seals can stay at Children's Pool - San Diego Union Tribune: http://bit.ly/1lJ9Gk (Good!)	Spam	**Spam**	**Spam**	Ham
RT @ResearchBuzz: Introducing the API Explorer Mutant (Yahoo! Developer Network Blog) -- http://bit.ly/3oR7Tl #yahoo #api	Ham	Spam	Spam	**Ham**
@ResearchBuzz Tara what happened to your avatar?	Ham	Spam	Spam	**Ham**

Text				
Putting the Public Back in Public Relations (A Must Read for PR people) http://ow.ly/CeEG	Spam	Spam	Spam	Ham
@SugarJones My daughter took her Wii to college, so I am also Wii-less (that sounds so wrong!)	Ham	Spam	Spam	Ham
RT @DebNg: @blogworld blog: The Power of Twitter: How the Blogosphere Came Through for @lizstrauss : http://bit.ly/qcQMl #getwellliz	Spam	Spam	Spam	Ham
@rockstarjen How come we don't have a Cat Beach? ;)	Ham	Spam	Spam	Ham
RT @KenMcArthur: Top 100 Business Authors to follow on Twitter http://budurl.com/Top100Authors	Spam	Spam	Spam	Ham
RT @KenMcArthur handing out 200 pages of a monstrous 648-page workbook on creating info products for FREE! http://budurl.com/Claim200	Spam	Ham	Spam	Ham
Want more information on LinkedIn? http://linkedin.alltop.com/	Spam	Ham	Spam	Ham
@KenMcArthur check out http://www.oneforty.com for Twitter apps and reviews	Spam	Ham	Spam	Ham
Yarnia! http://ow.ly/Ce3m	Spam	Ham	Spam	Ham
RT @KenMcArthur: On-Demand Videos Available all 3 days of jvAlert Live San Diego. http://budurl.com/JVALOnDemand (this was a great event!)	Spam	Ham	Spam	Ham
RT @BrooksCole: New FTC internet marketing rules? Read: "Federal Regulations and Full Disclosure about Advertising" http://j.mp/3qcT1K	Spam	Ham	Spam	Ham
@KenMcArthur who do I contact for the #ImpactHookup event in San Diego?	Ham	Ham	Spam	Ham
RT @KenMcArthur: Need JV Partners? World Wide local Impact Hookup Events on December 3rd? http://budurl.com/Hookup #IMPACTHOOKUP Please RT	Spam	Ham	Spam	Ham
Time Warner Cable running a contest for free trip 4 2 to 2010 Sundance Film Fest. Must be a TWC subscriber (sponsored) http://bit.ly/2s8Y1m	Spam	Ham	Spam	Ham
Warning! http://ow.ly/Cd3l	Spam	Ham	Spam	Ham
@iamkhayyam Happy Birthday!!	Ham	Ham	Spam	Ham
RT @iamkhayyam: The Get Well @LizStrauss Fund | http://j.mp/2bTqub //She's back, so chip in if you can! Would mean a lot!	Spam	Ham	Spam	Ham
RT @iamkhayyam: 20 Websites From Before the Internet was Invented | http://bit.ly/JlVeA	Spam	Ham	Spam	Ham
RT @Twitter_Tips: Malware spam going out right now: "I found you on here" DON'T click the links!!	Spam	Ham	Spam	Ham
@iamkhayyam how is it stealing? The Alltop team finds blog content from their blog directory and posts it	Ham	Ham	Spam	Ham
RT @SDHE: Become a Facebook Fan of San Diego Harbor Excursion! http://bit.ly/i9pkU	Spam	Ham	Spam	Ham

Tweet				
RT @iamkhayyam: Stoners Need Apply: Hiring a Full-Time Grateful Dead Archivist | @wsj http://bit.ly/rqDlb	Spam	Ham	Spam	Ham
RT @nicheprof: Sonia Simone of @copyblogger reveals The 7 Harsh Realities of Social Media Marketing http://budurl.com/pjwm	Spam	Ham	Spam	Ham
RT @noellechun: Pee for a better garden http://post.ly/CZm1 (ROFL!!)	Spam	Ham	Spam	Ham
RT @IreneKoehler: RT @AlmostSavvy A must-read for anyone using Facebook to plan events! http://bit.ly/1Q8Xh5	Spam	Ham	Spam	Ham
Bing Integrates Wolfram Alpha in Search Results http://ow.ly/C4uh	Spam	Ham	Spam	Ham
RT @GuyKawasaki: Any coin collectors? http://om.ly/bwuj	Spam	Ham	Spam	Ham
Wow! Thanks everyone for the #FF tweets! I have been offline due to burnout.	Ham	Ham	Spam	Ham
@BryanElliott that appears to be the wrong LinkedIn profile for you (unless you are working in Atlanta)	Ham	Ham	Spam	Ham
RT @GuyKawasaki: Eight Ways Marketers Can Benefit From Using Alltop : MarketingProfs http://om.ly/bsbu	Spam	Ham	Spam	Ham
Liz is an awesome person and needs help - The Get Well Liz Strauss Fund : http://ow.ly/BF7s	Spam	Ham	Spam	Ham
@DaveTaylor http://www.myspace-safety.org/ http://www.wiredsafety.org/internet101/blogs.html	Spam	Ham	Spam	Ham
RT @wbaustin: Missing Macaque on the Lam in Florida http://bit.ly/1qsoQp	Spam	Ham	Ham	Ham
It is not about the number of tweets nor the number of followers, but about your engagement on Twitter!!	Ham	Ham	Ham	Ham
@SharonHayes Valuate is powered by Estibot	Ham	Ham	Ham	Ham
Question from a client, if tweets are longer than 15 hours apart (on a weekend), does it really make a difference?	Ham	Ham	Ham	Ham
RT @planetrussell: Bird Drops Baguette, Shuts Down Large Hadron Collider: http://tr.im/ElKt - Bird ok, but bread is toast(ed).	Spam	Ham	Ham	Ham
Marketing: How Would You Remake Mickey Mouse? http://ow.ly/A3gW	Spam	Ham	Ham	Ham
RT @nicholaspatten: Tutorial: CSS/Wordpress: Wordpress CSS Cheat Sheet. http://bit.ly/KkiUN	Spam	Ham	Ham	Ham
First Ft. Hood, now Orlando? What is scary is that this type of amuck attack was predicted in John Brunner's sc-fi book, Stand on Zanzibar	Ham	Ham	Ham	Ham
RT @GuyKawasaki: How to write better email http://om.ly/bSBU	Spam	Ham	Ham	Ham
I'm being taken to Temecula for wine tasting this afternoon!!	Ham	Ham	Ham	Ham
An incredible, vibrant woman to follow is @DCCordova #ff	Ham	Ham	Ham	Ham

@TTaxChristine girl you need some new fantasies! ;)	Ham	Ham	Ham	Ham
@JeanetteJoy I have been busy with various projects. How are you?	Ham	Ham	Ham	Ham
@wizardelite and we all are truly amused, lol	Ham	Ham	Ham	Ham
@rachelakay depends on if you are the man or the surprised woman.	Ham	Ham	Ham	Ham
RT @unmarketing: New blog post: An Idiot Calling The Kettle Black http://bit.ly/kSkGE LOL!!!	Spam	Ham	Ham	Ham
RT @ComputerGeeks: "TGIF" To All Our Fellow "Computer Geeks" Fans! Any fun plans this weekend?? http://bit.ly/1Ad4UZ	Spam	Ham	Ham	Ham
RT @DinkerP2: OMG!!! - "Mattel makes 'Sugar Daddy' Ken doll" - FAIL!! That's just wrong on so many levels...Lol!!! http://bit.ly/3vEmIL	Spam	Ham	Ham	Ham
RT @alizasherman: RT @tobydiva Research says: twitter drove 48% of people who saw a brand to search for more info. http://ow.ly/zTHj	Spam	Ham	Ham	Ham
@TTaxChristine actually, that is not true for Guy. He reads all direct messages on Twitter to him, and checks his email carefully.	Ham	Ham	Ham	Ham
RT @dexin: Cloud computing data security starts with internal strategy http://bit.ly/1WhLJM	Spam	Ham	Ham	Ham
@Hip_M0M this happens to me too. Turn off the modem (switch in back usually), and let it sit for 5 minuites, then turn back on	Ham	Ham	Ham	Ham
@DrSanDiego can this shooting be classified as "workplace violence"?	Ham	Ham	Ham	Ham
T @DrSanDiego: Fort Hood shooting http://bit.ly/ul3W4 Dr. San Diego on KCBQ-AM tonight at 9 with Gayle Falkenthal call in 888-344-1170	Spam	Ham	Ham	Ham
What exactly is the Money & You program? The next one is in Feb in the San Diego area. http://ow.ly/zEyw	Spam	Ham	Ham	Ham
The ADAMA Institute of Self Healing - Journey Into Self With Adama - November 10th, 2009 http://ow.ly/zGP5 (Irvine)	Spam	Ham	Ham	Ham
RT @remarkablogger: Hollywood wants to tell you what you can't record on your DVR/PVR. Don't let them: http://is.gd/4O2sb (pls RT)	Spam	Ham	Ham	Ham
RT @patrickreyes: ...want to learn more about Buick? DM @buick your contact info for a chance to attend an event on Nov. 12	Ham	Ham	Ham	Ham
RT @chrisbrogan: Los Angeles: any car-bloggers, or interested-in-cars bloggers? Contact @patrickreyes if you want to hear of an event.	Ham	Ham	Ham	Ham
This is also true for words with double letters in it, get the URL with the single letter as well	Ham	Ham	Ham	Ham

SEO tip con't: i.e. get CuppaCoffe and Cupacoffee. Or, jewelry and jewelrey	Ham	Ham	Ham	Ham
SEO tip: When buying a domain URL with keywords in it, be sure to get a second one with misspelling in it...	Ham	Ham	Ham	Ham
RT @AlexKaris: RT @andysowards Android, and How It Will Take Over the World - android 2.0 - Gizmodo http://bit.ly/j7b7i	Spam	Ham	Ham	Ham
Off to brunch with @mobienthusiast and her baby (and dog)	Ham	Ham	Ham	Ham
@SharonHayes: If Facebook + Myspace Merged = Facespace http://bit.ly/33S6w1 via @JoshuaDenney *LOL	Spam	Ham	Ham	Ham
RT @GregReid: You HAVE to see this! http://bit.ly/1qTdWz	Spam	Ham	Ham	Ham
RT @remarkablogger: Normality requires an insane amount of effort. (Quote of the week)	Ham	Ham	Ham	Ham
RT @AlexKaris: WARNING: Income DM Phishing "haha check out this vid [#link]<-Don't Click. PLZ RT	Spam	Ham	Ham	Ham
RT @unmarketing: Regular reminder that if ur reading this instead of doing work, consider yourself busted	Ham	Ham	Ham	Ham
RT @truthdig Thai Police, Protesters Clash in Deadly Bangkok Battle - Truthdig http://bit.ly/ap7qGY	Spam	Ham	Ham	Ham
RT @truthdig Google Troubled After Data Audit - Truthdig http://bit.ly/a4nxLF	Spam	Ham	Ham	Ham
Ahoy! Plumes Ho!: What's 10 miles long, 3 miles wide, and 300 feet thick? The largest of a set ... http://tinyurl.com/2udh5zj @truthdig	Spam	Ham	Ham	Ham
Chomsky Denied Entry into Israel: Famed political critic Noam Chomsky was denied refused entry ... http://tinyurl.com/2vyvs56 @truthdig	Spam	Ham	Ham	Ham
Straight Women Play Softball, Too: By Ruth Marcus She's not gay, OK? Actually, the all-too-pu... http://tinyurl.com/3y9svo8 @truthdig	Spam	Ham	Ham	Spam
Bill Maher: Put Apple in Charge: The "Real Time" host says America is stuck in the mud and despera... http://tinyurl.com/2uf5pm5 @truthdig	Spam	Ham	Ham	Spam
RT @truthdig New Video Shows JFK on Eve of Assassination - Truthdig http://bit.ly/cVgXvi	Spam	Ham	Ham	Spam
Forget Polar Bears, We're Killing Our Food: Scientists once thought that all that carbon dioxid... http://tinyurl.com/3yyzw5c @truthdig	Spam	Ham	Ham	Spam
Primaries Show Off Dems' Diversity: By E.J. Dionne This year's elections may exacerbate the d... http://tinyurl.com/32ntpvn @truthdig	Spam	Ham	Ham	Spam

