

# **Intelligent Chat System for University Marketing Department**

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## **ABSTRACT**

A chatbot is an automated text or voice-based interactive chat system in which users can express their needs, interests or questions using voice or text. Most of the universities experience surge in inbound queries and one-to-one communication highly valued by many customers. Handling these communications appropriately and in timely manner manually is a challenging task for universities' marketing personnel. Besides this, extracting information from universities' website can be a difficult task for some users. Customers who visit universities' website beyond the working hours needs information from the marketing department on time to make some decisions. Thus, this project aims to develop a university chatbot which is a standard and informative widget that can enhance the user experience of visiting universities and provide users with effective information. This chatbot is an intelligent system developed using artificial intelligence (AI) and natural language processing (NLP) algorithms. It has an effective user interface and answers inquiries related to admissions, appointments, location and other miscellaneous information. The developed chatbot maintains a log of questions and answers and feedback from potential users and expected to replace the traditional manual method.

**Keyword:** Artificial intelligence, Chatbot, Natural Language Processing

## **1. INTRODUCTION**

In the domain of human-computer interaction, the development of artificial intelligence applications is extremely challenging as computers require people to communicate with them in precise, clear, and highly organized languages. Among them, Chat bots, also known as talking bots, IM bots, chat bots, robots, are interactive agents or computer program that conducts conversations via voice or text. They are used for customer services or information acquisition.

Natural language processing (NLP) is a subfield of artificial intelligence and machine linguistics that enables computers to learn from humans. It can derive meaning from natural language input and to evaluate text in order for machines enable to understand natural languages.

The competitive market in private universities needs a guide for customers through marketing channels and to promote the information about the universities. These chat bots can tailor university responses and content based on customers' queries and interests. Thus, create more personalized experiences for customers.

According to data from Grand View Research, by 2025, the global chatbot economy will reach US\$1.25 billion. According to a survey conducted in 2016, 80% of business decision makers stated that they have used chatbots or plan to use chatbots in 2020. There are 1,350 chatbots and virtual agents in use worldwide. Many big brands have created fascinating robots to attract their customers and target demographics. At present many industries already know or use some form of chatbot, such as Siri, Alexa, Cortana, and Google Assistant.

### **1.1. Objectives**

- To develop an AI chatbot using TensorFlow 2 and Django framework.
- To apply NLP to understand the text and respond appropriately.

### ***1.2.Problem Statement***

At present most of the private universities' marketing department using manual method of answering customer questions in real time. Manually serving information unable the marketing department to handle large volume of queries appropriately and on time. Customers need updated information as fast as possible to make decisions. In this competitive business world, customers need service anytime and anywhere possible. Besides this, some customers find difficulties in visiting universities' website to gather needed information especially those are not from educational environment.

## **2. LITERATURE REVIEW**

### **2.1 Language-based (rule-based chatbots)**

The rule-based chatbot is extremely simple. It offers users the kind of precise control and

flexibility that machine learning chatbots do not. It provides a response database as well as a set of rules to assist them in matching the proper response from the database. If/then logic is used by rule-based chatbots to construct conversation flow (Menal Dahiya 2017). To ensure that inquiries with the same meaning receive the same solution, language conditions can be built to view words, their order, synonyms, common ways of expressing questions, and so on. The most common sort of bot is rule-based chatbots, and many users engaged with them via live chat, e-commerce sites, or Facebook Messenger. A one-to-one input table and response is the most basic form of a rule-based chatbot. These bots are severely limited, and they can only react to queries that perfectly match the database input.

