KLCC Tourism Chatbot based on Chatterbot and FlowXO Frameworks

Tri Basuki Kurniawan [1], Mohd Zaki Zakaria [2, *], Misinem [3], Ainaa Izzati Binti Mohd Nasarudin [2]

[1] Faculty of Computer Science, University of Bina Darma, Palembang, Indonesia
[2] Faculty of Computer & Mathematics Sciences, University Technology Mara, Malaysia
[3] Faculty of Vocational, University of Bina Darma, Palembang, Indonesia

*__Email__: zaki@tmsk.uitm.edu.my

Abstract

This research aims to solve the constant problem of any tourist spot, which is information. Whenever tourists would like to travel, they would research many websites and maybe download many mobile applications for everything they would need when travelling. Therefore, a chatbot that helps tourists get the information they want has been developed to solve this problem. Firstly, research was done to gain more knowledge on how Chatbot is created and what suitable technique. Research is also done to achieve information on KLCC. This Chatbot is developed using natural language processing. Natural language processing will be allowed more dynamic input from the user and only needs to detect the keyword in the user input section. The Chatbot can respond to them. This study tested two different approaches to building a chatbot. The Chatbot in this study is developed based on the Python library Chatterbot and Flow XO frameworks. The experiment and testing are conducted with ten people using the Chatbot. The results show that Chatbot can give a response goodly.

Keywords

KLCC Tourism, Chatbot, Natural Language Processing, Chatterbot, FlowXO

Introduction

Tourism is a community, cultural and financial wonder involving individuals' movement to nations or places separate from their typical situations. It can be either for personal or professional purposes. These people are called guests, and the leisure industry has to do with their activities, some of which imply travel expenditure (UNWTO, 2008).

When tourists travel, they need information on the places they are going to. For example, they need to know how to get to a location using public transport or what event is happening now. They would like to see where the facility can be used. This problem has been solved by having Travel apps. With extensive Internet connectivity, the common use of smartphones, and the frequent use of mobile travel apps provide an opportunity for tourism to create an application that would help the tourist (Dastjerdi, Kaplan, de Abreu e Silva, & Pereira, 2019). However, travellers' most common complaint is that each focuses on different things. For example, one app provides

information on tourist attractions in a particular city. Another offers real-time weather updates. Yet another manages flights and hotel bookings.

A Facebook messenger bot launched an airfare booking platform in June 2016; the bot adapts to each user's conversation style and responds similarly to Cheap flights chat. It is a step towards frictionless dialogue with our users, and we can further develop this way of interacting with them in the months ahead (Intelligence, Messenger, Otter, & Chat, 2016).

To help with the hospitality of a company, Exa was made using Amazon's voice-activated assistant Alexa so that the guest can order room service, set the alarm, and ask a question from their room without calling customer service (Intelligence, Messenger, Otter, & Chat, 2016).

Travel chatbots offer a cleaner alternative. Online chatbots for websites and messaging (Illescas-Manzano, López, González, & Rodríguez, 2021) (Miklosik, Evans, & Qureshi, 2021). They use platforms like browsers or messenger apps that almost everyone has on their phone. As such, they make it possible for travellers to receive notifications, updates, and promotional offers, without downloading separate apps for each service they'll be using during their trip.

SAM is a chatbot app created that will care for travellers before, through, and after trips, from schedules, driving instructions, in-flight and inn reservations, permit advice, local city and country info, and local climate and restaurant recommendations. SAM picks up on signs, such as travel patterns and favourites, and informs travellers accordingly: the more a traveller uses Sam, the more intelligent the Chatbot becomes, so that information delivered to the user is even more personalized (Vilanova, 2018).

When a tourist arrives for the first time, the tourist needs to know, in broad terms, the characteristics of the place and the reasons why this place is worthy of interest. In addition, a classic situation for tourists is to plan their activities. Their visits are not always a journey that allows you to have the right time to visit a destination chosen entirely, and it is there that we are faced with the difficulty of deciding which attractions we can then actually visit the place (Clarizia, Colace, Lombardi, & Pascale, 2018). Having travel apps could be helpful, but for the average tourist, these can add up to a significant amount of storage space on their phone.

A user no longer needs to go through a list of activities that can do in a specific area. For example, on TripAdvisor, there is a list of famous places in Kuala Lumpur, but most of the top 20 lists are all places in KLCC (Law, 2018).

When there is the movement of people whom we call the visitor to countries or places outside of their usual environment, which entails social, cultural, and economic phenomena, this is called Tourism (UNWTO, 2008). Activities that involve long or short journeys that aim for leisure or recreational purposes are defined as Tourism (Hassan, 2014).

In the last few decades' tourism in Malaysia have to stand up and has grown into one of the main productions in the world after oil and automobile (Hanafiah & Harun, 2010). Malaysia's tourism has increased compared to a decade ago. In 2007 the number of tourist arrivals in Malaysia

was 20.97 million; in 2017, the number of arrivals increased to 25.95 million. From world bank data, Malaysia is one of the top 15 countries tourists visits.