Arab-American Wins Miss USA Crown: Donald Trump's Miss USA pageant represents yet another bizarre... http://tinyurl.com/362pxfl @truthdig	Spam	Ham	Ham	Spam
How Low Can the Euro Go?: The answer to the headline question, at least on Monday, would be $1.... http://tinyurl.com/2ujkg7a @truthdig	Spam	Ham	Ham	Spam
Vatican Says Bishops Aren't Employees: In an effort to keep the rising legal flood brought on b... http://tinyurl.com/3x5o2w6 @truthdig	Spam	Ham	Ham	Spam
Obama's African Aunt Granted Asylum in U.S.: The third time was the charm for Barack Obama's Afric... http://tinyurl.com/32moehm @truthdig	Spam	Ham	Ham	Spam
Whites Are 5 Times Richer than Blacks, Study Finds: A study out of Brandeis University has dete... http://tinyurl.com/37gafot @truthdig	Spam	Ham	Ham	Spam
Where's the Recovery?: By Bill Boyarsky As President Barack Obama, speaking l... http://tinyurl.com/39e5e8j @truthdig	Spam	Ham	Ham	Spam
RT @truthdig Cell Phones, Cancer and You - Truthdig http://bit.ly/d5GjWt	Spam	Ham	Ham	Spam
Facebook Privacy: By Cam Cardow, The Ottawa Citizen Related Entries May 16, 2010 Straight Women, To... http://tinyurl.com/3xgk6vs @truthdig	Spam	Ham	Ham	Spam
Postpartum Depression: It's Not Just for Women: The phenomenon of postpartum depression has got... http://tinyurl.com/2vwd65f @truthdig	Spam	Ham	Ham	Spam
So Long, Rep. Souder: Another day, another Capitol Hill sex scandal: On Tuesday, Congressman Ma... http://tinyurl.com/2wa5s4n @truthdig	Spam	Ham	Ham	Spam
Clinton Announces Iran Sanction Plan to Senate Committee: After months of negotiations between ... http://tinyurl.com/32csllh @truthdig	Spam	Ham	Ham	Spam
RT @truthdig http://bit.ly/aPPXTh	Spam	Ham	Ham	Spam
Taliban Suicide Attack Kills 18 in Kabul: The Taliban has claimed responsibility for a suicide bom... http://tinyurl.com/38mf49b @truthdig	Spam	Ham	Ham	Spam
Law & Order: Corporate Crime Unit: By Amy Goodman In the disasters at the Massey coal mine in... http://tinyurl.com/37apz45 @truthdig	Spam	Ham	Ham	Spam
Unions Punish Lincoln in Arkansas: Sen. Blanche Lincoln helped sink the proposed Employee Free ... http://tinyurl.com/3ygphbv @truthdig	Spam	Ham	Ham	Spam
Who's Afraid of Rand Paul?: By Robert Scheer Tuesday's election results were ... http://tinyurl.com/3yfrqn9 @truthdig	Spam	Ham	Ham	Spam
A Smorgasbord, Not a Tea Party: By E.J. Dionne Almost all the shibboleths of Washington conve... http://tinyurl.com/3574rfb @truthdig	Spam	Ham	Ham	Spam

Pakistan Bans Facebook Over Muhammad Drawings: Pakistanis will have to do their poking elsewher... http://tinyurl.com/3xgdhsr @truthdig	Spam	Ham	Ham	**Spam**
Presidents Obama and Calderon Dish on Arizona Immigration Law: The presidents of North America's t... http://tinyurl.com/3yehma5 @truthdig	Spam	Ham	Ham	**Spam**
Wall Street Reform Stalls in Senate: By day's end Wednesday, our chums over at the U.S. Senate ... http://tinyurl.com/3a5pxwt @truthdig	Spam	Ham	Ham	**Spam**
Oil Rules: By Joe Conason The more we learn about the BP oil well blowout in the Gulf of Mexi... http://tinyurl.com/36y3qje @truthdig	Spam	Ham	Ham	**Spam**
RT @truthdig Robert Scheer: Who's Afraid of Rand Paul? - Robert Scheer's Columns -Truthdig http://bit.ly/bbqKuO	Spam	Ham	Ham	**Spam**
How Baseball Became America vs. the Damn Yankees: By Mark Heisler Baseball ha... http://tinyurl.com/37znpfd @truthdig	Spam	Ham	Ham	**Spam**
Polish Plane Crash Probe Points to Pilot Error: There has been speculation, since last month's ... http://tinyurl.com/3xaus7q @truthdig	Spam	Ham	Ham	**Spam**
Scientists Create 'Synthetic Cell': A team of U.S. scientists has successfully created what the... http://tinyurl.com/3a9tzgj @truthdig	Spam	Ham	Ham	**Spam**
Stocks Take a Nosedive as Euro Worries Rise: The Icelandic volcano isn't the only problem blowi... http://tinyurl.com/3yskz4u @truthdig	Spam	Ham	Ham	**Spam**
Live Now! RT @truthdig Robert Scheer: Robert Scheer on this week's column - Truthdig http://bit.ly/9cMtvt	Spam	Ham	Ham	**Spam**
Adm. Blair Out as Intelligence Director: Retired Adm. Dennis Blair is expected to announce his ... http://tinyurl.com/3xth2f6 @truthdig	Spam	Ham	Ham	**Spam**
Making Sense of the Financial Reform Bill: The Senate passed what the Wall Street Journal descr... http://tinyurl.com/39q8q8o @truthdig	Spam	Ham	Ham	Ham
RT @truthdig Live Chat: Robert Scheer on Rand Paul - Truthdig http://bit.ly/9bm4hk	Spam	Ham	Ham	Ham
BP Launches Video Feed of Gulf Leak: Following criticisms that BP is withholding data and block... http://tinyurl.com/36h4pd4 @truthdig	Spam	Ham	Ham	Ham
Here They Come To Save Das Day: The German Parliament has approved a series of measures to allo... http://tinyurl.com/3yghhzw @truthdig	Spam	Ham	Ham	Ham
D.C. To Wrap It Up With Trojan: It may just be an extraordinary guerrilla marketing tactic, but... http://tinyurl.com/3x5osok @truthdig	Spam	Ham	**Spam**	Ham
Madonna Lets Malawi Judge Have It for Sentencing Gay Couple: The world may not have been waiting ... http://tinyurl.com/38wbend @truthdig	Spam	Ham	**Spam**	Ham

Financial Reform Won't Alter Capitalism's Icarus Trajectory: By Stuart Whatley Perhaps the mo... http://tinyurl.com/23pr4ml @truthdig	Spam	Ham	Spam	Ham
Tesla's Electric Stimulus Treatment: A joint partnership between Toyota and electric car manufa... http://tinyurl.com/35j7xrb @truthdig	Spam	Ham	Spam	Ham
Abbas Joins In On Boycott: A boycott of goods produced in Israeli settlements in the West Bank ... http://tinyurl.com/3xvunxh @truthdig	Spam	Ham	Spam	Ham
Facebook vs. The World: A recent privacy row has embroiled Facebook in the center of a public d... http://tinyurl.com/34zgss7 @truthdig	Spam	Ham	Spam	Ham
GOP Victorious In Hawaii: In the first time in 20 years the state of Hawaii has elected a Repub... http://tinyurl.com/32hhzrk @truthdig	Spam	Ham	Spam	Ham
Balls and Chains: By Mr. Fish Related Entries May 21, 2010 Financial Reform Won't Alter Capitalism'... http://tinyurl.com/32hwbsb @truthdig	Spam	Ham	Spam	Ham
A Month Later, Feds Are Angry With BP: Since oil began leaking into the Gulf of Mexico more tha... http://tinyurl.com/34775b3 @truthdig	Spam	Ham	Spam	Ham
Family Values and Glass Houses: By E.J. Dionne Enough with dividing the world between moral, ... http://tinyurl.com/3y3aueb @truthdig	Spam	Ham	Spam	Ham
The Greeks Get It: By Chris Hedges Here's to the Greeks. They know what to do... http://tinyurl.com/232o9ez @truthdig	Spam	Ham	Spam	Ham
S.C. Gubernatorial Hopeful Hit with Affair Accusation: Although she categorically denies the st... http://tinyurl.com/36nmug4 @truthdig	Spam	Ham	Spam	Ham
U.S. to Join Forces with South Korea for Seafaring Exercises: In a move that predictably provok... http://tinyurl.com/366vxrv @truthdig	Spam	Ham	Spam	Ham
Technology News Flash: Computer Users Slightly Less Inclined to IM: Those fickle users of online ... http://tinyurl.com/34mzmy2 @truthdig	Spam	Ham	Spam	Ham
'SATC 2' Review: Marking the 'Misogynistic, Borderline Racist' End of an Era: The early word is o... http://tinyurl.com/2wwuvqf @truthdig	Spam	Ham	Spam	Ham
Don't Ask Don't Tell Compromise Could Pass This Week: The White House, congressional leaders, t... http://tinyurl.com/36mqrkx @truthdig	Spam	Ham	Spam	Ham
Give Some Answers, Dr. Paul: By Eugene Robinson Not so fast, everybody. Rand Paul can't abrup... http://tinyurl.com/2vum7yb @truthdig	Spam	Ham	Spam	Ham
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Reach for the stars http://joefarrar.com/art-news/reach-for-the-stars/18956	Spam	Ham	Spam	Spam
Ice Floes, 1893 http://joefarrar.com/art-news/ice-floes-1893/18959	Spam	Ham	Spam	Spam
[UK] Principle in court threat to Sapro http://ff.im/-dOhYP	Spam	Ham	Spam	Spam
[US] Tiaa-Cref sells Sudan-linked oil holdings http://ff.im/-dOhYS	Spam	Ham	Spam	Spam
Won't even be a problem the ? Is ARE U ready	Ham	Ham	Spam	Spam
@rubie_e Ur name its the same as the 1st girl I was so crazy about but nothing happened, crazy part there's was 2of them different times	Ham	Ham	Spam	Spam
About to sync my phone #teamblackberry connects with MAC update contacts& music "DIASPORA SEDUCTION GETTING CLOSE @FLUTE NYC 4/30/10	Ham	Ham	Spam	Spam
#teamblackberry there's a new desktop software download it& #smackyourself if u have yet to update the software on the phone	Ham	Ham	Spam	Spam
@FlyGirl_Redd I hope you do get some much needed rest	Ham	Ham	Spam	Spam
#teamblackberry sync completed !	Ham	Ham	Spam	Spam
#twowordcombos BROOK LYN	Ham	Ham	Spam	Spam
pls ADD MY NEW SCREEN NAME djcam316 so ou know who it is DARLINGTON @darlington316 DJ CAM thank you	Ham	Ham	Spam	Spam
Ooo shit the last blast I thought was for my aim buddies smh forgotten I linked it with twitter lml	Ham	Ham	Spam	Spam
Even this will tell u I am tuff lml google it http://twitpic.com/1hi4rm	Ham	Ham	Spam	Spam
RIP TO THE UN FOLLOWED LML THANKS TO MY FOLLOERS AND THOSE THAT I'M FOLLOWING	Ham	Ham	Spam	Spam
#teamblackberry what's shaking today, glad 2 c every1 today is #twowordcombos PAY DAy also PAY BILL 2 stay with #teamblackberry	Ham	Ham	Spam	Spam
Today I'm getting THAT #teamiphone 3G unlocked Holla @ me if u want it BC I'm forever #teamblackberry #aintnoway I'd drop this lol	Ham	Ham	Spam	Spam
#teambackberry some like buttons & #twowordcombos track balls me I'm with that #twowordcombos Touch Screen I bring the storm2	Ham	Ham	Spam	Spam
#nowplaying "BABY" LL COOL J I just want that one queen to be MY LADY #twowordcombos MULTI TASK no wonder ?da batteries die fast CHARGe IT!	Ham	Ham	Spam	Spam
EVERYTHING SHUT OFF FOR NOW CATCH ME ON THE NEXT TWEET	Ham	Ham	Spam	Spam