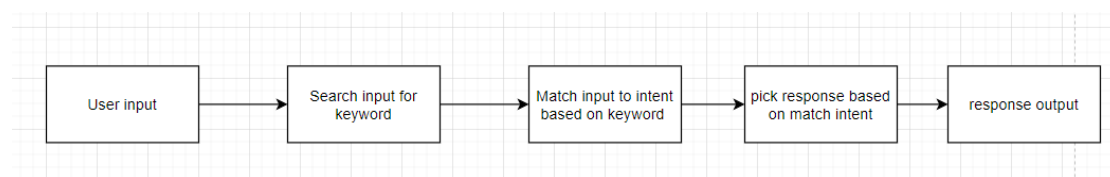


Figure 2.1 A flow of how the chatbot would process inputs (Menal Dahiya 2017)

## 2.2 Machine learning (AI chatbot)

Compared with rule-based chatbots, AI chatbots are more complex, more conversational, data flexible, and predictive. Natural language processing (NLP) is used by AI chatbots to assist users in interacting with web services or applications through text, graphics, or voice. To get the correct answer, these systems use a corpus (the main body of the content). In a huge storage library, the machine has the best learning effect. As a result, open-source repositories such structured Wikipedia are frequently included. It finds and scores information in the corpus using algorithms to alter data, particularly linguistic pattern matching. Based on customer feedback, it continues to enhance its reaction.

## 2.3. Natural language processing (NLP)

Artificial Intelligence chatbots can translate human speech and language into data that computers can understand. The process of understanding, evaluating, and responding to human speech is a difficult task that referred as natural language processing.

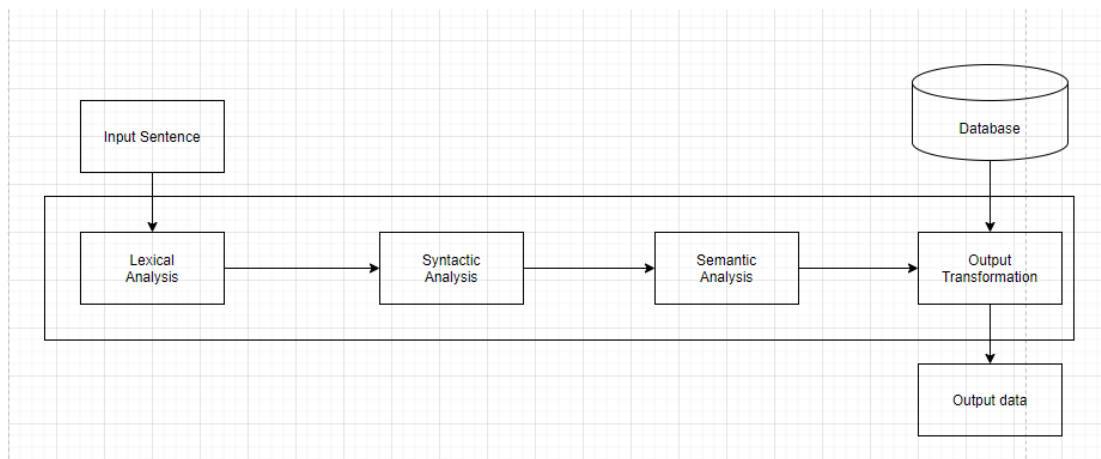


Figure 2.2 step of NLP (Meesad 2016)

The basic idea behind NLP is to take human text or voice input, apply AI to figure out what it means, and then produce and respond appropriately. Natural language processing allows robots to converse with humans in a manner that is similar to human conversation.

## 2.4 Summary

This project is developed using AI as it has the advantage of understanding behavior patterns, able to understand multiple languages and can perform continuous improvement as more data enters. NLP is implemented in this AI chatbot as it is highly expressive, permits a variety of access points and highly flexible.

## 3. RESEARCH METHODOLOGY

There are many techniques that can be used to develop chatbot applications. The technologies used in this project to implement chatbots are TensorFlow 2, Natural Language Processing, and Django framework.