Methodology

Generally, the methods and techniques used in this project were summed up in the research framework and elaborated in a different phase.

The goal of this project is to develop a chatbot that will help tourists when planning their trips. The scope is tourists visiting KLCC, either the locals or the foreigner. It can also give information to the tourist 24/7 without rest and stop.

Researchers searched the internet, read journals, and interviewed tourism experts to learn more about it. It is to understand how tourism work and what tourist want when visiting a place. This research also managed to gain information about the tourism activities that the tourist can do and other information that may be useful to the tourist. Then the data analyzed from information gained is identified and classified into something meaningful that the tourist would want.

For the Chatbot to be able, the Chatbot to be functional as it needs to be. The Chatbot needs to have data on what the Chatbot will be answering to the user. Hence, research has been done on the internet, through the official website of KLCC, and other websites. Research has also been done by observing the KLCC place itself. The place that has been observed is the KLCC, Aquaria, the park, and the Art Gallery. It is to learn about different activities, events, and places tourists can enjoy at KLCC. The data gained from the research is then sorted into different simple categories, as shown in figure 1. The types are the place, time, ticket, and note. This data serves as a guide to building the database for questions and answers.

Figure 1. Raw data

Before the Chatbot is developed, the obtained dataset from the second phase will be turned into a corpus. As shown in figure 2, the corpus is where all the questions and answers that the Chatbot will match.
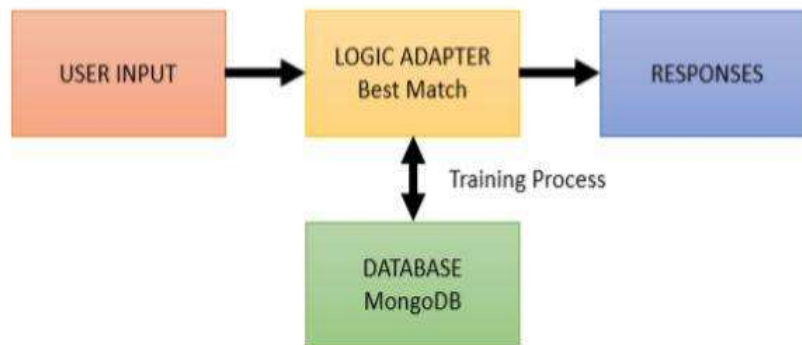

Figure 2. Corpus

Chatterbot

Figure 3. Chatterbot architecture

Figure 3 shows the basic architecture of Chatterbot. It starts with the user input into the Chatbot and is then processed through the logic adapter to find the best match of the input and produce a response. The input and response are saved in the database to be used for training.

FlowXO

FlowXO is figure 4, which starts with the user entering an input through Facebook messenger. The messenger will then connect with Flow XO and travel through the generating response. The user input is saved in the Flow XO database to be used for analytics.
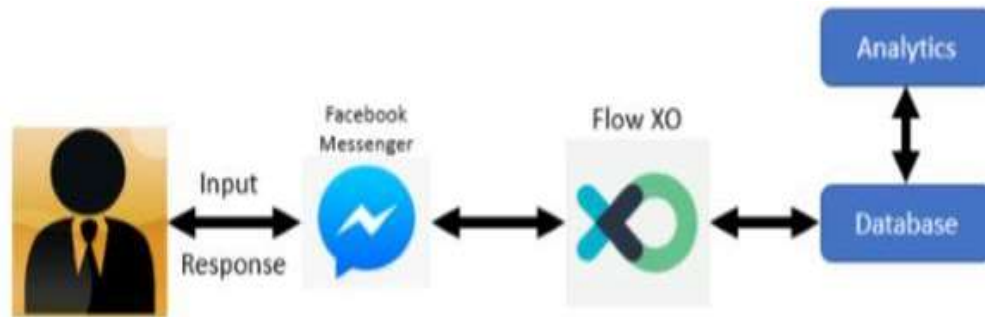
Figure 4. Flow XO architecture

All figures and tables should be labelled according to the sequence of 1, 2, and 3. Figure captions should be written on the line right after the figures. The line just before the table should provide the caption for that particular table. Only one level of the subsection is allowed for the approach. Results or discussion should not be stated in this section.

System Development

Two experiments have been done to achieve the final objective: developing the Chatbot.

Python
This experiment used the latest version of python, version 3.7. The reason for using python is that it is easier to understand and is widely used by other researchers.

Chatterbot Python Library
Chatterbot is a python library that helps to generate automated responses to a user's input using selection machine learning algorithms to create different responses.

Figure 5 shows the process flow of the Chatterbot. When the Chatbot was created based on the Chatterbot framework, it did not know how to communicate. When the user first enters the input, it will tokenize the user input, which is splitting the sentences into separate words. For example, the user input "What is KLCC?". It will split the word such as "What", "is", "KLCC?".