A man is dieing of cancer but tells ppl its AIDS when his son ask why he replies so no 1 would have relationsh with his wife	Ham	Ham	Spam	Spam
@WisdomSoul I'm glad to be aboard I look foward to tweeting you DJ cam darlington316	Ham	Ham	Spam	Spam
Ooooo my gosh what a day MAN BROOkLyn was crazy MY dUDE DJ SK crazy I GOT THATview & its crazy DJ CAM About to eat BC2nightI'mgoingINNNnn	Ham	Ham	Spam	Spam
@jarule#AINTNOWAY THIS COULD BE THE REAL JA RULE IT'S MURDER !!! THANKS FOR FOLLOWING ME DJ CAM DARLINGTON316	Ham	Ham	Spam	Spam
#aintnoway the Lakers lost that game# aintnoway i did not even see it may that's why? ooo well next time i am shure THE LAKERS HAVE THIS!	Ham	Ham	Spam	Spam
@MrzEndy UMMM PICK ME LML I'D RUB ANY THING U WANT ON U!	Ham	Ham	Spam	Spam
@MrzEndy yeah especially if your sick idk if u got the 1st msg but Nurse CAM in training I'd take care of u lol I kid u not	Ham	Ham	Spam	Spam
@TheRealDJKhaled #aintnoway thus DJkhaled HE THE BEST!!	Ham	Ham	Spam	Spam
@MrzEndy get to know me it will not be a Wrong move look @ my info/bio u got the # I take care of the rest	Ham	Ham	Spam	Spam
@LadiiScORpiiO its always gonna be some crazy funny shit @ that ferry especially @ night time they should have there own you tube! Lol	Ham	Ham	Spam	Spam
@MrzEndy just checking up how r u now ?	Ham	Ham	Spam	Spam
#twowordcombos WHITE LABEL	Ham	Ham	Spam	Spam
@juicyyj goodmorning beautiful #nowplaying "I won't TELL	Ham	Ham	Spam	Spam
@MrzEndy see if u can get either ginger tea or regular Tea with honey it should help and lip ton chicken noodle soup may also help	Ham	Ham	Spam	Spam
@MrzEndy also increase the fluids intake aka water or some grapefruit juice stay away from soda if u do drink it at least for now	Ham	Ham	Spam	Spam
@eddyshades I hope u can make it to flute 4/30/10 come check DJ CAM out to see if I can be the DJ for one of ur events	Ham	Ham	Spam	Spam
@eddyshades @FLUTE 40e 20th St Broadway&Park NY! NY! MUSIC BY DJ CAM darlington316	Ham	Ham	Spam	Spam
@TGIFhaas what's shaking on your side of things? Thanks#FF darlington316 I got u back	Ham	Ham	Spam	Spam
In LINDEN NJ!	Ham	Ham	Spam	Spam

Text			
#Teamblack whats good everyone dj cam here about 2 go to work #FF @darlington316 BBMPIN 313EA64A NO EVERYONE PUT UR PIN UP LOL IN DA AIR!!!	Ham	Ham	Spam	Spam
#teamblackberry PUT UR PIN UP IN DA AIR. PUT UR PIN UP IN DA AIR (SINGING} ADD DJ CAM BBM PIN 313EA64A	Ham	Ham	Spam	Spam
@MissNanaOnline BIG SHOUT TO DA BADDEST FOR #FOLLOWING DJ CAM @darlington316 THANK U VERY MUCH MISSNANA SHE THE BEST!!!	Ham	Ham	Spam	Spam
Just used http://twilk.com to put people I follow on my Twitter background. Check it out!	Ham	Ham	Spam	Spam
#smackyourself if you not on my My wall"no ho mo" BIG SHOUT OUT TO ALL MY FOLLOWERS LOOK HOW IMPORTANT YOU R LOL REAL TWEET DJ CAM,	Ham	Ham	Spam	Spam
@BADGIRLSTREETS that would make u flipper skipper then.. Nice!	Ham	Ham	Spam	Spam
Goodmorning sweets for thE lady I call you sweets hope everyone had a productive wkend let's keep grinding this wk!!	Ham	Ham	Spam	Spam
The highly anticipated shut down blockbuster is this wk @ flute !! NY 4/30/10 trust me be there music by: DJ CAM darlington316	Ham	Ham	Spam	Spam
A husband thought he was funny & said to his wife may b if they wash her clothes in slim fast it would take a few inches off her ass	Ham	Ham	Spam	Spam
A wife thought to get back @ her husband & put marcle grow in his underwater & when he asked ? She said may b it would help him grow !	Ham	Ham	Spam	Ham
@StephSdOpe amen to that but the question what make the woman carying the pu**y Happy	Ham	Ham	Spam	Ham
#teamblackberry who up with me hit me up :313EA64A. Bbm pin this Friday its going down @flute don't miss it music by DJ CAM!!	Ham	Ham	Spam	Ham
#aintnoway you can afford to miss the EPIC production "DIASPORA SEDUCTION" #smackyourself if ur not there #teamblackberry :313EA64A bbm pin	Ham	Ham	Spam	Ham
#teamblackberry really rules the world something for the real boss in you !! Everyone put your pin up #FF darlington316	Ham	Ham	Spam	Ham
#teamblackberry #nowplaying "watagatapitusberry " don't worry be happy they mad BC u got a blackberry #teamblackberry! Watagatapitusberry!	Ham	Ham	Spam	Ham
@_CarmelBeauty #free carmel beauty !!	Ham	Ham	Spam	Ham
@Bartylby no but I'm on skype djcam316.	Ham	Ham	Spam	Ham
@Bartylby as of right now no but its a avenue I'm going in to I'm just making shure its on point b4 I do	Ham	Ham	Spam	Ham

Text			
Light that shit the fuck up & beam me up Scottie! Yeah I'm beamed! I was beaming b4 they started to lean up!! I'm up! UP! UP & AWAY!	Ham	Ham	Spam	Ham
Ooooo myyyy gosh!! Do remember this Friday.. Wait STOP!! THIS FRIDAY ITS going UP @ FLUTE NYC ! A EPIC PRODUCTIOn. MUSIC BY DJ CAM	Ham	Ham	Spam	Ham
DAMN these dudes must have lyk a forest! In here in that case call me MR GUMP ! Just missing that box of chocolate ! ANY FLAVOR WILL DO!	Ham	Ham	Spam	Ham
Now to get something to eat	Ham	Ham	Spam	Ham
Tomorrow! Tomorrow	Ham	Ham	Spam	Ham
Tomorrow! Tomorrow! "DIASPORA SEDUCTION". @ FLUTE 40 E 20th st Broadway & PARK! NY NY! MUSIC BY DJ CAM	Ham	Ham	Spam	Ham
Woke up this Moring ! Did my AM routine felling REal good right now ! About to see what's shaking outside	Ham	Ham	Spam	Ham
Watching this twisted as movie "TROIS" wow the games some I said SOME females PLAY! & some dudes too.. Wow&SMH @the same time	Ham	Ham	Spam	Ham
I luv the sweet taste of " MANGOS"!! Go MaNGO MANGO MANGO!! NEW HOT SPOT LATIN Teemed on STATEN ISLaND 661 BAY SY! MUSIC BY DJ CAM! 5/5/10!	Ham	Ham	Spam	Ham
Back to work grind .. Nurse CAM in training DJ CAM ! Flute was a great look! Thanks to EPIC PRODUCTION the focus shifts to the school grind	Ham	Ham	Spam	Ham
What a day just getting in felling melow going to play some slow jams for the night..	Ham	Ham	Spam	Ham
would gladly appreciate subjection on a book to read for the wk I'm open to anything as long as its good right now the bible is #1	Ham	Ham	Spam	Ham
Too all my lakers fan I missed the last game can some1 pls give me a run down?	Ham	Ham	Spam	Ham
Book to read for the wk is "intelligent design" by William dembski.. A great read so far #FF darlington316 for my thoughts	Ham	Ham	Spam	Ham
Goodmorning to the word today I'm @ the jl green space in the city for battle of the broughs!! With my dude AXEL! NY NY	Ham	Ham	Spam	Ham
@laskanstallion word? Lucky u .. But I knew it would pop off I have yet to see it but will soon, how would u rate it 1 10	Ham	Ham	Spam	Ham
Goodmorning, Its Da start of Mothers day wkend I hope you enjoy it and know all though U get 1day on da calendar, everyday is yours..	Ham	Ham	Spam	Ham
To the fathers that are playing the roll of mothers, Happy Mothers day to you as well... God Bless and may Heaven smile upon you.	Ham	Ham	Spam	Ham

Text				
@ladiiemenace o shit did I un follow u my bad I had no clue I got u back trying to get rid of some spamets Or ppl that don't say what's up	Ham	Ham	Spam	Ham
@ladiiemenace I got u back now on the follow tip now I know u one of my real tweet people	Ham	Ham	Spam	Ham
@ladiiemenace ps I dig the funky fresh style in ur pic DJ CAM #FF darlington316	Ham	Ham	Spam	Spam
@BlakIzBeautyful #FF @BlakIzBeautyful for tips on that funky fresh all natural hair!	Ham	Ham	Spam	Spam
@TunezWorld #FF @Tunezworld that's the M.I.A connection!!	Ham	Ham	Spam	Spam
RT @truthdig Thai Police, Protesters Clash in Deadly Bangkok Battle - Truthdig http://bit.ly/ap7qGY	Spam	Spam	Spam	Spam
RT @truthdig Google Troubled After Data Audit - Truthdig http://bit.ly/a4nxLF	Spam	Spam	Spam	Spam
Ahoy! Plumes Ho!: What's 10 miles long, 3 miles wide, and 300 feet thick? The largest of a set ... http://tinyurl.com/2udh5zj @truthdig	Spam	Spam	Spam	Spam
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Nothing makes a woman more beautiful than the belief that she is beautiful. -Sophia Loren	Ham	Ham	Spam	Spam
Hobo International Spring 2010 has arrived: http://www.raincollection.com/pages/hobo_international/665.php	Spam	Ham	Spam	Spam
Modern Solutions for an Organized Work Space: http://www.raincollection.com/blog/modern-solutions-for-an-organized-work-space	Spam	Ham	Spam	Spam
A girl should be two things: classy and fabulous. -Coco Chanel	Ham	Ham	Spam	Spam
YOU'RE IN LUCK! Save 7% with coupon code TWLUCKY7 for 7 days! Coupon code is case sensitive. Valid 3.11-3.17. Happy St. Patrick's Day!	Ham	Ham	Spam	Spam
Jan Barboglio Monogram Napkin Rings are back in their new, 2010 style! http://bit.ly/aPyyBZ	Spam	Ham	Spam	Spam