Initially, the user has to provide a text input. The Chatbot will use NLP to understand the text and to find and retrieve the data in the data set to answer questions and answers. Django framework is used to create the web interface. The architecture of the proposed system is depicted in figure 3.1

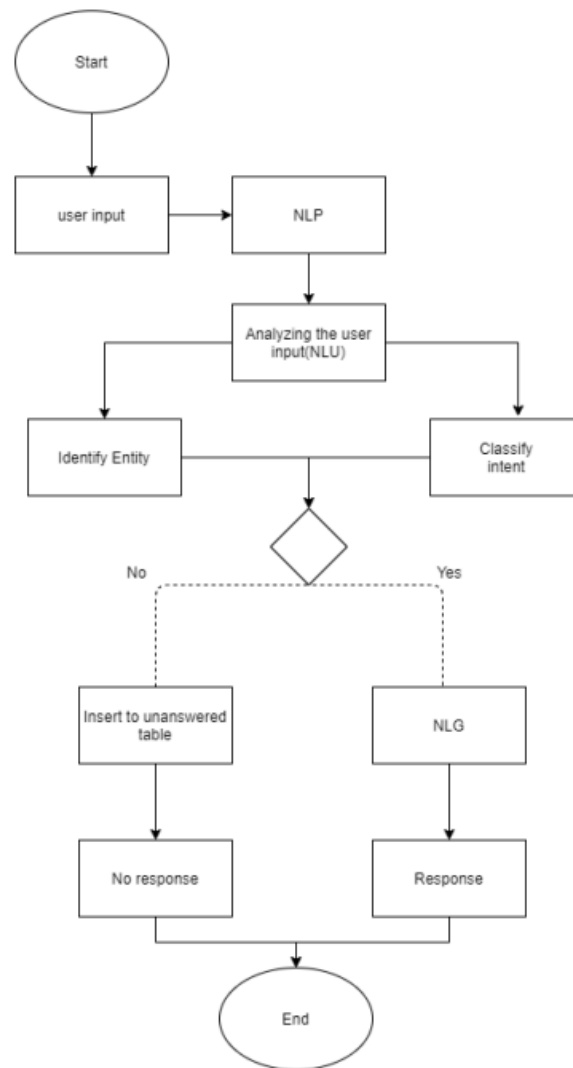


Figure 3.1: Application of NLP in chatbot

### 3.1 Proposed Model

The proposed model is intended to use NLP to separate the user input into sentences and words. It also standardizes the text before identifying whether the word is an adjective or verbs. NLU is responsible for processing data and understanding the data into content that the system can easily understand. NLU is used to understand the text input by the user. TensorFlow 2 is used to classify and identify the intent and NLG is used to transform the data into natural language. The whole application is developed using Django framework.