Once the tokenizing part is done, it will check if the user input contains less than two words. If it is true, then it will not change the composition of the word. For example, it was changing from singular to plural or changing the present tense to the past tense.

If it is false, it will check if the word is alphabetic and listed in the stop list. A stop list is a list where NLTK and wordnet stop word are contained. Stop word can help the Chatbot understand any misspelling of the user input. However, some of the user input may be unable to be corrected. It is probably because the word is not listed in the stop list.
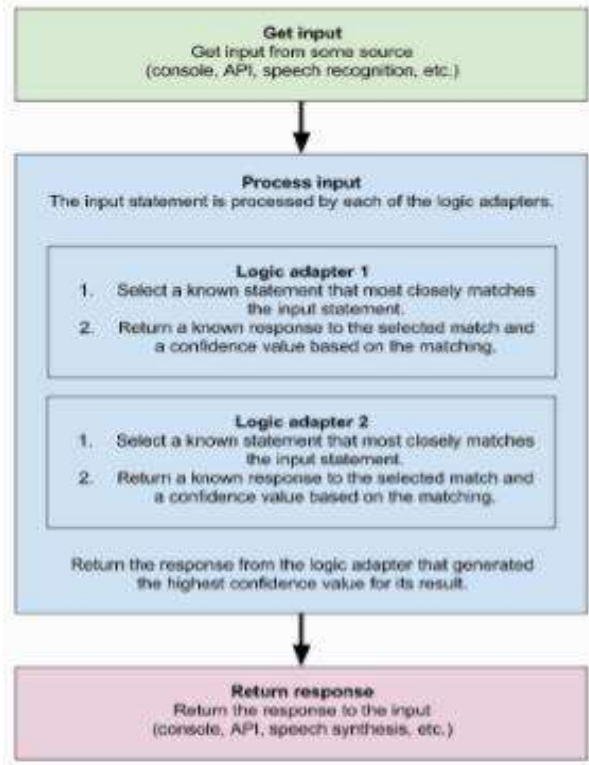
Figure 5. Chatterbot process flow

Then, every time the user enters input, it will be saved to the database along with the response statement. Once the chat data have been saved in the database, it can be reused to undergo the training process.
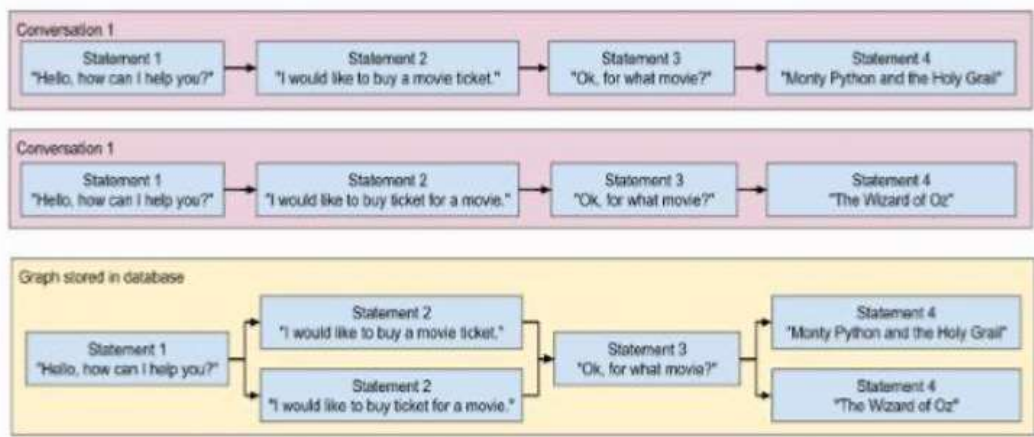

Figure 6. Training process

Chatterbot includes a function that helps to simplify the process of training a chatbot. Figure 6 shows how the training process will create a graph data structure representing the sets of general statements and responses. It will allow the Chatbot to understand the user better.

MongoDB

The database used in this research is MongoDB. It is where the chatbot input and response are saved. This database will then be used in the training process. The input and response are categorized in text string by pair. Then it undergoes preprocessing, where tagging, tokenizing, and stop words are done. After the preprocessing, it is classified in the search_text string, as shown in figure 7.
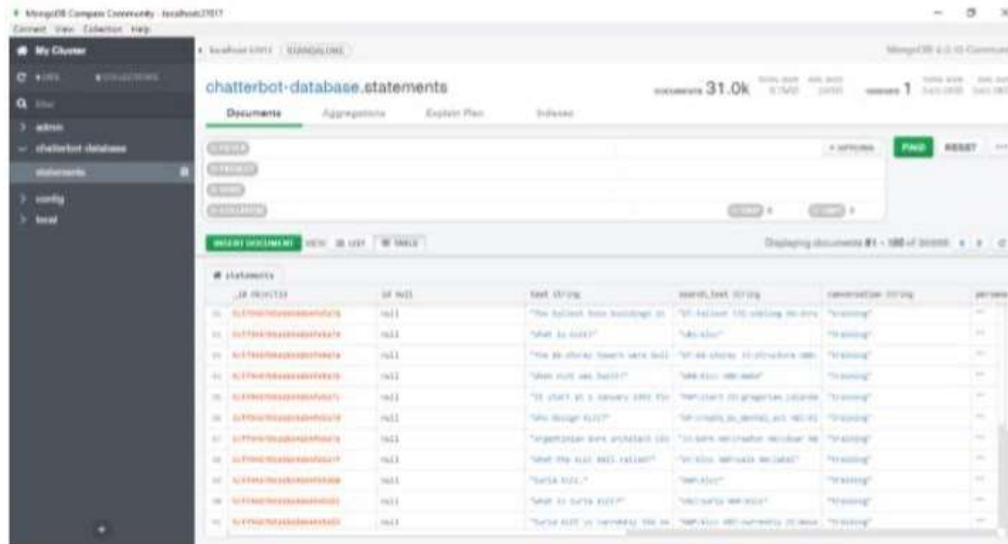