We just received in a fabulous new line and we are in love! Look for Arte Italica products to show up at RainCollection.com later this week!	Ham	Ham	Spam	Spam
Matt by Matt & Nat has arrived! View this eco-chic and vegan friendly accessories line here.. http://bit.ly/aXyhm4	Spam	Ham	Spam	Spam
New colors in Hobo's Clover Wristlet...Mustard and Maple! Check them out here http://bit.ly/9UiAU1	Spam	Ham	Spam	Spam
Arte Italica now available at Rain Collection! Check out the new collection here http://bit.ly/9YzU3T	Spam	Ham	Spam	Spam
DayNa Decker Botanika Candles are now available in 16 oz! Enjoy! http://bit.ly/9TOKzf	Spam	Ham	Spam	Spam
This just in from France:Check out the new Cote Bastide now available at Rain Collection. We LOVE the Amber Exfoliant!! http://bit.ly/9OSM55	Spam	Ham	Spam	Spam
New additions to Melie Bianco's 2010 spring line. http://bit.ly/94IIcZ	Spam	Ham	Spam	Spam
Sale into Spring with New Markdowns at Rain Collection! http://bit.ly/18Db0z	Spam	Ham	Spam	Spam
Zoe Chicco's Alchemy of Style http://bit.ly/9ieDzX	Spam	Ham	Spam	Spam
DayNa Decker's Botanika Essence Spray in a now available in a new "petit" size! Great for the home or the body! http://bit.ly/9I6GZn	Spam	Ham	Spam	Spam
Stay tuned for our Earth Day Sweepstakes and your opportunity to enter to win something fabulous!	Ham	Ham	Spam	Spam
Reduce Your Spring Cleaning Carbon Footprint: http://bit.ly/9xsWKV	Spam	Ham	Spam	Spam
Dare to Win DayNa Earth Day Sweepstakes for a chance to win DayNa Decker Soleil Couture Candle 16 oz: http://wfi.re/fc0a	Spam	Ham	Spam	Spam
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Boost Your Twitter Marketing With These Tools! Make Money Too! http://bit.ly/9c19fN	Spam	Ham	Spam	Spam
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This Could Be One Of The Best New Opportunities To Hit The Net! http://bit.ly/bwHUHj	Spam	Ham	Spam	Spam
Free Tips To Maximize Your Twitter Marketing Fast And Easy! http://bit.ly/9c19fN	Spam	Ham	Spam	Spam
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Ezinearticles.com Drops The Hammer: For some bizarre reason EzineArticles has decided to implement.. http://tinyurl.com/5mvob4	Spam	Ham	Spam	Spam
I'll Never Sell Another eBook Again: I've sold a number of ebooks in the past but I'm do.. http://tinyurl.com/68anku	Spam	Ham	Spam	Spam
I Finally Found My Look: After months and months of searching and trying different looks I've.. http://tinyurl.com/539xnp	Spam	Ham	Spam	Spam
Hundred's of Links to Your Articles - On Autopilot: I recently discovered a killer way to get seve.. http://tinyurl.com/3nlmcg	Spam	Ham	Spam	Spam
Very Easy Money In About 5 Hours: If you've been in internet marketing for even a short perio.. http://tinyurl.com/4b4ejd	Spam	Ham	Spam	Spam
How Download Any Video to Your Computer: I'm going to give you a really easy way to download .. http://tinyurl.com/65bau3	Spam	Ham	Spam	Spam

A Lesson In Customer Service From Amazon: For my first online business I sold a physical product t.. http://tinyurl.com/562wjh	Spam	Ham	Spam	Spam
test post: test post Tags: internet marketing, online marketing, work at home online, make money o.. http://tinyurl.com/5sppp5	Spam	Ham	Spam	Spam
The Ultimate Copywriting Course - Always Free: You may or may not know that copywriting is the sin.. http://tinyurl.com/3t7mxk	Spam	Ham	Spam	Ham
Hungry Markets That Buy Again And Again Part 1: There are literally hundreds of niches full of mil.. http://tinyurl.com/4jzgbd	Spam	Ham	Spam	Spam
What Goes Around Comes Around - This Is Funny: A couple of months ago I posted about a guy on the .. http://tinyurl.com/3eeew4	Spam	Ham	Spam	Spam
Guru's - Shady Bonuses And Features: How many times have your read a sales letter for an ebook or .. http://tinyurl.com/3twuxb	Spam	Ham	Spam	Spam
PayPal Fraudsters - Fighting Back: I don't know how many times I've read a blog or forum.. http://tinyurl.com/3z48kk	Spam	Ham	Spam	Spam
MyBlogLog - Right Through The Backdoor: Most people in the internet marketing industry have heard .. http://tinyurl.com/4wnof7	Spam	Ham	Spam	Spam
New blog post: Ezine Articles Announces Killer Feature http://tinyurl.com/4swl6e	Spam	Ham	Spam	Spam
Ezine Articles has a killer new feature that will bring more people to your articles and websites. On your page where all your articl ...	Ham	Ham	Spam	Spam
Ezine Articles Announces Killer Feature: I was looking at my articles in my EZA account today and .. http://tinyurl.com/4swl6e	Spam	Ham	Spam	Spam
New blog post: Customizing Your Twitter Background - What A difference http://tinyurl.com/4z7m9t	spam	Ham	Spam	Spam
Customizing Your Twitter Background - What A difference: I came across a post on the Croncast Blog.. http://tinyurl.com/4z7m9t	Spam	Ham	Spam	Spam
Just finished setting up my customized twitter background. Always good to stand out from everyone else	Ham	Ham	Spam	Spam
Hungry Markets That Buy Again And Again - Part 2: This is part 2 of a post I made last week about .. http://tinyurl.com/4q3djo	Spam	Ham	Spam	Spam
Personal finance stuff. Try to do it a couple of mornings per week. Sidenote, I highly recommend getting a credit card that has rewards.	Ham	Ham	Spam	Spam
@Viv10 Glad you like it. I'm pretty new to twitter but I've got a lot of great stuff I'll be delivering in the near future.	Ham	Ham	Spam	Spam

@victoriaplayer Ditto victoriaplayer. Have a wonderful day. Do something today that directly makes you money.	Ham	Ham	Spam	Spam
Trying to figure out how people message you and expect you to respond if they haven't followed you. It's not possible. Why do ask?	Ham	Ham	Spam	Spam
@ChrisMonty That's the thing. When I try to enter a response twitter doesn't allow me because they aren't following me.	Ham	Ham	Spam	Spam
Trying out some new adsense tricks. Here's a quick tip for adsense. I changed my titles to red and my ctr trippled.	Ham	Ham	Spam	Spam
Want to Grow Your Business? - Don't Do This: You may know that I'm a big fan of the Warrior F.. http://tinyurl.com/4coggh	Spam	Ham	Spam	Spam
Permalinks Can Make or Break Your Business: The Permalinks plugin now comes on all the new version.. http://tinyurl.com/3gwgk2	Spam	Ham	Spam	Spam
@ChrisMonty I'm talking about messages not tweets. Twitter doesn't let you respond to their message unless they are following you	Ham	Ham	Spam	Spam
@HuMBush looking forward to it	Ham	Ham	Spam	Spam
up early to go workout. Crossfit.com - the greatest workout you'll ever try	Ham	Ham	Spam	Spam
Secret Strategy to Increase Sales: I wanted to tell you about a killer strategy to increase sales .. http://tinyurl.com/4ucob8	Spam	Ham	Spam	Spam
The New Myspace Goldmine - Now Open To All: MySpace just opened up banner advertising to anyone an.. http://tinyurl.com/4zgcta	Spam	Ham	Spam	Spam
Putting the finishing touches on edubacklinksexposed.com before I release it to the public	Ham	Ham	Spam	Spam
@Bajun Part of it is related to socialbookmarking	Ham	Ham	Spam	Spam
Edu Backlinks Exposed is now live. Get hundreds of Free DoFollow Edu backlinks - http://www.edubacklinksexposed.com	Spam	Ham	Spam	Spam
@Bajun I've been in IM for about 5 years now. And you?	Ham	Ham	Spam	Spam
@ChrisMonty Visitors should only see it unless they optin then it goes away when they come back. Is it not that way for you? I'll look	Ham	Ham	Spam	Spam
Edu Backlinks Exposed - The Secrets Are Live: I finally finished EDU Backlinks Exposed and it&#039.. http://tinyurl.com/3ph6rn	Spam	Ham	Spam	Spam
NoFollow Tags - People Are Going Overboard: I've noticed that more and more blogs are using n.. http://tinyurl.com/4pagpl	Spam	Ham	Spam	Spam
writing a few articles, making some changes to a product	Ham	Ham	Spam	Spam

trying out contentboss.com - wow very easy to rewrite articles that you have rights to. Not totally automated but almost	Ham	Ham	Spam	Spam
Edu Backlinks Exposed - Price Going Up Tomorrow: I realeased my new report that goes into detail o.. http://tinyurl.com/3vhmsw	Spam	Ham	Spam	Spam
@hlln say what?	Ham	Ham	Spam	Spam
@ChrisMonty Live and well chris, the price just went up	Ham	Ham	Spam	Spam
ralaxing with the family, quick check on twitter activity. see ya	Ham	Ham	Spam	Spam
make a few twitter changes then working on a new product	Ham	Ham	Spam	Spam
Automated Deep Linking Part 1: Did you know you can automate deep linking to your blog posts. If .. http://tinyurl.com/48g2wn	Spam	Ham	Spam	Spam
Just Wrote 10 Articles In One Hour - Here's How: As hard to believe as it sounds it's true, I.. http://tinyurl.com/6de9hq	Spam	Ham	Spam	Spam
When Someone Unsubscribes - Easiest Money You've Every Made: Okay, it doesn't get any easier .. http://tinyurl.com/6r9ta4	Spam	Ham	Spam	Spam
The Biggest Ripoff In Online Marketing: It's amazing how many unsuspecting marketers fall for.. http://tinyurl.com/57gs5g	Spam	Ham	Spam	Spam
working on another new product. Just wrote 5 articles	Ham	Ham	Spam	Spam
Get Indexed In Just Hours - Super Simple: In this post I'm going to share a secret technique .. http://tinyurl.com/5eqrpc	Spam	Ham	Spam	Spam
Been Posting to Your Blog? - Don't Lie Now: If you have an internet blog there is one strategy tha.. http://tinyurl.com/55gxor	Spam	Ham	Spam	Spam
Wordtracker Research Problems - Problem Solved: Has this ever happened to you? You find a great ni.. http://tinyurl.com/6amro4	Spam	Ham	Spam	Spam
Here Are Some Very Powerful DoFollow Backlinks: If you've read about my Edu Backlinks Exposed.. http://tinyurl.com/5m4un9	Spam	Ham	Spam	Spam
Automated Deeplinking Part 2 - Kind of: A few days ago I wrote a post that talked how to automatic.. http://tinyurl.com/6r2o7r	Spam	Ham	Spam	Spam
Your Online Marketing Business - The Tasks That Matter: http://EzineArticles.com/?id=1638162	Spam	Ham	Spam	Spam
Taking Some Time Off: I'll be posting here less frequently for at least the next few months. .. http://tinyurl.com/6gwpjy	Spam	Ham	Spam	Spam
My Best Source For Cheap High Quality Articles: A while back I made a post about how I wrote 10 ar.. http://tinyurl.com/64ortp	Spam	Ham	Spam	Spam

Text	Col1	Col2	Col3	Col4
1 Minute Change to Double Affiliate Commissions: Here's a simple strategy that I've neve.. http://tinyurl.com/5r4nk4	Spam	Ham	Spam	Spam
Free Traffic Secrets - Now Online: Been taking some time off but I have managed to put together in written forma.. http://tinyurl.com/6sxbyy	Spam	Ham	Spam	Spam
I'm Back, And Here's a Powerful Secret: I'm going to share with you a simple but powerful way to get massiv.. http://tinyurl.com/b2uryt	Spam	Ham	Spam	Spam
Give Real Value, Not Just Another Sales Letter: I've opted into to a large number of lists over the past se.. http://tinyurl.com/b99zqr	Spam	Ham	Spam	Spam
This Could Save Your Pants - NOT IM Related: A friend of mine sent this to me over the email the other day. Ther.. http://tinyurl.com/ddpqqd	Spam	Ham	Spam	Spam
Affiliate Marketing Best Program - http://tinyurl.com/l5ufnb	Spam	Ham	Spam	Spam
Affiliate Marketing Best Program: Affiliate Marketing Best ProgramPromoteIMC.com AFFILIATE MARKETING BEST PROGRA.. http://bit.ly/PYCzp	spam	Ham	Spam	Spam
Algorithms-The Foundation of Search Engine Optimization - http://tinyurl.com/mrgv45	Spam	Ham	Spam	Spam
Algorithms-The Foundation of Search Engine Optimization - http://tinyurl.com/ljgjyt	Spam	Ham	Spam	Spam
Algorithms-The Foundation of Search Engine Optimization: In the ninth century Abu Abdullah Muhammad ibn Musa al-.. http://bit.ly/176dta	Spam	Ham	Spam	Spam
Algorithms-The Foundation of Search Engine Optimization: In the ninth century Abu Abdullah Muhammad ibn Musa al-.. http://bit.ly/10ArRU	Spam	Ham	Spam	Spam
Been in the beautiful smoky mountains today with @elizabethkirk http://twitpic.com/17194o	Spam	Ham	Spam	Spam
making adjustments to the final mixes of my new record this morning... my head is about to explode! :)	Ham	Ham	Spam	Spam
work out time...	Ham	Ham	Spam	Spam
Headed to some meetings @hopepark!	Ham	Ham	Spam	Spam
Anyone else's allergies goin nuts?	Ham	Ham	Spam	Spam
@FlyingFreeJules Lol... Yeah... I feel the same way!! sucks...	Ham	Ham	Spam	Spam
are we friends on Facebook?! www.facebook.com/andykirkworship - also become a fan of the new record here at www.facebook.com/andykirkmusic	Spam	Ham	Spam	Spam
Im gonna say this one more time... American Idol is... awwwwwful this year...	Ham	Ham	Spam	Spam
reading 2 Corinthians this morning... I like it cause its about sinners... i fit in well...	Ham	Ham	Spam	Spam

