

**CHATDRIBIE: MALAYSIAN ROAD SIGN RECOGNITION
CHATBOT**

NURUL AZIEYATI ASYIQIN BINTI ABDUL MALEK

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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JUDUL: **CHATDRIBIE: MALAYSIAN ROAD SIGN RECOGNITION CHATBOT**

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Alamat Tetap: LOT 11, NO. 15,
LORONG KEMAJUAN 1, TAMAN
KEMAJUAN LIKAS, 88400, KOTA
KINABALU, SABAH

Tarikh: 13/09/2023

(TANDATANGAN PENYELIA)

Profesor Madya Gs. Dr. Asmala Ahmad
Nama Penyelia

Tarikh: 13/09/2023

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**CHATDRIBIE: MALAYSIAN ROAD SIGN RECOGNITION
CHATBOT**

NURUL AZIEYATI ASYIQIN BINTI ABDUL MALEK

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

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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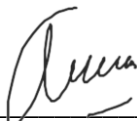
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(NURUL AZIEYATI ASYIQIN BINTI ABDUL MALEK)

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SUPERVISOR :  Date: 13/09/2023
(ASSOC. PROF. GS. DR. ASMALA AHMAD)

DEDICATION

First of all, I would like to dedicate this report to my beloved family and to all those who have supported, encouraged, and inspired me to reach this point. And, to my supervisor Assoc. Prof. Gs. Dr. Asmala Ahmad who has been guiding me during this semester. Most thanks for his support, feedback and all the worthwhile lessons.

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I would like to express my gratitude to Almighty Allah for enabling me to complete this report during this final year project. With His permission, I can complete my Final Year Project successfully and I have learnt a lot during my research.

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Finally, I also dedicate this report to my beloved family and to all those who have supported, encouraged, and inspired me to reach this point. I do appreciate all the helping hands they lent while I had lost the courage at a certain point and, they for sure had gathered me back into conscience effortlessly. Big thanks to all of them.

ABSTRACT

Traffic signs are an important thing to provide information about what happens on the road while driving or walking. It also may cause an accident if the road user is not aware of traffic signs on the road. In another hand, tourists or international students who drive in Malaysia also may have the same problem and some of them maybe don't understand the meaning of road signs in Malaysia. This project is to focus on detecting the traffic/road signs on the roadside using Convolution Neural Network with PyTorch. This is done by initially analyzing the requirements followed by designing the architecture, implementing, and testing the chatbot. In developing the chatbot, a CNN model is trained with pre-processed datasets to predict the recognition of the traffic/road signs. The recognition accuracy achieved higher than 90% recognition accuracies for traffic signs using Malaysia's traffic sign data set. This system will help the driver to learn and get knowledge about the meaning of traffic signs. It seems like a simple problem but may have a significant impact on their lives and their environment if this problem is ignored. It is also easy to access the system because the user just needs to search for the "DRIEBIE" chatbot on Telegram and then can easily access and learn from there. Users don't need to install additional software or hardware to get the system and it's free for anyone who needs it. The system requires users to send an image of a traffic sign on the road as input, then the system will provide explanations, and instructions to help users to refer and make decisions.

ABSTRAK

Papan tanda lalu lintas adalah perkara penting untuk memberi maklumat tentang apa yang berlaku di jalan raya semasa memandu atau berjalan kaki. Ia juga boleh menyebabkan kemalangan jika pengguna jalan raya tidak sedar akan kepentingan memahami papan tanda lalu lintas di jalan raya. Seterusnya, pelancong atau pelajar antarabangsa yang memandu di Malaysia juga mungkin mengalami masalah yang sama di mana ada di antara mereka yang tidak memahami maksud papan tanda jalan di Malaysia. Oleh itu, projek ini adalah untuk memberi tumpuan kepada pengesanan tanda lalu lintas/jalan raya di tepi jalan menggunakan *Convolution Neural Network (CNN)* dengan PyTorch. Ini dilakukan dengan menganalisis keperluan pada mulanya diikuti dengan mereka bentuk seni bina, melaksanakan dan menguji chatbot. Dalam membangunkan chatbot, model CNN dilatih dengan set data pra-diproses untuk meramalkan pengiktirafan tanda lalu lintas/jalan raya. Ketepatan pengecaman mencapai ketepatan pengecaman lebih tinggi daripada 90% untuk papan tanda trafik menggunakan set data tanda trafik di Malaysia. Sistem ini akan membantu pemandu untuk mempelajari dan mendapat pengetahuan tentang maksud papan tanda jalan raya di Malaysia. Ia kelihatan seperti masalah mudah tetapi masalah ini boleh memberi kesan yang besar kepada kehidupan mereka dan orang di persekitaran mereka jika masalah ini diabaikan. Sistem ini juga mudah untuk diakses untuk menggunakannya kerana pengguna hanya perlu mencari DRIEBIE chatbot di Telegram kemudian boleh mengakses dan belajar dengan mudah dari situ. Pengguna tidak perlu memasang perisian atau perkakasan tambahan untuk mendapatkan sistem dan ia percuma untuk sesiapa sahaja yang memerlukannya. Sistem ini memerlukan pengguna menghantar imej tanda lalu lintas di jalan raya sebagai input, kemudian sistem akan memberikan penerangan, dan arahan untuk membantu pengguna merujuk dan membuat keputusan.