Figure 7. MongoDB database

FlowXO

The second experiment uses FlowXO to develop the Chatbot. Just like its name, it uses the flow of conversation for the Chatbot to give a response to the user, as shown in figure 8.
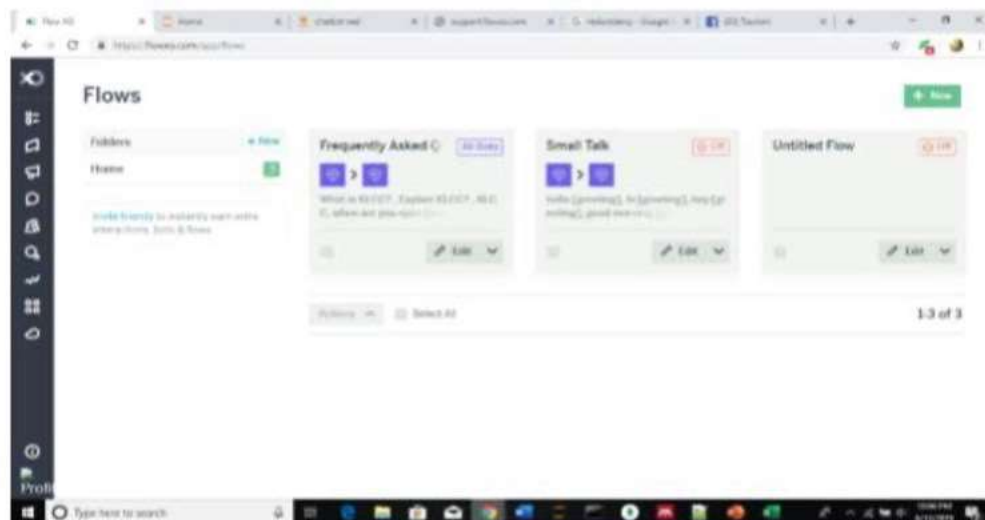

Figure 8. FlowXO list of flow

Figure 8 shows the list of flows used for the Chatbot. The flow is custom-made, and some use the one that has been prepared. The flow starts when the user puts in their input. It then will trigger the flow and gives the Chatbot the ability to respond to the user.
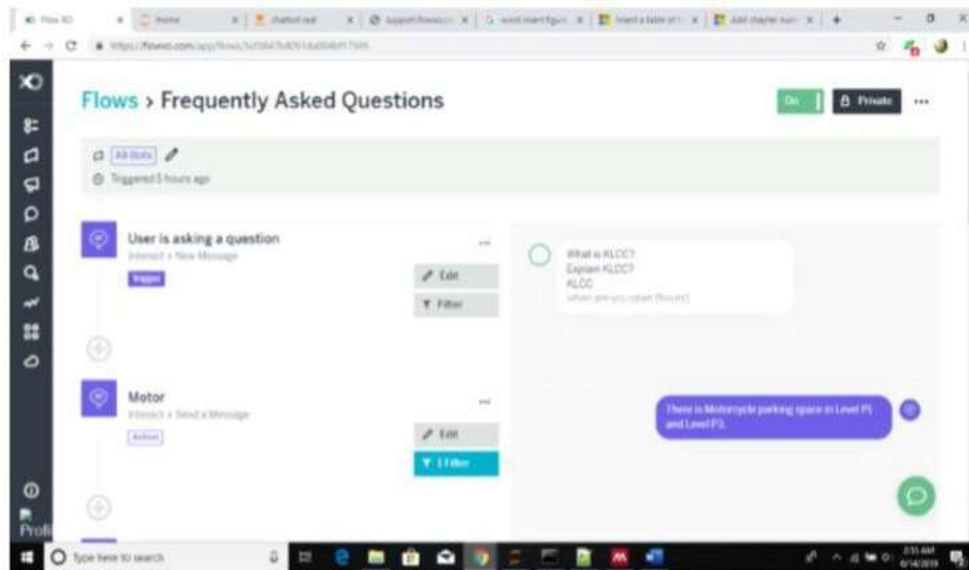