2 Cor. 5:7 "Its what we trust in but don't yet see that keeps us going"	Ham	Ham	Spam	Spam
headed to meet up with a guitar player for coffee...	Ham	Ham	Spam	Spam
Ohh fido... U are so "cool" but u never have parking which makes u considerably less cool...	Ham	Ham	Spam	Spam
Just met and hung out for a bit @davidarchuleta at fido... Awesome guy... Hope we can write soon bro!	Ham	Ham	Spam	Spam
@mattunderwood88 lol... yeah ever since you walked in... ooooooo	Ham	Ham	Spam	Spam
going for a run...	Ham	Ham	Spam	Spam
still adjusting mixes! wow... can't wait for this thing to be completed!	Ham	Ham	Spam	Spam
what would we do without computers!? I mean... seriously...	Ham	Ham	Spam	Spam
going over the album artwork with @1CNRecords... so close!	Ham	Ham	Spam	Spam
starting to get really freaked out by all these earthquakes...	Ham	Ham	Spam	Spam
Not sure whether your living in the past, present, or future!? Come check out "Three Lives" @hopepark this weekend from @davidperezusc	Ham	Ham	Spam	Spam
working on some vocal training...	Ham	Ham	Spam	Spam
@alandanielson - hey bro... shoot me your email/numbers we need to catch up!	Ham	Ham	Spam	Spam
@AlanDanielson you have been followed!	Ham	Ham	Spam	Spam
getting hungry... who is down for lunch?!	Ham	Ham	Spam	Spam
@ktackel lol... yeah about that :)	Ham	Ham	Spam	Spam
#ff @ddisney, @jleeworship, @scottwilliams, @jonniew, @john_driver @johnsherrill @charmainemusic @stephen_cole	Ham	Ham	Spam	Spam
#ff correction @jonnie_w - funniest man on the planet... www.jonniew.com - book him now before he's too expensive!! :)	Ham	Ham	Spam	Spam
@jaqchapman I so wanted to do it! I had to play this weekend... sorry!	Ham	Ham	Spam	Spam
@jordanvandiver you look like such a lawyer in your new twitpic!	Ham	Ham	Spam	Spam
@ddisney congrats!!	Ham	Ham	Spam	Spam
just finished an intense workout... yay	Ham	Ham	Spam	Spam
tweeps... are we friends on face book!? become a friend and fan here! www.facebook.com/andykirkmusic www.facebook.com/andykirkworship	Ham	Ham	Spam	Spam
about to head to dinner with my lovely wife @elizabethkirk... where to eat...	Ham	Ham	Spam	Spam
Headed to a meeting w/@ddisney and praisecharts.com	Ham	Ham	Spam	Spam

Message	Col1	Col2	Col3	Col4
workin' on a "song peek" its like a sneak peek but with a... well you get it... I'll be posting the vid soon!	Ham	Ham	Spam	Spam
is it still cool to be a christian pop culture/twitter-super-star and only follow like 3 people but have 2,000 followers!? just sayin...	Ham	Ham	Spam	Spam
Song Peek #1 for the new record. Check out the video for the song peek of "Wake Up My Soul" here! http://tinyurl.com/y9nwol5 rt's apprectd!	Spam	Ham	Spam	Spam
Is it weird that Im saying "hashtag" in normal sentences outside of twitter now!?	Ham	Ham	Spam	Spam
Muse is playing in Nashville tonight and everyone is going... I don't even know who they are...	Ham	Ham	Spam	Spam
Wow... Lots of Muse fans out there... I will be sure to check them out tweeps!	Ham	Ham	Spam	Spam
Good morning... Headed to a creative meeting @hopepark then to the final mastering session for the new radio single...	Ham	Ham	Spam	Spam
Song Peek #1 for the new record. Check out the video for the song peek of "Wake Up My Soul" here! http://tinyurl.com/y9nwol5 rt's apprectd!	Spam	Ham	Spam	Spam
Busy day... Single is officially done and headed to radio... Now Im headed to pick up my car from the shop...	Ham	Ham	Spam	Spam
RT @liz_thomton @karijobe should win new artist of the year this yr @ the #doveawards & @andykirk should win this title next yr // Thnks!!	Ham	Ham	Spam	Spam
watching #lost with @elizabethkirk... this show used to be my favorite... now I hate it...	Ham	Ham	Spam	Spam
if you could punch 1 #idol judge who would it be!?	Ham	Ham	Spam	Spam
we've got one vote for ellen from @makennah and 2 votes for kara from @sethwarton and @jordanvandiver!	Ham	Ham	Spam	Spam
after 20 or so votes... its lookin' like Kara and Ellen are neck and neck... thx for playing along friends... i'd go for Kara personally...	Ham	Ham	Spam	Spam
good morning people... I'm reading the bible... still in 2nd Corinthians...	Ham	Ham	Spam	Spam
My grace is enough; its all you need. My strength comes into its own in your weakness. 2 Cor 12:9	Ham	Ham	Spam	Spam
tweeps - we are playing at Green Hills Church this sunday in the village. Come check it out at 10 am at Cabana behind the pancake pantry!	Ham	Ham	Spam	Spam
knocking my to-do list OUT today... feeling good :)	Ham	Ham	Spam	Spam
RT @salomonduran @andykirk new song is hot man // Thanks man!!	Ham	Ham	Spam	Spam
dear radio... please start playing my single without even thinking about it... its good I promise! :)	Ham	Ham	Spam	Spam
If you've been turned down, overlooked, told no, stepped on, pushed aside, and even forgotten / keep fighting for what God put N your heart!	Ham	Ham	Spam	Spam

Text				
working on a treatment of delirious' "Solid Rock" for easter @hopepark church... don't want to miss this one!	Ham	Ham	Spam	Spam
Nothing makes a woman more beautiful than the belief that she is beautiful. -Sophia Loren	Ham	Ham	Spam	Spam
Hobo International Spring 2010 has arrived: http://www.raincollection.com/pages/hobo_international/665.php	Spam	Ham	Spam	Spam
Modern Solutions for an Organized Work Space: http://www.raincollection.com/blog/modern-solutions-for-an-organized-work-space	Spam	Ham	Spam	Spam
A girl should be two things: classy and fabulous. -Coco Chanel	Ham	Ham	Spam	Spam
YOU'RE IN LUCK! Save 7% with coupon code TWLUCKY7 for 7 days! Coupon code is case sensitive. Valid 3.11-3.17. Happy St. Patrick's Day!	Ham	Ham	Spam	Spam
Jan Barboglio Monogram Napkin Rings are back in their new, 2010 style! http://bit.ly/aPyyBZ	Spam	Ham	Spam	Spam
We just received in a fabulous new line and we are in love! Look for Arte Italica products to show up at RainCollection.com later this week!	Ham	Ham	Spam	Spam
Matt by Matt & Nat has arrived! View this eco-chic and vegan friendly accessories line here.. http://bit.ly/aXyhm4	Spam	Ham	Spam	Spam
New colors in Hobo's Clover Wristlet...Mustard and Maple! Check them out here http://bit.ly/9UiAU1	Spam	Ham	Ham	Spam
Arte Italica now available at Rain Collection! Check out the new collection here http://bit.ly/9YzU3T	Spam	Ham	Ham	Spam
DayNa Decker Botanika Candles are now available in 16 oz! Enjoy! http://bit.ly/9TOKzf	Spam	Ham	Ham	Spam
This just in from France:Check out the new Cote Bastide now available at Rain Collection. We LOVE the Amber Exfoliant!! http://bit.ly/9OSM55	Spam	Ham	Ham	Spam
New additions to Melie Bianco's 2010 spring line. http://bit.ly/94IIcZ	Spam	Ham	Ham	Spam
Sale into Spring with New Markdowns at Rain Collection! http://bit.ly/18Db0z	Spam	Ham	Ham	Spam
Zoe Chicco's Alchemy of Style http://bit.ly/9ieDzX	Spam	Ham	Ham	Spam
DayNa Decker's Botanika Essence Spray in a now available in a new "petit" size! Great for the home or the body! http://bit.ly/9I6GZn	Spam	Ham	Ham	Spam
Stay tuned for our Earth Day Sweepstakes and your opportunity to enter to win something fabulous!	Ham	Ham	Ham	Spam
Reduce Your Spring Cleaning Carbon Footprint: http://bit.ly/9xsWKV	Spam	Ham	Ham	Spam
Dare to Win DayNa Earth Day Sweepstakes for a chance to win DayNa Decker Soleil Couture Candle 16 oz: http://wfi.re/fc0a	Spam	Ham	Ham	Spam

Text				
Dare to Win DayNa Earth Day Sweepstakes for a chance to win DayNa Decker Soleil Couture Candle 16 oz: http://wfi.re/fc0a	Spam	Ham	Ham	Spam
Get Gas For 1/2 Price, FREE Or All That Plus More! With An Unlimited Residual Income Opportunity Program Too!http://tinyurl.com/yj9toow	Spam	Ham	Ham	Spam
Join This New And Unique One Of A Kind Social Media Surf Exchange!http://vurl.bz/s/medvu ... http://bit.ly/7dHEQ5	Spam	Ham	Ham	Spam
The Club Is Now LIVE! Get Gas At 1/2 PRICE! Make MONEY Too!http://vur.me/s/propelink ... http://bit.ly/7dHEQ5	Spam	Ham	Ham	Spam
Earn Active And Passive Residual Income With The Gas Club! http://vur.me/s/propelink ... http://bit.ly/7dHEQ5	Spam	Ham	Ham	Spam
IMPORTANT GAS CLUB REVIEW HERE! http://tinyurl.com/yjaqb7k ... http://bit.ly/7dHEQ5	Spam	Ham	Ham	Spam
Earn Active And Passive Residual Income From Gas! http://bit.ly/bwHUHj	Spam	Ham	Ham	Spam
Boost Your Twitter Marketing With These Tools! Make Money Too! http://bit.ly/9c19fN	Spam	Ham	Ham	Spam
Now Get Gas For 1/2 Price, FREE Or All That Plus More! http://bit.ly/bwHUHj	Spam	Ham	Ham	Spam
The Ultimate Way To Get More Followers On Twitter And Extra Cash! http://bit.ly/9c19fN	Spam	Ham	Ham	Spam
This Could Be One Of The Best New Opportunities To Hit The Net! http://bit.ly/bwHUHj	Spam	Ham	Ham	Spam
Free Tips To Maximize Your Twitter Marketing Fast And Easy! http://bit.ly/9c19fN	Spam	Ham	Ham	Spam
Get Half Of What You Normally Spend On Gas Back Into Your Wallet! http://bit.ly/bwHUHj	Spam	Ham	Ham	Spam
Twitter Marketing Tools Get More Followers And Makes You Money Too! http://bit.ly/9c19fN	Spam	Ham	Ham	Spam
Making loads of cash on the internet and loving life.	Ham	Ham	Ham	Spam
How I Trippled My Affiliate Commissions - Super Easy: If you've ever thought about writing an.. http://tinyurl.com/555rem	Spam	Spam	Ham	Spam
What A Killer JV Marketing Idea - Not Mine: I have no problem giving props to someone else when it.. http://tinyurl.com/5lfxu7	Spam	Spam	Ham	Spam
I've Been Hacked: Yep, it finally happened to me. I first realized something was wrong when I got .. http://tinyurl.com/6g8tjw	Spam	Spam	Ham	Spam
Just Got Back From An Awesome Trip: It's been a while since I've posted I know. I just .. http://tinyurl.com/6cmswq	Spam	Spam	Ham	Spam
The Race Is On: Well I know it's probably considered a touchy subject to talk about politics .. http://tinyurl.com/6rb9ok	Spam	Spam	Ham	Spam