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LIST OF ABBREVIATIONS

FYP	- Final Year Project
CNN	- Convolution Neural Network
TSR	- Traffic Sign Recognition
VGG-16	- Visual Geometry Group 16
DenseNet	- Dense Network
Resnet-50	- Residual network with 50 convolutional layers

CHAPTER 1: INTRODUCTION

1.1 Introduction

Road signs are visual symbols or markings placed along roadways to provide information, guidance, and warnings to drivers, pedestrians, and other road users. They play an important role in ensuring safety and promoting efficient traffic flow. Road signs convey various types of information, such as regulatory instructions, warnings of potential hazards, guidance for directions, and important information about the road and its surroundings. It is important to familiarize yourself with the meaning of different road signs and their implications to avoid accidents. Moreover, road signs are like a language that the road wants to convey to drivers which gives relevant information on when to turn, street names, routes, directions, and warning for drivers. This road sign also helps drivers to keep them safe while driving. Without the knowledge of road signs, they hardly recognize what happens in front of them and tend to cause rising accidents in those areas. Some drivers might not realize this, but the road and safety signs in Malaysia have different meanings and functions according to their shape, font size, signboard color, placement, and symbol (Asyraf, 2022)

The purpose of CHATDRIBIE which is known as the Malaysian road sign classification system in Chatbot aims to provide important information and instructions to the road users and to accurately classify traffic signs based on their visual content. This classification system enables the chatbot to provide users with relevant information, guidance, and assistance related to specific traffic signs. Furthermore, this system also focuses on helping road users who are still new in

driving and doesn't remember the meaning of road symbol it is also useful for tourist who drives in Malaysia so that they can better understand the meaning of the road signs. The chatbot will require users to send an image of road signs then it will explain in detail the meaning of the road signs and the instruction on what they should do.

1.2 Problem statement

Most people believe that distracted driving is the only reason why car accidents occur, but several factors may contribute to accidents on the road, including drivers who do not have an awareness of the importance of learning and understanding the meaning of road/traffic signs. Secondly, the new drivers who are still newbies understand all the road symbols, whether they have obtained an L or P license. Since they are still new, it is difficult for them to remember most of the sign's meanings on the road especially when they are still inexperienced. On the other hand, due to the comparison of the different traffic signs in different countries. In Malaysia, the procedure for obtaining an international driving license is relatively straightforward and does not impose strict requirements. It typically involves presenting a valid driving license and other necessary documents, without the need for additional tests or classes specifically focused on Malaysian road signs (Sarah, 2021). This problem may lead to confusion for tourists who drive in Malaysia. As a result, if users are unable to understand the symbols on the road, it can potentially lead to road accidents or unsafe driving situations. Although there are similar chatbots that have been developed by many researchers from different countries, the accuracy is questionable since their development did not focus on Malaysian perspectives.

1.3 Objectives

This project embarks on the following objectives:

1. To identify the requirements for developing a road sign recognition chatbot.
2. To develop a road sign recognition chatbot for Malaysian road signs.
3. To test the performance of the chatbot using quantitative and qualitative methods.