Figure 9. Flow of Chatbot

Figure 9 shows the flow of the Chatbot where the first one, "User is asking a question" is where the trigger is. The trigger is a keyword that will interact with the flow of Chatbot when the user enters input. Once the user enters input, it will check with the trigger if it is identical or similar.
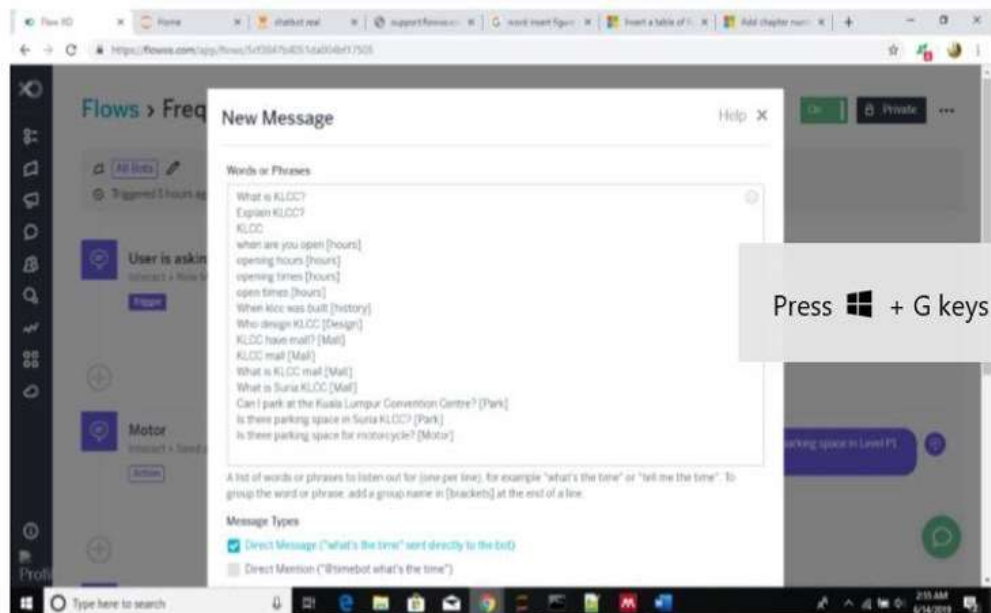

Figure 10. Trigger phases

Figure 10 shows some phrases or words triggered when the user enters input. Therefore, if the user enters any trigger phrases, it will continue to bring the Chatbot to the phase of the subsequent flow.
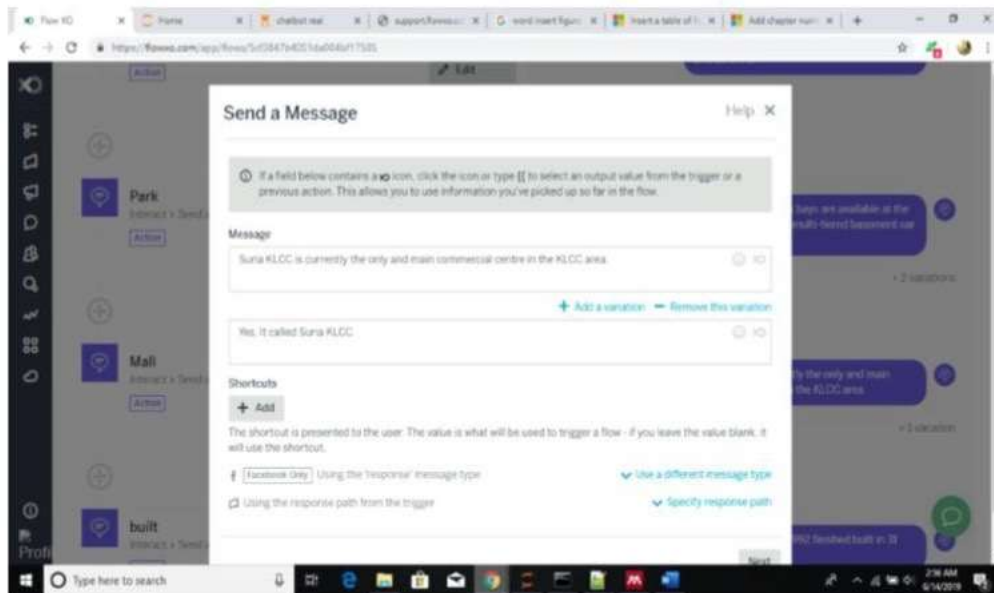
Figure 11. Chatbot send message

Once the phrases have been triggered, they will go to the subsequent flow, which is the chatbot sending message back to the user. Figures 11 and 12 show that two different messages are set to reply to the user. More variety of messages could be developed to respond to the user; the message is randomly sent to the user. This flow will only happen if the trigger word is "mall". The different flows will have another trigger word.

