ENSEMBLE METHOD OF TWEET, URL AND OTHER FEATURES CLASSIFIERS IN TWITTER BOT DETECTION

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BORANG PENGESAHAN STATUS LAPORAN

JUDUL: [**ENSEMBLE METHOD OF TWEET, URL AND OTHER FEATURES CLASSIFIERS IN TWITTER BOT DETECTION**]

SESI PENGAJIAN: [2022 / 2023]

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Tarikh: 22/9/2023

ENSEMBLE METHOD OF TWEET, URL AND OTHER FEATURES CLASSIFIERS IN TWITTER BOT DETECTION

AHMAD SYAHMI FARHAN BIN SABRI

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

2023

DECLARATION

I hereby declare that this project report entitled

[ENSEMBLE METHOD OF TWEET, URL AND OTHER FEATURES CLASSIFIERS IN TWITTER BOT DETECTION]

is written by me and is my own effort and that no part has been plagiarized without citations.

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SUPERVISOR : _____ Date : 22/9/2023
([TS. NOR AZMAN BIN MAT ARIFF])

DEDICATION

To my beloved parents, I like to extend my thanks to my father and mother who always support me despite of many obstacles in life. I would like to express my gratitude and appreciation to them because they have given me a lot of encouragement and keep praying for successful future. This work hard is for my parents, and I want to make them happy.

To my fellow friends, thank you for being there for me throughout the entire bachelor program and their cooperation while conducting the research. I would like to express my gratitude to my supervisor for encouraging and believing in me to complete this research.

ACKNOWLEDGEMENTS

All praise is due to the All-Mighty Allah SWT, who has granted me the faith, strength, and abilities to comprehend, study, and complete this research. Peace and prayers be upon our most beloved Prophet Muhammad S.A.W., the most beautiful soul whose sayings, actions, and stories have profoundly inspired me to believe that there are no limits to what I can accomplish when fully committed to achieving something with Allah on my side.

I also revere the assistance and direction of my supervisor, Mr. Nor Azman bin Mat Ariff, for his guidance, encouragement, and patience in preparing this research. I am fortunate to have had such wonderful, loving, and supportive parents, who provided me with a home education while I was growing up and paid for my education until I graduated. They have **been** my pillar of fortitude, and to this day, they want to be the first to congratulate me on even the smallest of my accomplishments. To my colleagues who assisted in the arduous process of gathering data and preparing this research. May Allah bless you all for your perseverance and altruism. I would also like to thank my beloved parents who have supported and motivated me throughout my project.

ABSTRACT

Twitter has experienced a remarkable rise in popularity and influence. However, twitter's popularity and open nature make it a desirable target for bots known as Twitter bots. This research proposes an Ensemble method for detecting Twitter bots. In the initial phase, four models are developed from Twitter features: a model that extracts tweet features using words, a model that extracts tweet features using n-gram, a model that extracts URL features using n-gram, and one that extracts additional features. Information Gain feature selection is applied and evaluated for multiple threshold values for all models to achieve the most accurate representation. The model with the threshold value that has the highest accuracy on the training set is chosen as the input for the ensemble method. The final prediction is derived by combining the probability outputs of these four models. This Ensemble method strategy aims to improve the classifier's overall performance by capitalizing on the strengths of the four fundamental models. To evaluate the effectiveness of the proposed method, extensive experiments are conducted on the Cresci-2017 dataset. The test results show that the proposed method using four models provides a satisfactory mean accuracy of 97.50%, which surpasses the accuracy of the models together, which are 70.50% for the tweets word model, 85.00% for the tweets n-gram model, 93.50% for the URL n-gram model and 82.00% for other features model. This demonstrates the efficacy of the ensemble approach and the importance of incorporating diverse features to achieve outstanding Twitter bot detection accuracy.

ABSTRAK

Twitter telah mengalami peningkatan yang luar biasa dalam popularity dan pengaruh. Walau bagaimanapun, popularity dan sifat terbuka Twitter menjadikannya sasaran yang wajar untuk bot yang dikenali sebagai bot Twitter. Penyelidikan ini mencadangkan Kaedah Ensemble untuk mengesan bot Twitter. Pada fasa awal, empat model dibangunkan daripada ciri Twitter: model yang mengekstrak ciri tweet menggunakan perkataan, model yang mengekstrak ciri tweet menggunakan n-gram, model yang mengekstrak ciri URL menggunakan n-gram, dan model yang mengekstrak ciri tambahan. Pemilihan filtur *Information Gain* digunakan dan dinilai untuk nilai ambang berbilang bagi kedua-dua model untuk mencapai perwakilan yang paling tepat. Model dengan nilai ambang yang mempunyai ketepatan tertinggi pada set latihan dipilih sebagai input untuk kaedah *Ensemble*. Ramalan akhir diperoleh dengan menggabungkan output kebarangkalian bagi empat model ini. Strategi kaedah *Ensemble* ini bertujuan untuk meningkatkan prestasi keseluruhan pengelas dengan memanfaatkan kekuatan empat model asas. Untuk menilai keberkesanan kaedah yang dicadangkan, eksperimen yang meluas dijalankan pada dataset awam Cresci-2017. Keputusan ujian menunjukkan bahawa kaedah yang dicadangkan hanya menggunakan empat ciri memberikan ketepatan min yang memuaskan iaitu 97.50%, yang mengatasi ketepatan model bersama, iaitu 70.50% untuk model perkataan *tweets*, 85.00% untuk model *tweets* n-gram, 93.50% untuk model URL n-gram dan 82.00% untuk model ciri lain. Ini menunjukkan keberkesanan pendekatan *ensemble* dan kepentingan menggabungkan ciri yang pelbagai untuk mencapai ketepatan pengesanan bot Twitter yang cemerlang.

TABLE OF CONTENTS

PAGE

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

LIST OF ABBREVIATIONS

FYP	**-**	**Final Year Project**
BOW	**-**	**Bag-of-Words**
CS	**-**	**Chi-Square**
DoS	**-**	**Denial-of-Service**
SVM	**-**	**Support Vector Machine**
IG	**-**	**Information Gain**
TP	**-**	**True Positive**
TN	**-**	**True Negative**
FP	**-**	**False Positive**
FN	**-**	**False Negative**
URL		**Uniform Resource Locator**

LIST OF ATTACHMENTS