Ezinearticles.com Drops The Hammer: For some bizarre reason EzineArticles has decided to implement.. http://tinyurl.com/5mvob4	Spam	Spam	Ham	Spam
I'll Never Sell Another eBook Again: I've sold a number of ebooks in the past but I'm do.. http://tinyurl.com/68anku	Spam	Spam	Ham	Spam
I Finally Found My Look: After months and months of searching and trying different looks I've.. http://tinyurl.com/539xnp	Spam	Spam	Ham	Spam
Hundred's of Links to Your Articles - On Autopilot: I recently discovered a killer way to get seve.. http://tinyurl.com/3nlmcg	Spam	Spam	Ham	Spam
Very Easy Money In About 5 Hours: If you've been in internet marketing for even a short perio.. http://tinyurl.com/4b4ejd	Spam	Spam	Ham	Spam
How Download Any Video to Your Computer: I'm going to give you a really easy way to download .. http://tinyurl.com/65bau3	Spam	Spam	Ham	Spam
A Lesson In Customer Service From Amazon: For my first online business I sold a physical product t.. http://tinyurl.com/562wjh	Spam	Spam	Ham	Spam
test post: test post Tags: internet marketing, online marketing, work at home online, make money o.. http://tinyurl.com/5sppp5	Spam	Spam	Ham	Spam
The Ultimate Copywriting Course - Always Free: You may or may not know that copywriting is the sin.. http://tinyurl.com/3t7mxk	Spam	Spam	Ham	Spam
Hungry Markets That Buy Again And Again Part 1: There are literally hundreds of niches full of mil.. http://tinyurl.com/4jzgbd	Spam	Spam	Ham	Spam
What Goes Around Comes Around - This Is Funny: A couple of months ago I posted about a guy on the .. http://tinyurl.com/3eeew4	Spam	Spam	Ham	Spam
Guru's - Shady Bonuses And Features: How many times have your read a sales letter for an ebook or .. http://tinyurl.com/3twuxb	Spam	Spam	Ham	Spam
PayPal Fraudsters - Fighting Back: I don't know how many times I've read a blog or forum.. http://tinyurl.com/3z48kk	Spam	Spam	Ham	Spam
MyBlogLog - Right Through The Backdoor: Most people in the internet marketing industry have heard .. http://tinyurl.com/4wnof7	Spam	Spam	Ham	Spam
New blog post: Ezine Articles Announces Killer Feature http://tinyurl.com/4swl6e	Spam	Spam	Ham	Spam
Ezine Articles has a killer new feature that will bring more people to your articles and websites. On your page where all your articl ...	Spam	Spam	Ham	Spam
Ezine Articles Announces Killer Feature: I was looking at my articles in my EZA account today and .. http://tinyurl.com/4swl6e	Spam	Spam	Ham	Spam

Text				
New blog post: Customizing Your Twitter Background - What A difference http://tinyurl.com/4z7m9t	Spam	Spam	Ham	Spam
Customizing Your Twitter Background - What A difference: I came across a post on the Croncast Blog.. http://tinyurl.com/4z7m9t	Spam	Spam	Ham	Spam
Just finished setting up my customized twitter background. Always good to stand out from everyone else	Ham	Ham	Ham	Spam
Hungry Markets That Buy Again And Again - Part 2: This is part 2 of a post I made last week about .. http://tinyurl.com/4q3djo	Spam	Ham	Ham	Spam
Personal finance stuff. Try to do it a couple of mornings per week. Sidenote, I highly recommend getting a credit card that has rewards.	Ham	Ham	Ham	Spam
@wineponit #nowplaying demarco wine pon di thing I dedicate the wicked tune to di wicked est @wineponit	Ham	Ham	Ham	Spam
@WineMcGee #aintnoway I got the real @wineMcgee following me @darlington316 .. Nuff respect I got u back	Ham	Spam	Ham	Spam
Early CAM .. I making my turn Big shout out to my new ppl on #teamblackberry let's go thanks for the add	Ham	Spam	Ham	Spam
@MizzDangerous 313EA64A darlington316 DJ CAM	Ham	Spam	Ham	Spam
#nowplaying "I'm the Man " fabulous that's the track when I listen makes me work to Be the Man! "yes shorty I'm the Man"	Ham	Spam	Ham	Spam
#aintnoway I'm going back to sleep now I'm always up @ this time to take a wiz #damnitstrue but #thankyoujesus	Ham	Spam	Ham	Spam
@MiissLove thinks for the warm welcome @miisLove that's queen missLove if u ask me.. :)	Ham	Spam	Ham	Spam
@kashiatiara thanks for the follow also 1million cool points for u !! Welcome to my word	Ham	Spam	Ham	Spam
@Karien22 what's going on ? Big shout out to @Karien22 look fresh with the hater blocker on .. They can't see u!	Ham	Spam	Ham	Spam
@Karien22 I'm good get that education it pays off I'm putting in some work on these turntables for a few events I have coming up	Ham	Spam	Ham	Spam
@Karien22 what school u go To and how do u like it?	Ham	Spam	Ham	Spam
@Karien22 which island u from 2 many questions for u .. I hope not	Ham	Spam	Ham	Spam
@isahater big shout out to @isahater lyk you CAM I dislike a hater but its just luv unspoken, they give me the drive to keep going	Ham	Spam	Ham	Spam

Text				
@Karien22 nuff respect to the good ppl from Antigua if @ all they friendly & approachable lyk @karien22 then I'm learning more about You	Ham	Spam	Ham	Ham
@Karien22 me I'm from west Africa LIBERIA to be exact lone star red white n blue but NY everywhere is what I call Home! BK/SI/Qb/NY& YO	Ham	Spam	Ham	Ham
@Karien22 you allready know yes ..but for trade I'm a health care provider soon to be a nurse	Ham	Spam	Ham	Ham
All the way turned up! http://twitpic.com/1n9cqw	Spam	Spam	Ham	Ham
@Karien22 n u? ..also do u have any siblings me I have 4 I'm the eldest!	Ham	Spam	Ham	Ham
BIBLE STUDY TIME !! ON MY WAY TO GET A WORD FROM THE GOOD BOOK ! TwEET YOU IN A FEW!	Ham	Ham	Ham	Ham
Its always good for me to shut self or everything off n pray and read the bible now I'm refreshed on the grind! Going HARD!	Ham	Ham	Ham	Ham
Its beautiful out where I am hope its the same where u at let's get it!	Ham	Ham	Ham	Ham
Nothing lyk a good breakfast of orange juice egg white on wheat bread and Quaker Oats all made by me yeah I gets bz in the kitchen	Ham	Ham	Ham	Ham
@ work now but I go dance BC its time to "celebrate" D'BANJ find out about THAT tweet u after WORK	Ham	Ham	Ham	Ham
Just got off work making my way home @ the train station .. Productive day, different unit I got a 5 day stretch Yes! Let's get it $$$$!	Ham	Ham	Ham	Ham
Nuff things ahh gwan as si wkend approaches but I'm laying high	Ham	Ham	Ham	Spam
#twowordcombos back rub I need one right now with no spa in seight SHM @ being single right now but I go dance ooo BC "no woman no cry	Ham	Ham	Spam	Spam
#Smackyourself if UR got a good woman & UR crying & not joyful tears .. My adjustments for my Queen wherever she may be I'm REaDY!!!	Ham	Ham	Ham	Ham
LETS GO LAKERS!!! REMEMBER U READ IT HERE 1ST I SEE A REPEAT OF LAST YEAR 2010 THE LAKERS WIN LETS GO I'D PUT MONEY ON THEM BOYS	Ham	Ham	Ham	Spam
#ITSBETTERWHEN YOU ACCEPT THE FACT THAT THE LAKERS GONNA WIN THAT SHIP THIS YEAR YEAH #24 ONE OVER UMMM WHAT'S HIS NAME AGAIN?	Ham	Ham	Ham	Ham
#DAMTHATSUCKS TO BE THE TEAM GOING AGINST THE LAKERS FOR THE SHIP WHEN THEY KNOW #24 AND THE REST OF THE SQUAD GONNA FLY AWAY WITH IT	Ham	Ham	Ham	Ham
#teamblackberry what's shaking ooo yeah that's right the phone I bring the storm every time u hit me on that bbm tip.pin:313EA64A	Ham	Ham	Ham	Ham

|				
Calling it a night goodnight tweet ppl	Ham	Ham	Ham	Ham
Hello! Good evening! Hello.. How u doing? #nowplaying "hello good Moring " dirty money	Ham	Ham	Ham	Ham
@Sh335hD5tackz #FF @sh335hD5tackz yup that's the dude right there one of my main supporters #FF @darlington316 let's go! DJ CAM dappl choice	Ham	Ham	Ham	Ham
Half hour more till I punch the clock	Ham	Ham	Ham	Ham
I think its time to call Verizon and tell them my #teamblackberry is acting up freezing on me n shit that means a new pin# in store 4 me	Ham	Ham	Ham	Ham
#teamblackberry whats up for the night? oo yeah i know not the vloume on my phone it's too loud "i thing the neighbors know my ring lol	Ham	Ham	Ham	Ham
@EaT_Diz_NaNa @ home just now lol & u?	Ham	Ham	Ham	Ham
THE PPL CHOICE IS HERE TWEET PPL JUST A FEW MORE #FF TO HIT 400 OMG CAN WE PLS HIT THAT EVERYONE #FF @darlington316 i will follow back	Ham	Ham	Ham	Ham
#NOWPLAYING "LET ME LOVE YOU DOWN" YUUP LADY THAT ALL I WANT TO DO .. ITS GHOST TOWN DJ'S YEAH THATS THE JAM 7 I'M BRINGING IT BACK!!	Ham	Ham	Ham	Ham
WAITING FOR LUV TO CALL ME OOO HOW I LUV TO HEAR HER VOICE WHAT EVER SHE HAS TO SAY Z WAY BETER THEN HATE	Ham	Ham	Ham	Ham
DO NOT ASK ME TO PLAY ON A TEAM HALF ASKED, I'M NOT WITH THAT, IT'S EITHER I GIVE MY ALL OR NONE AT ALL U DIG	Ham	Ham	Ham	Ham
Goodmorning tweet ppls Hope your wkend going great so far	Ham	Ham	Ham	Ham
TIME iS FAST!! remember 5/28 AFRO JAm @ bunnychow IN NY NY 5/29 Smokee da Don's B-day ! MIAMi on Targee st STaten ISLand! Music by DJ CAM	Ham	Ham	Ham	Ham
Time is really fast.. Getting ready for work yeah think God I'm working	Ham	Ham	Ham	Ham
#teamblackberry never ever leave home without the charger its lyk driving a car with no gas	Ham	Ham	Ham	Ham
@TWrightJr nah the original app for twitter to me is way better and its free in blackberry app world	Ham	Ham	Ham	Ham
@TWrightJr pin:313EA64A #teamblackberry that's my pin @TWrightjr future nurse lyk me#FF him	Ham	Ham	Ham	Ham
Hello! goodmorning!!!	Ham	Ham	Ham	Ham
Yo word to me if these ppl don't move from around here smelling lyk str8 shit I'm gonna blast them	Ham	Ham	Ham	Ham
#teamfollowback help me reach 400 I need about 50 more I will #teamfollowback	Ham	Ham	Ham	Ham
#nowplaying gyptian "hold Yuh .. Re mix ft nikki Minaj#smackyourself I you have yet to hear it	Ham	Ham	Ham	Ham