Figure 12. Filter the trigger word

To be correctly triggered, the phrases must be filtered. Sometimes when the user input, there must be more than one trigger word. Hence, the user 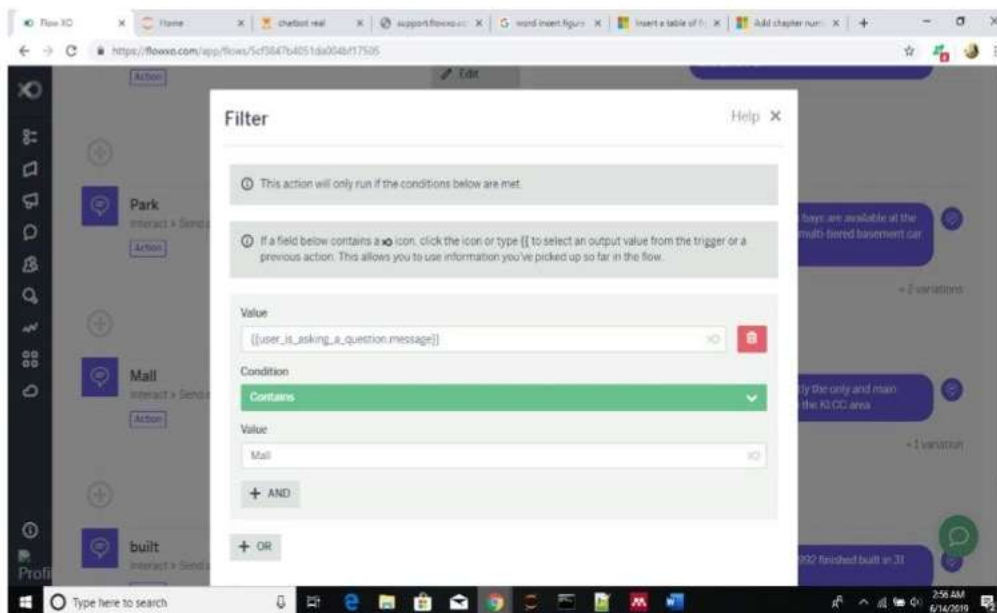input needs to be filtered so that it will not overlap with other flow that has been created. The trigger word will be filtered here to give the user the correct response. This flow will only be triggered if the word "mall" is used in the user input.

Interface Design

The interface is done for Python and FlowXO, Due to python being hard to integrate into a different platform. This research uses Tkinter as the interface of the Chatbot created with python. FlowXO is one of the tools to develop a Chatbot; hence it has a partnership with many social media platforms to be selected for the chatbot interface. The platform is Facebook.
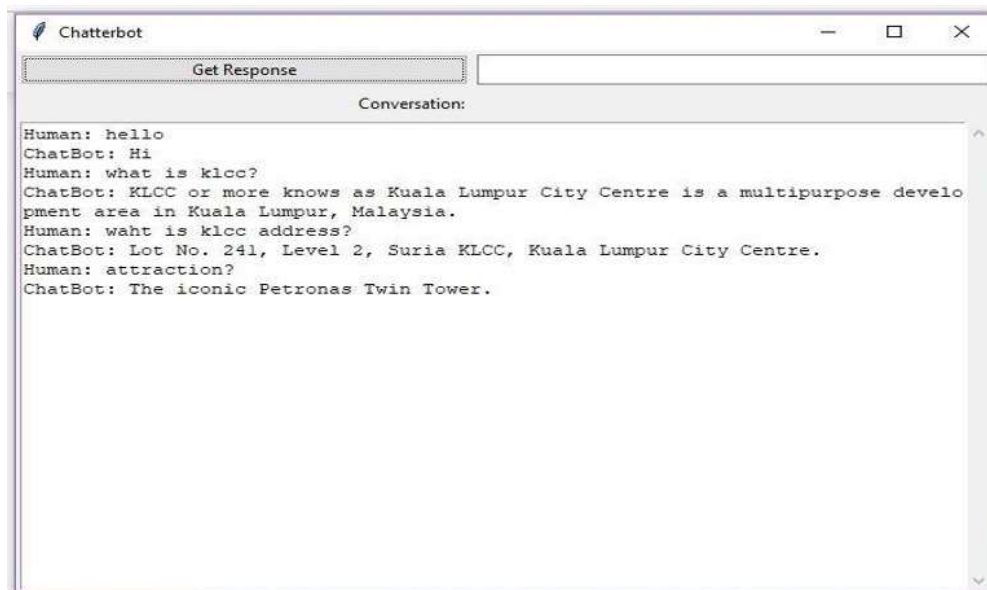
Figure 13. Python chatbot interface

Figure 13 shows the interface using python Tkinter. This interface contains a box for the user to enter their input. It will collect the user input to be processed. Then the box on the left is a button named "Get Response". The button is where the Chatbot will get the user input and then undergoes the adapter to give the response to the user. Lastly is the space below the user input and the button. It is where the chat between the user and Chatbot is shown. We could differentiate the "Human" as the user and the Chatbot as the self.