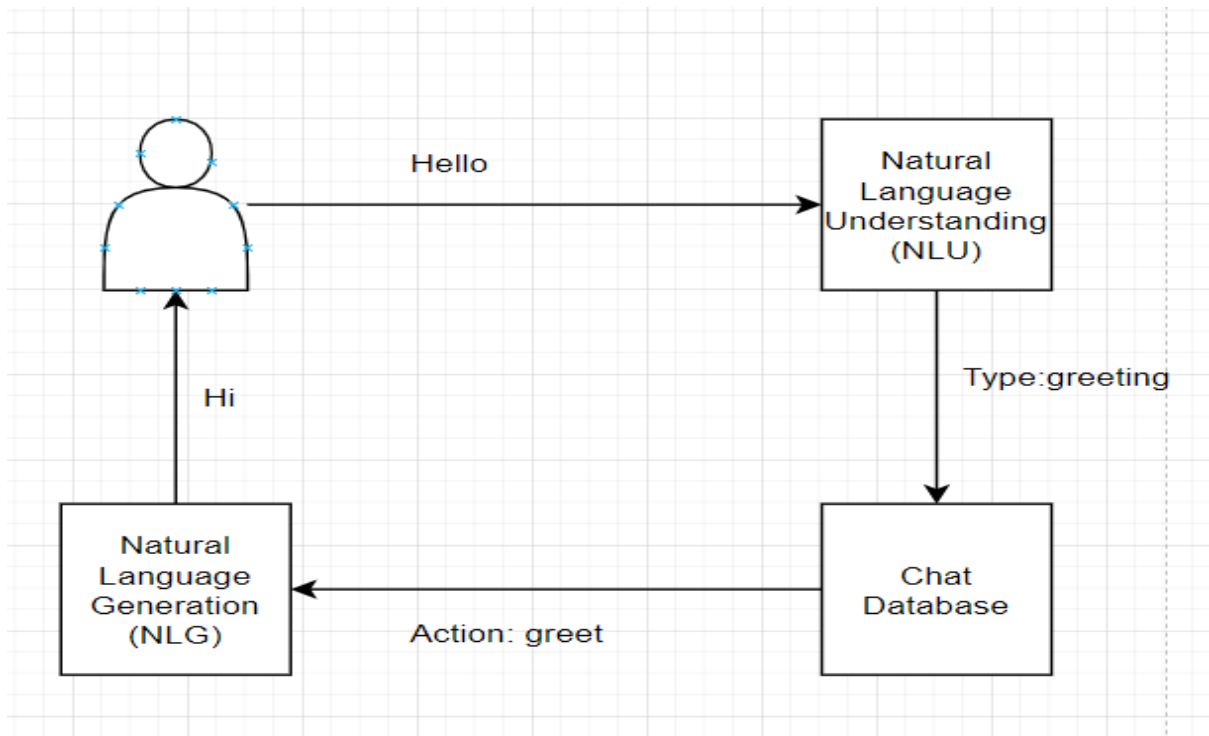
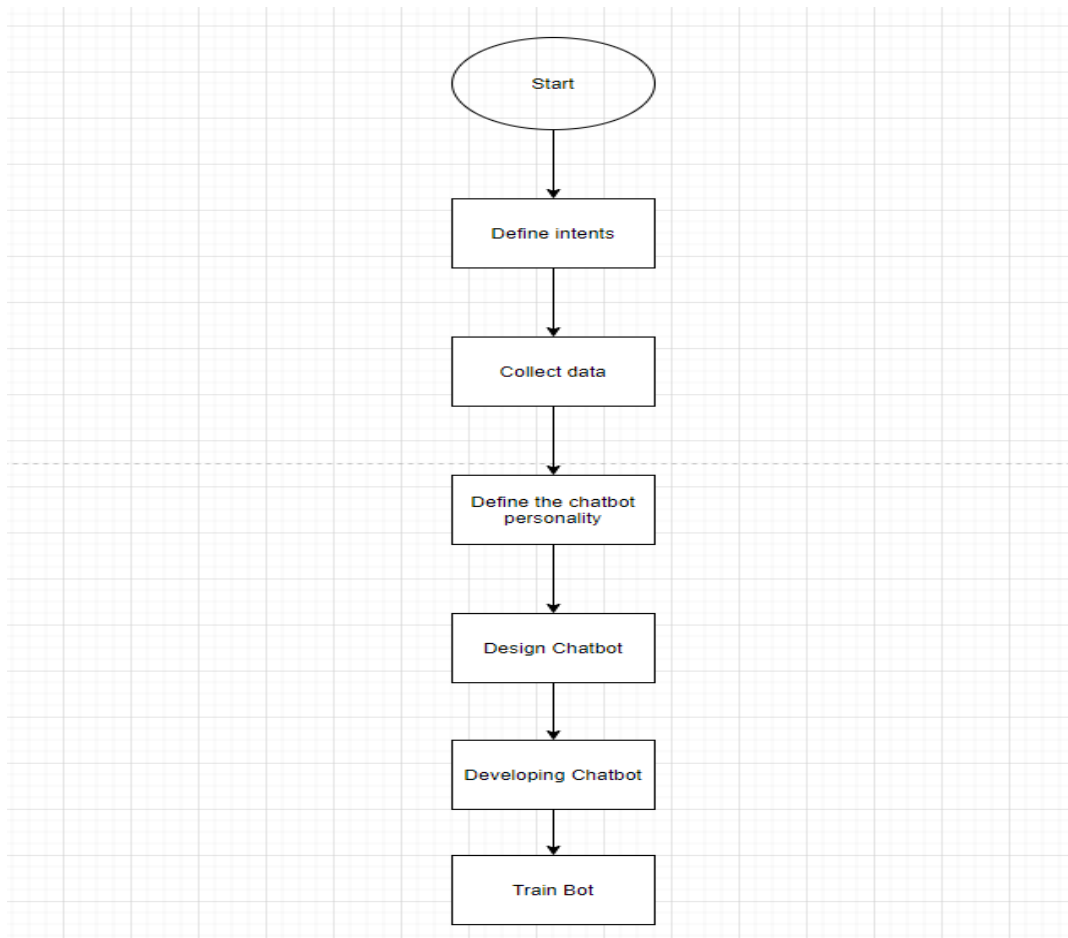