@iammzchoc2u I'm rocking a few events thus month if only u could be here to see me shut it down I got this ! On the 28th & 29th	Ham	Ham	Ham	Ham
to all my followers my#teamblackberry is down right now i was a victim of armed robbery also some very important tools i need for djing	Ham	Ham	Ham	Ham
For everyone on the CEltics the lakers have a better answer	Ham	Ham	Ham	Ham
What ever will be will be &CAM I must be A winner big shout out to all my new & Old followers thanks for the luv I'm almost @ 400 let's go	Ham	Ham	Ham	Ham
Everything happens in life for a reason we may not innerstand them @ the moment but @ the end you will see	Ham	Ham	Ham	Ham
Ummm did I say yeah that's right let's go lakers I see a sweep in this series and the next #24 MVP the Lakers r Champions!!	Ham	Ham	Ham	Ham
Kobe Bryant #24 one over what's there names again #23 let's see umm Jordan& James ummm rest in peace dead!	Ham	Ham	Ham	Ham
UMMM I JUST WAHT TO SAY LET'S GO LAKERS! SORRY SUNS AND WHILE I'M AT IT SORRY CELTICS YOU MAY GET ONE GAME IN BUT THIS YEAR IS LAKERS YEAR	Ham	Ham	Ham	Ham
#NEEDSTOSAID THE LAKERS GONNA WIN#SAMCKYOURSELF IF YOU THINK NOT BC #AINTNOWAY ANY OF THE OTHER TEAMS IN HERE A MATCH	Ham	Ham	Ham	Ham
BIG S/O TO #TEAMFOLLOWBACK @darlington316 on deck #teamfollowback i rock when them bc they Follow Back!!	Ham	Ham	Ham	Ham
#teamfollowback #smackyourself is you on the squad and relly not about the movement all it takes is to follow back lol	Ham	Ham	Ham	Ham
#needtobe said that I go to BIBLE STUDY SCHEDULED EVERY WED I'M I GLAD I WENT YESTERDAY IT HELPED ME WITH SOMETHING I WAS THINKING ABOUT	Ham	Ham	Ham	Ham
#rise and grinds #teamblackberry/#teamfollowback toay like anyother is get money$$$ yeah dj cam i'm about that	Ham	Ham	Ham	Ham
Thank god it's thurs. means today is payday but i wilkl be at work this wkend doing a double oooo bc i have to double up on my gears yeah	Ham	Ham	Ham	Ham
my brother young chris is set to finish high school in in motion to go to college as a scholar and play basketbal I AM VERY PROUD	Ham	Ham	Ham	Ham

INTELLIGENT SOUNDZ ! IN DA STREETZ PRINTING! YOUNG CHRIS? DJ TORUCH/ CAM/CAM ENT THE MOVEMENT IS NOW IT'S TOO GOOD OF A LOOK TO SHOW U NOW	Ham	Ham	Ham	Ham
FROM NOW ON CALL ME MR I PUT ON BC I PUT GZ ON TO SPOT THAT THEY SLEPT ON , BUT I'M GLAD BC I MOVE UP .. THAT'S HOW IT IS IN THIS ENT BIZ	Ham	Ham	Ham	Ham
MAY ALL MY DJ'S I HOPE YOU GET TRIPPLE BOOKED REAL TWEET	Ham	Ham	Ham	Ham
@Burcum7 NO LUV I'M FAR FROM A GANGSTER I'M MORE OF A GENTLEMAN A LOVER NOT A FIGHTER EVERYTHING GOOD AND NOT TOO MUCH BAD	Ham	Ham	Ham	Ham
SMH @ SOME PPL ESP FAM.. LOL ALWAYS ON SUM GIVE THIS GIVE THAT ,GIVE THIS GIVE THAT, WHEN WILL THAT EVER GIVE TO THIS..LOL BUT I LUV THEM	Ham	Ham	Ham	Ham
you know whatumm #needstobesaid that #itgrindsmygeras when the radio plays one song many times iluv the song but let it rest "hold yuh"	Ham	Ham	Ham	Ham
it's good that the song is gettin air time but if you play it way too much ppl would start not to like it as much.. the good and the bad	Ham	Ham	Ham	Ham
#TEAMBLACKBERRY, #TEAMFLLOWBACK, I AM GLAD TO SEE THAT I HAVE NOW PAST 400 MAY THE NUMBERS KEEP GROWING JUNE 3RD "SOMETHING DIFFERENT"	Ham	Ham	Ham	Ham
JUNE RD! JUNE 3RD! DJ CAM LAY LOW FLY HIGH "SOMETHING DIFFERENT" AND NOT WHAT THEY THINK THANK GOD FOR THE VISION I'M ON A MISSION TO WIN!!	Ham	Ham	Ham	Ham
@ARLEIGHBANNER I WAS JUST TRYING TO SEE THE REAL FROM THE FAKE WAY TOO MANY SPAMERS BUT CAM YEAH I' BACK FOLLOWING YOU	Ham	Ham	Ham	Ham
@ bible study with good prayful women!	Ham	Ham	Ham	Ham
Ummm I still think the lakers will win the championship!	Ham	Ham	Ham	Ham
3936. Get your FREE Apple iPad 3G on us! http://tinyurl.com/2cnupwk	Ham	Ham	Ham	Ham
RT @CarlosGandara: @jaquefiamenghi Me? I ate too well, but I did come home with the same weight.	Ham	Ham	Ham	Ham
Perhaps, @arjunvkp, your dad would appreciate the Sound of Silence early on a Saturday. ♫ http://blip.fm/~j8n4n	Ham	Ham	Ham	Ham
RT @pdejager: @AhhPhotography Old computer programmers never die, they just ..... Abend	Ham	Ham	Ham	Ham

Text				
@MyNatureTracks @pdejager @WCRSaenz @arjunvkp @CarlosGandara @the_daemon_ @BDnUSA @Darth_RikG @janeson59 @SanDanYi TY4RT&#ff 4U!	Ham	Ham	Ham	Ham
@arjunvkp No, but the double meaning may be on your dad's mind. not mine. We're cool!	Ham	Ham	Ham	Ham
Happy trails to you, until we meet again. Some trails are happy ones, Others are blue. Dale Evans	Ham	Ham	Ham	Ham
The ocean is rising. Why isn't it number of boats instead of global warming?	Ham	Ham	Ham	Ham
If we'd stop trying to be happy we could have a pretty good time.	Ham	Ham	Ham	Ham
ItsTooMuchCoffeeWhen: The Taster's Choice couple wants to adopt you	Ham	Ham	Ham	Ham
LetItNotBeSaidOfU There's intelligent life on his planet, but he isn't it.	Ham	Ham	Ham	Ham
Some people find fault like there is a reward for it. Zig Ziglar	Ham	Ham	Ham	Ham
How many…Chihuahua: Yo quiero Taco Bulb. Pointer: I see it, there it is, there it is, right there ...	Ham	Ham	Ham	Ham
Two cannibals are eating a clown. One says to the other: Does this taste funny to you?	Ham	Ham	Ham	Ham
ItsTooMuchCoffeeWhen: You can type sixty words a minute with your feet	Ham	Ham	Ham	Ham
Lord, if I can't be skinny, please let all my friends be fat.	Ham	Ham	Ham	Ham
HaplessHeadline: Police Station Toilet Stolen. Cops Have Nothing To Go On.	Ham	Ham	Ham	Ham
It doesn't matter where you are coming from. All that matters is where you are going. Brian Tracy	Ham	Ham	Ham	Ham
ItsTooMuchCoffeeWhen: You so stupid things faster & with more energy	Ham	Ham	Ham	Ham
HaplessAd: Amana Washer $100. Owned By Clean Bachelor Who Seldom Washed	Ham	Ham	Ham	Ham
Hey, @HeatherNix! Happy Birthday! Celebrate getting thru that last year, and here's to a much brighter one. #ff #togsfollow	Ham	Ham	Ham	Ham
RT @rayuotila: The Hidden Costs of TrueTwit: http://bit.ly/4GsCJE (I agree!) / Me, 2.	Spam	Spam	Ham	Ham
RT @txheadshots: Subscribing to a foolish consistency is the hobgoblin of little minds. -- Ralph Waldo Emerson #quote	Ham	Ham	Ham	Ham
RT @CarinaK: You're not better than anyone but no one is better than you.	Ham	Ham	Ham	Ham
@sprittibee @ArtisticContent @AmyDelaine @majaelcomo @FasTake @Sung_H_Lee @zbleumoon @Restoration @Restoration @elnerito TY4RT&#FF 4U!	Ham	Ham	Ham	Ham

RT @elnerito: @AhhPhotography @rmindler @FasTake @Sung_H_Lee today's pic panoramic view of Mexico City http://bit.ly/8dskBD / Nice!	Spam	Spam	Ham	Ham
RT @operationSAFE: We give children their smiles back http://bit.ly/6avrfh - but we need your help! #Haiti #traumachildren	Spam	Spam	Ham	Ham
Votivo:The White Collection http://tinyurl.com/bruo5b	Spam	Spam	Ham	Ham
Special discount for Twitter friends..enter coupon code twitt03(case sensitive) for 15% off during the month of March www.raincollection.com	ham	Spam	Ham	Ham
Rain: New 'Shop by Fragrance' feature lets you experiment with new Brands http://tinyurl.com/da8tkz	Spam	Spam	Ham	Ham
Rain's Newest: Finnish Designer, Marimekko now available at Rain Collection http://www.raincollection.com/pages/marimekko/565.php	Spam	Spam	Ham	Ham
Rain presents our much anticipated blog...and this season's must have accessories! http://www.raincollection.com/blog/	Spam	Spam	Ham	Ham
Rain's latest 'On Trend' report now posted on our blog!...http://www.raincollection.com/blog/	Spam	Spam	Ham	Ham
A new look at Jan Barboglio, the artist's inspirations, and some of our favorite items... http://bit.ly/Dt1JS	Spam	Spam	Spam	Ham
New Markdowns at Rain Collection. Save up to 50% off! http://bit.ly/12KUGv	Spam	Spam	Spam	Ham
Modern form fuses with function at Rain Collection. http://bit.ly/bbqe6	Spam	Spam	Spam	Ham
DayNa Decker: An Eco-chic Ambiance http://bit.ly/cf36R	Spam	Spam	Spam	Ham
On Trend: Heavy Metal and Druzy for Fall http://www.raincollection.com/blog/	Spam	Spam	Spam	Ham
A special discount for our Twitter friends! Use coupon code 'twitt10' for 10% off throughout October. http://www.raincollection.com/	Spam	Spam	Spam	Ham
Check out Rain Collection featured in InStyle's November issue! http://www.raincollection.com/pages/press/552.php	Spam	Spam	Spam	Ham
Save 15% at RainCollection.com, now through December 16th. Enter HOL15 at checkout and get your order in time for Christmas!	Spam	Spam	Spam	Ham
New markdowns at Rain Collection http://www.raincollection.com/pages/on-sale/354.php	Spam	Spam	Spam	Ham
Votivo:The White Collection http://tinyurl.com/bruo5b	Spam	Spam	Spam	Ham
Special discount for Twitter friends..enter coupon code twitt03(case sensitive) for 15% off during the month of March www.raincollection.com	Spam	Spam	Spam	Ham