Figure 14. FlowXO chatbot interface

Figure 14 shows the interface that FlowXO uses, which is a Facebook messenger. FlowXO interface is more user-friendly as it can be used anywhere as long there is an internet connection, Facebook account, and Facebook messenger.
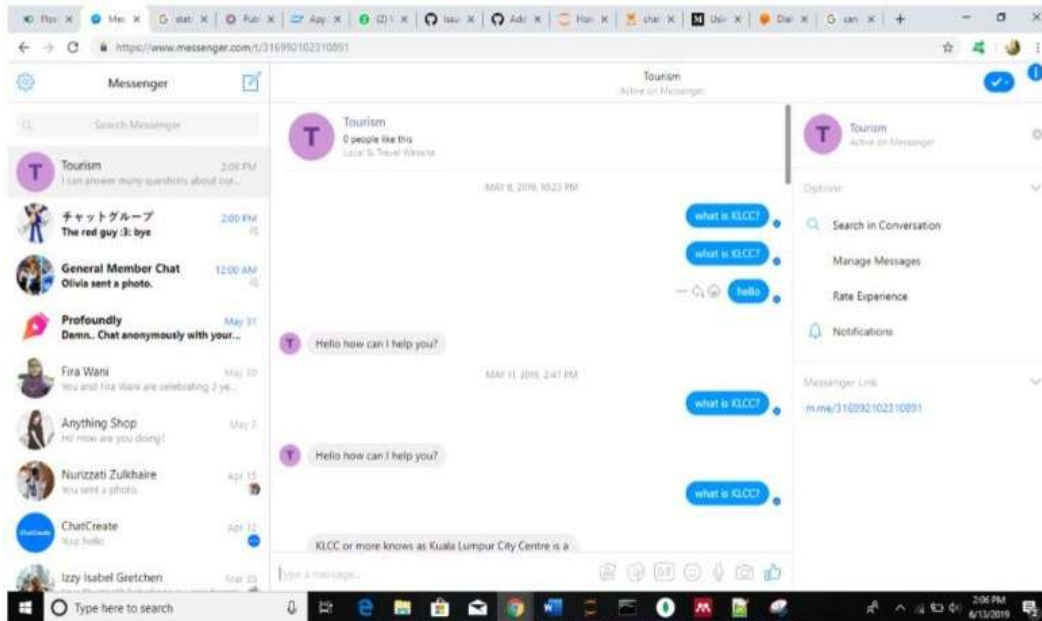

Results and Discussion

The experiment and testing are conducted with ten people using the Chatbot. The result is shown in Table 1.

Table 1. Accuracy of the Chatbot

Test	Correct answer out of 10 (x)
1	3
2	4
3	6
4	3
5	6
6	3
7	4
8	5
9	4
10	3

Table 1 is the result of users using the Chatbot. Ten people have been using the Chatbot. The user's instruction is to ask Chatbot about KLCC, Aquaria, Art Gallery and the KLCC park.

The response was taken, and the correct answer was calculated. The result from the table is taken to do a simple calculation to determine the Chatbot's accuracy, refer to Eq. (1).

$$Accuracy = \frac{Total\ of\ x}{100} \ x\ 100\% \tag{1}$$

From the formulation, as shown in Eq. 1, we determine the accuracy of the Chatbot is 41%. The Chatbot is receiving low accuracy due to the Chatbot is only able to answer the question that is the same from the corpus. Human has a different way of getting their word across. Therefore, it was hard to ensure the Chatbot could answer the question.
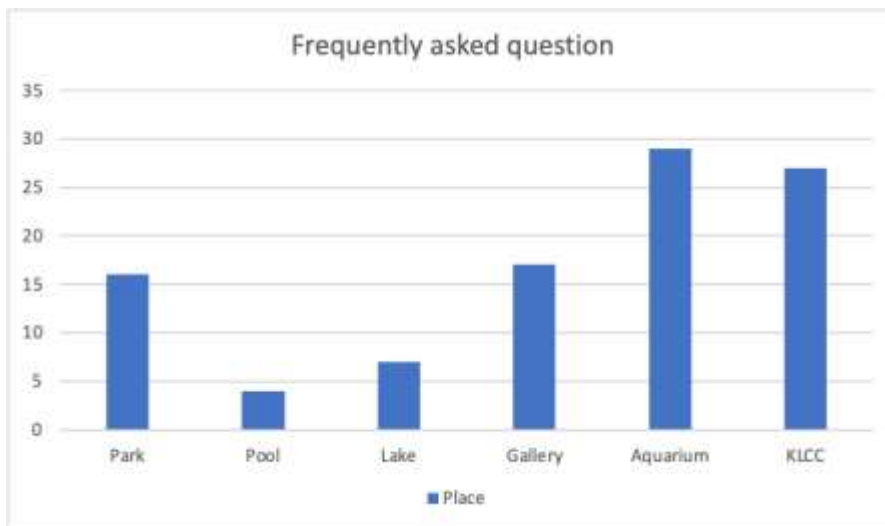

Figure 15. Frequently asked question

Figure 15 shows the frequently asked question by the previous ten users of the Chatbot. It shows that the aquarium is the most frequently asked question of 27 questions. It indicates that KLCC is famous for its Aquarium. The second frequently asked question is the KLCC itself. At the same time, the least asked question is the pool with four queries.