1.4 Scope

There are two modules that are to be developed which are Image classification module and Telegram bot model. The **image classification module** aims to develop a system that can analyze and categorize images into different classes or categories. The first step in this process is data collection, where a dataset of labelled images is gathered, covering the classes or categories that need to be classified. This dataset should include images with ground-truth labels. Once the dataset is collected, the next step is preprocessing. This involves cleaning and preparing the images for the training process. Preprocessing techniques may include resizing, cropping, normalizing, or augmenting the images to improve the model's ability to learn from them. Model selection is an important step in image classification. Deep learning models, particularly Convolutional Neural Networks (CNNs), are commonly used for this task. The model training phase involves splitting the dataset into training and testing sets. The training set is used to optimize the model's parameters through techniques like gradient descent. It's crucial to monitor the model's performance on the validation (test) set to prevent overfitting and ensure generalization. After training the model, it needs to be evaluated on a separate test set that was not used during training. Evaluation metrics such as accuracy, precision, recall, or F1-score can be calculated to assess the model's effectiveness and performance. Once the model is trained and evaluated, it can

be deployed in a suitable environment, and in this project used Telegram bot as an API, to make it accessible for image classification tasks. This allows users to submit images to the deployed model, and it will provide predictions or classifications based on the trained knowledge.

Meanwhile, the **Telegram chatbot module** involves developing a chatbot that can interact with users on the Telegram messaging platform. The first step is to register a Telegram bot by communicating with the Telegram BotFather, which provides an API token necessary for interacting with the Telegram API. Choosing a suitable framework or library for building the chatbot is the next step. Popular options include Python libraries like `python-telegram-bot` or frameworks. These frameworks provide the necessary tools and functionality to develop chatbots. Once the chatbot is developed, it needs to be integrated with the Telegram API using the API token obtained earlier. This allows the chatbot to receive incoming messages from users, process their queries, and send responses back to them via the Telegram platform. Extensive testing and iteration are necessary to ensure the chatbot can handle various user inputs and scenarios effectively. This involves simulating different user interactions and validating the chatbot's responses. Feedback from users and observed performance can help refine and improve the chatbot over time. This platform is used as a chatbot that accepts images from users, classifies them using the trained model, and responds with the classification results. This allows users to leverage the image classification capabilities within the Telegram messaging platform.

1.5 Target user:

- Newbie drivers

Newbie drivers refer to individuals who have recently obtained their driver's license or have limited driving experience. They may lack confidence and

knowledge in various aspects of driving, including road rules, traffic signs, and safe driving practices.

- Tourist who drives in Malaysia

This user group consists of tourists who are studying or just visiting Malaysia and choose to explore the country by driving. They may be unfamiliar with Malaysian roads, traffic regulations, and local driving customs.

1.6 Project Significance

This project is focusing on helping the newbie driver to better understand the meaning of each traffic/road sign in a different way. It also potentially enhances road safety, improves driver awareness, and contributes to a more efficient and organized traffic system. In addition, the project also contributes to the education and awareness of drivers, particularly those who are less experienced or unfamiliar with certain traffic signs. The chatbot can provide explanations, and instructions to help users to refer and make decisions, empowering them to become safer and more informed drivers. As a result, by leveraging the power of computer vision and machine learning, the project addresses crucial aspects of traffic management, aiming to create safer, more informed, and more efficient systems.

1.7 Expected Output

The system will accurately classify the input image of road signs and provide the relevant information and instruction regarding the specified traffic signs. This can be done by the user to capture images of traffic signs found on the side of the road and submit them as input for the system. The system will predict the input image and present the result to the users. This functionality aids users in better understanding the meaning of road signs and helps users to make decisions.

1.8 Summary

In conclusion, this chapter provided a comprehensive overview of the initial stages of the project, including the problem statement, objectives, and scope. It emphasized the significance of developing the project and outlined the expected outcomes upon its completion. Moving forward, the next chapter will investigate in detail to review more relevant and related articles about the project. It will also discuss the project methodology that will be employed to achieve the objectives.

CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter will cover the essential information about the research and studies of the project. It will explain in detail about the relevant literature and research overview of the existing system, the methodology or research approach that will be used in the project, the project requirements such as software, hardware, and other requirements to develop the project, and this chapter also includes the project timeline or schedule for each phase of stage of the project.

2.2 Facts and findings

2.2.1 Domain

The domain related to the project is Artificial Intelligence, image processing technique, and transportation system.