Rain: New 'Shop by Fragrance' feature lets you experiment with new Brands http://tinyurl.com/da8tkz	Spam	Spam	Ham	Spam
Rain's Newest: Finnish Designer, Marimekko now available at Rain Collection http://www.raincollection.com/pages/marimekko/565.php	Spam	Spam	Ham	Spam
A new look at Jan Barboglio, the artist's inspirations, and some of our favorite items... http://bit.ly/Dt1JS	Spam	Spam	Ham	Spam
New Markdowns at Rain Collection. Save up to 50% off! http://bit.ly/12KUGv	Spam	Spam	Ham	Spam
Modern form fuses with function at Rain Collection. http://bit.ly/bbqe6	Spam	Spam	Spam	Spam
DayNa Decker: An Eco-chic Ambiance http://bit.ly/cf36R	Spam	Spam	Spam	Spam
On Trend: Heavy Metal and Druzy for Fall http://www.raincollection.com/blog/	Spam	Spam	Spam	Spam
Prediction (Correct)		710	690	570
Prediction (Incorrect)		290	310	430
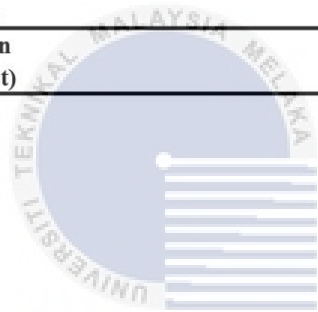
Appendix B: Scripting for machine learning classifier models to test and train.

```python
import re

import os.path

import numpy as np

import pickle

from sklearn.feature_extraction.text import TfidfVectorizer

from scipy.sparse import csr_matrix

from sklearn import metrics

from sklearn.naive_bayes import GaussianNB

from sklearn import svm

from sklearn.ensemble import RandomForestClassifier, AdaBoostClassifier

from sklearn.tree import DecisionTreeClassifier

import matplotlib.pyplot as plt


##########################################################

#

# TwitterUser class for storing info. about user and his tweets

#

##########################################################

class TwitterUser:


    def __init__(self, idd, created, collected, followings,
            followers, tweets_num, length_name, length_description):
        self._user_id = idd
        self._created_at = created
        self._collected_at = collected
        self._numb_followings = followings
        self._numb_followers = followers
        self._numb_tweets = tweets_num
```

```python
        self._name_length = length_name
        self._description_length = length_description
        self._tweets = []

        self._tfidf = []
        self._ratio_follower_following = 0.0
        self._count_http = 0
        self._count_at = 0


    @property
    def user_id(self):
        return self._user_id

    @user_id.setter
    def user_id(self, value):
        self._user_id = value

    @property
    def created_at(self):
        return self._created_at

    @created_at.setter
    def created_at(self, value):
        self._created_at = value


    @property
    def collected_at(self):
        return self._collected_at
```

```python
@collected_at.setter
def collected_at(self, value):
    self._collected_at = value


@property
def numb_followings(self):
    return self._numb_followings


@numb_followings.setter
def numb_followings(self, value):
    self._numb_followings = value


@property
def numb_followers(self):
    return self._numb_followers


@numb_followers.setter
def numb_followers(self, value):
    self._numb_followers = value


@property
def numb_tweets(self):
    return self._numb_tweets


@numb_tweets.setter
def numb_tweets(self, value):
    self._numb_tweets = value


@property
```
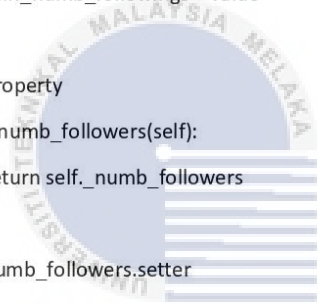
```python
    def name_length(self):
        return self._name_length


    @name_length.setter
    def name_length(self, value):
        self._name_length = value


    @property
    def description_length(self):
        return self._description_length


    @description_length.setter
    def description_length(self, value):
        self._description_length = value


    @property
    def tweets(self):
        return self._tweets


    @tweets.setter
    def tweets(self, value):
        self._tweets = value


    @property
    def ratio_follower_following(self):
        return self._ratio_follower_following


    @ratio_follower_following.setter
    def ratio_follower_following(self, value):
```
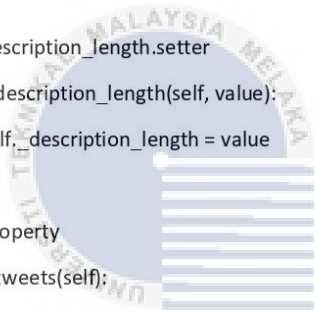
```python
        self._ratio_follower_following = value


    @property
    def count_http(self):
        return self._count_http


    @count_http.setter
    def count_http(self, value):
        self._count_http = value


    @property
    def count_at(self):
        return self._count_at


    @count_at.setter
    def count_at(self, value):
        self._count_at = value


    @property
    def tfidf(self):
        return self._tfidf


    @tfidf.setter
    def tfidf(self, value):
        self._tfidf = value



##############################################################
#
```

```python
# Imports data from text files, stores it into TwitterUser object
# and finally return a list TwitterUser objects.
#
################################################################
def import_user_data(user_file, tweet_file):
    twitter_users = []
    with open(user_file) as f1:
        all_user_info = f1.readlines()
        for user_info in all_user_info:
            twitter_user_ob = TwitterUser(re.split(r'\t+', user_info)[0], re.split(r'\t+', user_info)[1],
                            re.split(r'\t+', user_info)[2], float(re.split(r'\t+', user_info)[3]),
                            float(re.split(r'\t+', user_info)[4]), float(re.split(r'\t+', user_info)[5]),
                            float(re.split(r'\t+', user_info)[6]), float(re.split(r'\t+', user_info)[7][:-1]))
            twitter_users.append(twitter_user_ob)

    with open(tweet_file, encoding='utf-8') as f2:
        all_user_tweets = f2.readlines()
        for line_tweets_info in all_user_tweets:
            for twitter_user in twitter_users:
                if twitter_user.user_id == re.split(r'\t+', line_tweets_info)[0]:
                    tweets = twitter_user.tweets
                    tweets.append(re.split(r'\t+', line_tweets_info)[2])
                    twitter_user.tweets = tweets

    return twitter_users


################################################################
#
```

```python
# Calculates various features derived from the existing data types
# of the TwitterUser object, and add those calculated features back
# to the object.
#
################################################################
def calculate_features(twitter_users):
    for user in twitter_users:


        try:
            tfidf = TfidfVectorizer(min_df=1).fit_transform(user.tweets)
            pairwise_similarity = tfidf * tfidf.T
            user.tfidf = csr_matrix.mean(pairwise_similarity).item()
        except Exception:
            user.tfidf = 0.0
            pass


        if user.numb_followings > 0:
            user.ratio_follower_following = user.numb_followers / user.numb_followings
        else:
            user.ratio_follower_following = 0
        at_count = 0
        http_count = 0
        for tweet in user.tweets:
            at_count += tweet.count("@")
            http_count += tweet.count("http")
        user.count_at = at_count
        user.count_http = http_count
```

```python
################################################################
#
# Converts the features into numpy arrray / matrix and normalizes it
#
################################################################
def build_feature_matrix(twitter_users):
    features_matrix = []


    for user in twitter_users:
        features_matrix.append([user.name_length, user.description_length, user.count_http,
                        user.count_at, user.ratio_follower_following, user.tfidf])


    features_matrix_np = np.array(features_matrix)
    features_matrix_normalized = features_matrix_np / features_matrix_np.max(axis=0)


    return features_matrix_normalized


################################################################
#
# Importing files, creating training & testing features and labels
#
################################################################
predictUsers = []
def appendToUsers(predictThis):
    for i in predictThis:
        predictUsers.append(i.user_id)
```
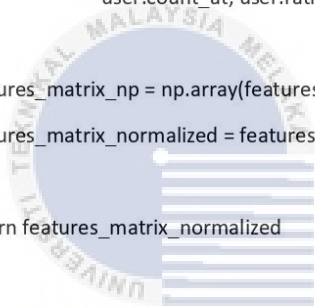
```python
def refomat_new_lines(filename):

    print(filename)

    with open(filename, "rt", encoding='utf-8') as fh:

        content = fh.read().replace('\r', '')

    print(content[:3])

    with open(filename + '_new', "wt", encoding='utf-8') as fh:

        fh.write(content)

    print('OK!')




if os.path.isfile("training_labels.dat") and os.path.isfile("training_features_matrix.dat") and
os.path.isfile("testing_labels.dat") and os.path.isfile("testing_features_matrix.dat"):

    # for filename in ["training_labels.dat", "training_features_matrix.dat",
    #            "testing_labels.dat", "testing_features_matrix.dat"]:
    #    refomat_new_lines(filename)

    training_labels = pickle.load(open("training_labels.dat_new", "rb"), encoding = 'bytes')

    training_features = pickle.load(open("training_features_matrix.dat_new", "rb"), encoding = 'bytes')

    testing_labels = pickle.load(open("testing_labels.dat_new", "rb"), encoding = 'bytes')

    testing_features = pickle.load(open("testing_features_matrix.dat_new", "rb"), encoding = 'bytes')
    testing_legit = import_user_data("Testing_data/legitimate_users1.txt",
"Testing_data/legitimate_users_tweets.txt")

    testing_spammers = import_user_data("Testing_data/spammers1.txt",
"Testing_data/spammers_tweets.txt")

    appendToUsers(testing_legit)

    appendToUsers(testing_spammers)
else:

    training_spammers = import_user_data("Training_data/spammers.txt",
"Training_data/spammers_tweets.txt")
```

```python
    calculate_features(training_spammers)

    training_spammers_feature_matrix = build_feature_matrix(training_spammers)


    training_legit = import_user_data("Training_data/legitimate_users.txt",
"Training_data/legitimate_users_tweets.txt")

    calculate_features(training_legit)

    training_legit_feature_matrix = build_feature_matrix(training_legit)


    training_labels = [0] * len(training_spammers_feature_matrix) + [1] *
len(training_legit_feature_matrix) #0 spammers, 1 - legit

    with open('training_labels.dat', 'w') as outfile:

        pickle.dump(training_labels, outfile)


    training_features = np.concatenate((training_spammers_feature_matrix,
training_legit_feature_matrix), axis=0)

    with open('training_features_matrix.dat', 'w') as outfile:

        pickle.dump(training_features, outfile)

    testing_spammers = import_user_data("Testing_data/spammers1.txt",
"Testing_data/spammers_tweets.txt")

    calculate_features(testing_spammers)

    testing_spammers_feature_matrix = build_feature_matrix(testing_spammers)

    appendToUsers(testing_spammers)

    testing_legit = import_user_data("Testing_data/legitimate_users1.txt",
"Testing_data/legitimate_users_tweets.txt")

    calculate_features(testing_legit)

    testing_legit_feature_matrix = build_feature_matrix(testing_legit)

    appendToUsers(testing_legit)

    testing_labels = [0] * len(testing_spammers_feature_matrix) + [1] * len(testing_legit_feature_matrix)

    with open('testing_labels.dat', 'w') as outfile:
```

```
        pickle.dump(testing_labels, outfile)


    testing_features = np.concatenate((testing_spammers_feature_matrix, testing_legit_feature_matrix),
axis=0)
    with open('testing_features_matrix.dat', 'w') as outfile:

        pickle.dump(testing_features, outfile)




################################################################
#
# Configuring plot appearance and labels
#
################################################################
def plot_confusion_matrix(cm, title='Confusion matrix', cmap=plt.cm.BuPu):
    plt.imshow(cm, interpolation='nearest', cmap=cmap)
    plt.title(title)
    plt.colorbar()
    tick_marks = np.arange(2)
    plt.xticks(tick_marks, ["Spammer", "Non-Spammer"], rotation=45)
    plt.yticks(tick_marks, ["Spammer", "Non-Spammer"])
    plt.tight_layout()
    plt.ylabel('True label')
    plt.xlabel('Predicted label')


################################################################
#
# Building, testing and evaluating various Machine Learning models.
#
################################################################
```

```python
def select_classifier(algo, label):

    model = algo

    print(training_features)

    print(training_labels)

    model.fit(training_features, np.array(training_labels))

    expected = testing_labels

    predicted = model.predict(testing_features)

    count = 0

    for predict in predicted:

        count+=1

        if(predict == 0):

            print(predictUsers[count - 1]),

            print("is a spammer")

        else:

            print(predictUsers[count - 1]),

            print("is a not spammer")

    print("--------------------------------------------------")
    print("|            Classification Report            |")
    print("--------------------------------------------------")
    print(metrics.classification_report(expected, predicted))
    print("")


    print("--------------------------------------------------")
    print("|              Confusion Matrix               |")
    print("--------------------------------------------------")
    print(metrics.confusion_matrix(expected, predicted))
    print("")


    cm_list = metrics.confusion_matrix(expected, predicted).tolist()
```

```python
    list_total = float(sum(sum(x) for x in cm_list))


    print("---------------------------------------------------")
    print("|          False Positives and Negatives          |")
    print("---------------------------------------------------")
    print ("False Positive: ", cm_list[1][0] / list_total)
    print("")
    print ("False Negative: ", cm_list[0][1] / list_total)
    print("")


    plt.figure()
    plot_confusion_matrix(metrics.confusion_matrix(expected, predicted), label)
    plt.show()


# Naive Bias
select_classifier(GaussianNB(), "Naive Bayes Classifier")


# SVM
select_classifier(svm.SVC(), "SVM Classifier")


# Random Forest
select_classifier(RandomForestClassifier(n_estimators=150), "Random Forest Classifier")
```