Table 2. Accuracy of Chatbot based on the question

Question	No of the answer correctly by the Chatbot out of the 10
What is KLCC	10
Where is Aquaria?	10
Where is Aquaria?	10
Who designed KLCC?	10
When was KLCC built?	10
What is Suria KLCC?	10
How to get to Aquaria	10
Is there an art gallery?	10
Is there a park?	10

Table 2 shows the accuracy of a chatbot when the user asks a question set for them to ask. The result indicates that the Chatbot can answer the user input correctly if it is the same as shown in the table. However, there is some error in which the question "Where is Aquaria?" is the same as "Where is Aquaria?". However, the Chatbot cannot answer "Where is Aquaria?". It is may because inside the corpus, it is set "Where is Aquaria?".

Table 3. Accuracy with misspelling

Question	No of the answers correctly by the Chatbot out of the 10
When was KLCC built?	10
Wehn KLCC was built?	10
When KCLL was built?	10
When KLCC was build?	10
Waht is KLCC address?	10
What is KLCC adress?	10
What si KLCC address?	10
Waht is KLCC adress?	0

Table 3 shows a chatbot's accuracy when the user asks the question but with the wrong spelling and tenses. The result shows that the Chatbot can answer the user input correctly if it is the same as shown in the table. The Chatbot can answer the question even if the word is in the past or present tense. However, there is a question that the Chatbot is unable to answer. The questions "What si KLCC address??" and "Waht is KLCC adress??". The Chatbot is unable to respond when the misspelling of the word "is" and when there are two different words misspelt in the same question.

Table 4. Accuracy of a chatbot on Aquaria

Question	No of the answers correctly by the Chatbot
Is there Aquaria?	10
Where is the Aquaria?	10
What time does it open?	0
Will need ticket to enter?	10
Can we buy ticket online?	10
How to get to the aquaria?	10
what can you do at aquaria?	10
what is the price for Disable people?	10

Table 4 shows a chatbot's accuracy when the user asks the question only about Aquaria. The result shows that the Chatbot can answer the user input correctly if it is the same as shown in the table. The Chatbot can answer the question. However, there is a question that the Chatbot is unable to answer. In which the question "What time does it open?". The Chatbot cannot answer because it cannot remember past user input information. Hence, it is not able to understand the consecutive conversation.

References

Clarizia, F., Colace, F., Lombardi, M., & Pascale, F. (2018). *A Context-Aware Recommender System for Digital Storytelling*. 542–549. Retrieved from https://doi.org/10.1109/AINA.2018.00085

Dastjerdi, A., Kaplan, S., de Abreu e Silva, J., & Pereira, F. (2019). Motivating the use of real-time multimodal travel planners: the role of users value, technophile and community resilience. *Transportation Research Procedia*, *41*, 113–116. https://doi.org/10.1016/j.trpro.2019.09.022

Hanafiah, M. H. M., & Harun, M. F. M. (2010). Tourism Demand in Malaysia: A cross-sectional pool time-series analysis. *International Journal of Trade, Economics, and Finance*, *1*(1), 80–83. Retrieved from https://doi.org/10.7763/IJTEF.2010.V1.15

Hassan, H. (2014). The Representation of Malaysian Cultures in Tourism Brochures. *Procedia - Social and Behavioral Sciences*, *118*, 140–151. Retrieved from https://doi.org/10.1016/j.sbspro.2014.02.019

Illescas-Manzano, M., López, N., González, N., & Rodríguez, C. (2021). Implementation of Chatbot in Online Commerce, and Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*, 125. https://doi.org/10.3390/joitmc7020125

Intelligence, J. W. T., Messenger, F., Otter, S., & Chat, C. (2016). Chatbot tourism. *(June)*, 1–5.

Law, T. (2018). Malaysia is the 9th most popular tourist destination in the world?! *But There's a Catch*, *25*, 2018. Retrieved from https://cilisos.my/malaysia-is-the-9th-most-popular-tourist-destination-in-the-world-but-theres-a-catch/

Miklosik, A., Evans, N., & Qureshi, A. (2021). The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review. *IEEE Access*, *9*, 106530–106539. https://doi.org/10.1109/ACCESS.2021.3100885

UNWTO. (2008). For more information : Facts & Figures section at www.unwto.org International tourism – a key driver for the world economy. *UNWTO Tourism Highlights 2007*.

Vilanova, C. (2018). *Who's Sam*.