Figure 3.2 Chatbot Process System

#### 4. IMPLEMENTATION

The AI Chatbot is implemented using NLP that uses TensorFlow 2 and developed using Django framework. The whole process is divided into 6 steps: define intents, collect data, define the chatbot personality, design the chatbot and develop chatbot and train the bot. This is shown in figure 4.1.



#### **4.1 Define intent**

The first step in developing a chatbot is to clearly define the intent, the problem to be solved and the better experience for users. Our goal is to apply the chatbot system to the marketing department of the university.

#### **4.2 Data Collection**

The developed chatbot needs to be trained using data set. So, the training data must be comprised of examples (a.k.a. utterances) of users asking questions or making requests. Data collection is done in two stages. In the first phase, five chatbot users were recruited to conduct in-depth interviews to obtain key insights about the use of chatbots. The interview lasted about an hour. In the second stage, 20 non-chatbot users were selected for in-depth research interviews and chatbot testing. The chatbot test is completed in 10 minutes and no less than 2 minutes.

In the second stage, qualitative analysis of in-depth interviews is used to determine the behaviors and attitudes of chatbot users and non-users towards chatbots. The interview is

recorded. Participants' speeches and interview time were transcribed. For non-chatbot user groups, their interaction and explicit words when using chatbot are also recorded. Then, the interview data of the second stage of in-depth recording will be automatically recorded and transcribed, and data reduction analysis will be performed, including verbatim analysis and iterative

### **4.3 Define the personality of the chatbot**

The technology for defining user roles should be applicable to the creation of "chat robot roles", including their age group, interests, behavior styles, communication styles, sense of humor and their limitations. Chatbots with personality and compassion for customers can increase user engagement and create meaningful experiences. Here we use UCD to decide how to define the personality of the robot. In this process, the developer will focus on the user to meet the needs of the user at all stages (interaction design basis, unknown).

### **4.5 Design Chatbot**

The chatbot is designed using fundamental chatbot design.

### **4.5 Develop Chatbot**

The proposed Chatbot is developed using Django framework. This framework makes the interface of the chatbot be able to run on mobile phones and all kinds of browsers.

### **4.6 Train Bot**

Training the developed chatbot is divided into three stages:

1. Perform preliminary training: Train the Chatbot to answer and handle requests and to access knowledge and database,
2. Evaluation and improvement. Regularly evaluate performance. Determine which requests were not processed.
3. Retraining. When product or process data changes, additional training is required.

## **5. Results and Discussions**

The developed Chatbot is tested using 10 conversations each time to evaluate the performance of the chat robot. The 10 conversations allow the robot to respond and answer the queries. The testing is done to ensure that the answers to the chatbot's question match the



database. The image below shows an example of a screenshot of the chatbot testing.



Figure 5.1 Interface of the system

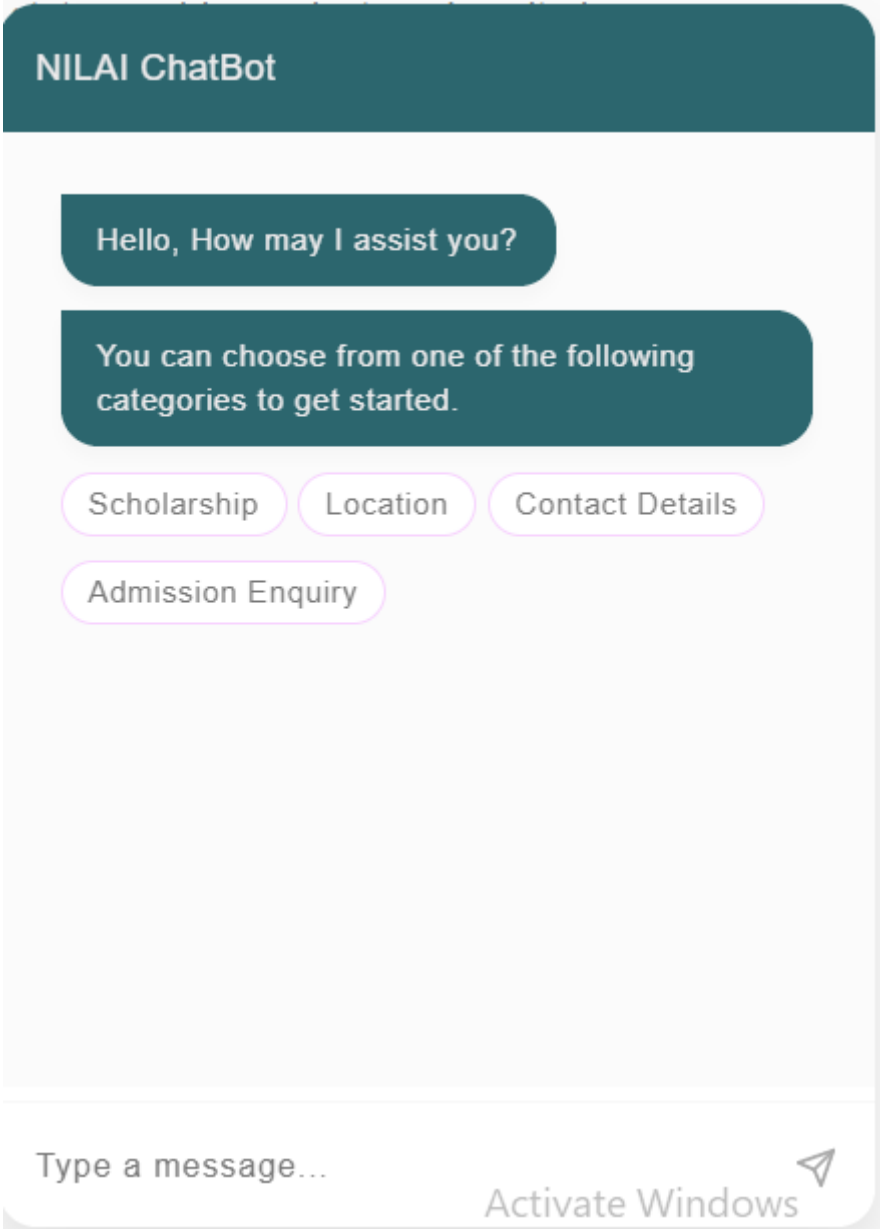


Figure 5.2 For person who communication with chatbot page.

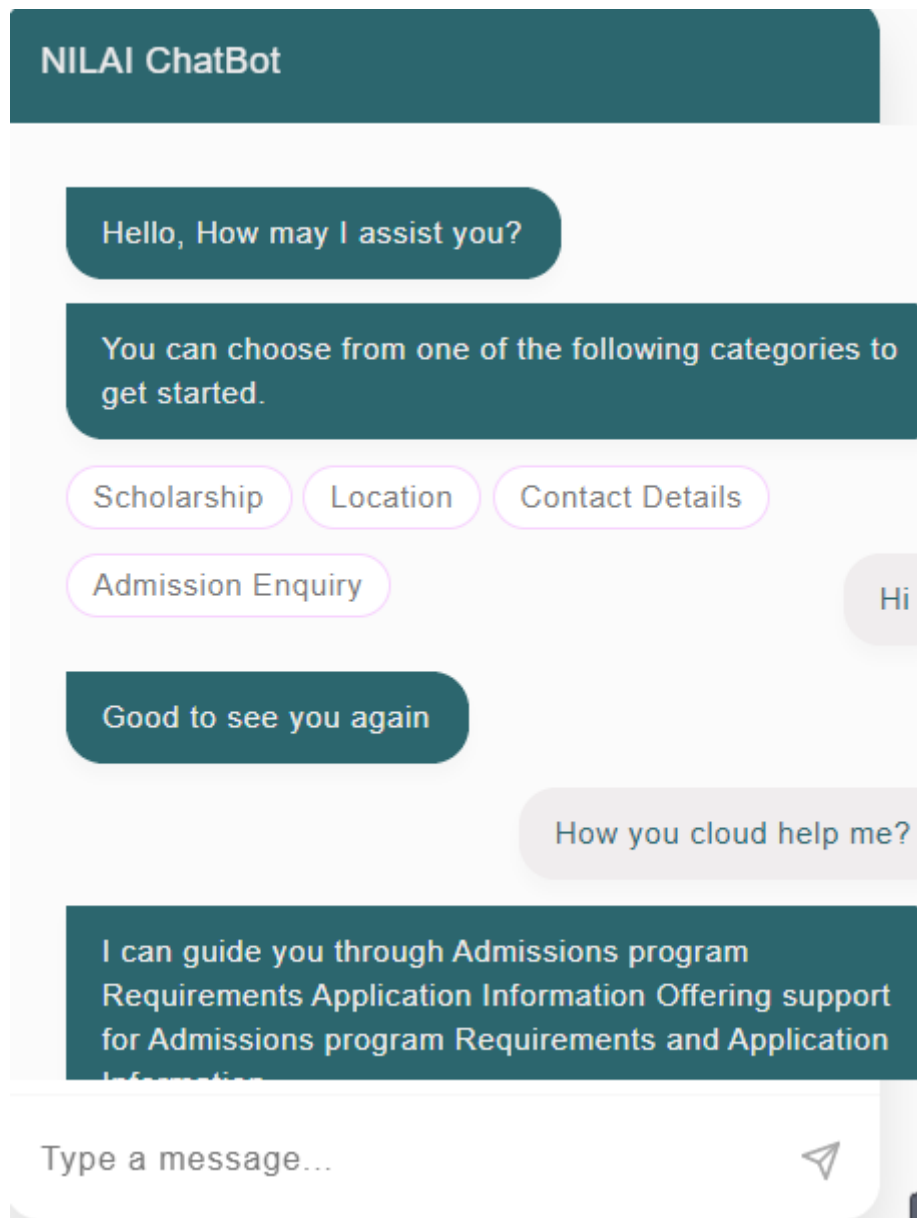


Figure 5.3: For the conversation between customer and chatbot.

The result of the system shows that the Chatbot takes about 10 seconds to respond each user's query. At each testing the Chatbot enable to understand and respond around 7 to 8 queries correctly. In average the performance of the Chatbot is 70% to 80%. If the Chatbot cannot understand the user's query, the respond will be the nearest answer. This usually happens due to the fact either the customer's input is incorrect, or the system's dataset does not have the data. The accuracy of the chatbot is still very high and the respond time is fast. However, the Chatbot's performance is consistently improved by adding in new query and continuous train of the robot.

## 6. CONCLUSION AND RECOMMENDATIONS

A Chatbot for universities' marketing department is developed using TensorFlow 2, Natural Language Processing, and Django framework. It is able to recognize the simple queries about admission, programmes, location and so on. The performance of the Chatbot is considered good with accuracy 70% to 80%. The performance of the system is keep updated by adding new queries and consistent training of the system.

Chatbots are becoming widely used system in educational environment. By developing and implementing this Chatbot, private universities can stay competitively with other educational institutions.

This research is a preliminary exploration research which involves 11 students as participants. Therefore, it is hoped that other participants such as graduate students and parents can be added in the future. Hence the project can be enhanced to explore different levels of customers service and queries.

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