

NEEV: An Education Informational Chatbot

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With increasing importance towards education & the no. of evolving areas of study, it has become a difficult task for the students to keep a track on them. This lack of awareness can affect their decision in identifying what they really want. The proposed system developed is an Informational cum Guidance Chatbot which tackles issues like what are the trending courses, finding new courses or courses of one's interest, providing guidance, finding colleges, etc. The idea is to collect basic information about user's interest through conversations. The Chatbot interacts with the user by asking basic questions, processes the query using Machine Learning Algorithms along with Natural Language Processing, and accordingly, serve the response or suggest the possible options.

Key Words: NLP, ML, Supervised Learning, Intent Matching, Chatbot, Android Application

1. INTRODUCTION

A Chatbot is a program that mimics human-like intelligent conversations through text chats and voice commands [1]. It is fast and less confusing which makes it easy to install as there is no need to have installation packages. Also, these packages are easy to manage and distribute [2]. Generally, Chatbots can either be Rule-based or Self-learning bots [3]. Rule based approach uses if-else techniques whereas Self-learning approach uses ML techniques to continue learning in case it encounters something unusual with respect to whatever is stored in the data repository or the knowledge base.

The current era is seeing an increasing trend in Artificial Intelligence, Machine Learning and Natural Language Processing. The strategy used in making Chatbots is inclined towards these technologies. According to A. Vaish, "Globally, the Chatbot market has seen explosive growth with a growth rate of 35% CAGR" (2017). These reasons have been a great driving force for us to build this Chatbot project. Another reason to develop this Chatbot is to make the information available to everyone and everywhere. Chatbots have been developed for many domains like e-commerce, entertainment, traveling, etc. This Chatbot is built for the Education domain where we exploit the available frameworks. The general architecture for the Chatbot is shown in Fig-1[4].

Conversational intelligence using Supervised Machine Learning techniques provide a rich experience by allowing the feeling of personal approach.

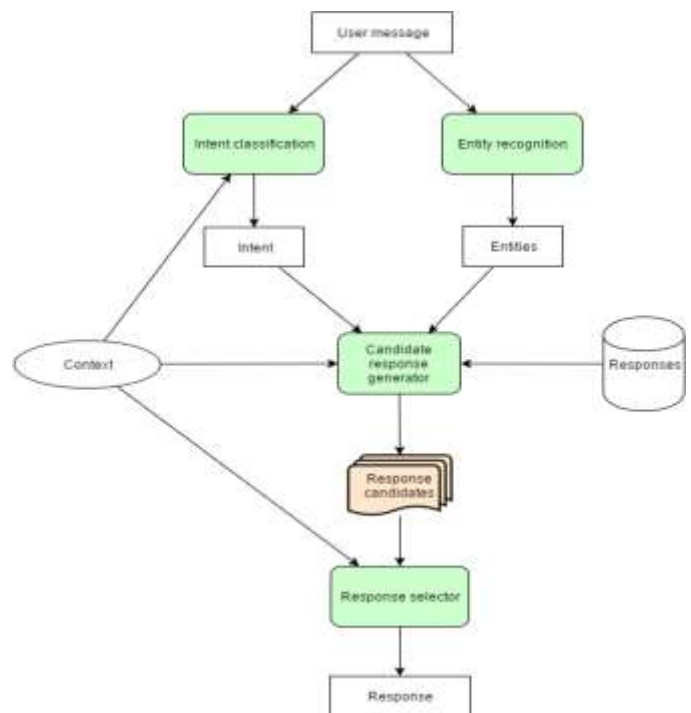


Fig-1: Chatbot Architecture

2. LITERATURE SURVEY

There are various Chatbots in the day to day market that provide different types of services to the user using different strategies. Until now, no such Chatbot has been developed which facilitates the students in choosing careers. A Chatbot named Career Geek is implemented using Facebook Messenger. It provides advices on résumé and cover letter. Naveen Kumar M, Linga Chandar P C, Venkatesh Prasad A, Sumangali K [5] discuss a chat of similar interest for visually impaired people. Also, websites have been developed that help the students in choosing their career by asking some questions to find out the best career to chose. Shiksha.com is one of those websites that help students know about which career is good and which path should be chosen. Chatbots with similar features, have been developed, but for some other purposes that help the user in their routine activities.

These bots use Natural Language processing and various artificial intelligence algorithm that help them work in a better way to serve the user.

Disadvantages of existing system

- 1) A large no. of experts are required for providing guidance thereby, increasing manpower.
- 2) There is no mechanism for intelligent communication.
- 3) There is no voice input and output; it only has text input and output.

2. PROPOSED SYSTEM

The proposed system called NEEV is an Intelligent Chatbot, that is, it makes use of Supervised Machine Learning techniques and NLP (Natural Language Processing). The motivation for the proposed system is derived from seeing the disadvantages of the existing system and to make information available for free. The system focuses on reducing the manpower to a single expert system which replies to all queries and provides intelligent communication between the Chatbot and user. Also, all of the data can be in text or voice form for query as well as response. The system will be developed for handling two languages. To maintain connectivity an active Internet connection will be needed. The user can input their query and get the response. Moreover, an FAQ page can be maintained along with feedbacks to keep a track on the Chatbot performance.

Advantages:

- 1) 24 x 7 system availability.
- 2) Reduced Manpower.
- 3) Voice as well as text input and output.
- 4) User friendly system.
- 5) User does not have to follow standard format while asking any queries.
- 6) The built in artificial intelligence system will carry out all the processing to give suitable answers to the user.

4. IMPLEMENTATION

This Chatbot is deployed as an Android application. An already available framework from Google called Dialogflow (previously known as api.ai) is used. Firebase from Google is used as the data repository. The GUI (Graphical User Interface) & connectivity to Dialogflow is provided using Android Studio. The system makes use of Machine Learning at the back end for processing and training purposes, and NLP & NLU (Natural Language Understanding) for taking and understanding the input. Fig-2 shows how Dialogflow handles the user query, processes it and serves the response to the user. Fig-3 represents a brief conversation life-cycle diagram.



Fig-2: Dialogflow's Working



Fig-3: Life Cycle of a Conversation

4.1 ALGORITHM

1. Take input from the user either in Text or Voice format.
2. IF the input is in Voice format
Then convert it into Text format
ELSE keep the text format as it is
3. Send text input for further processing
4. Match the input for intents and entities
5. Search the data repository for an appropriate answer or generate the response
6. Serve the result either in Speech or in Text format or both
7. IF the conversation has ended
Then STOP
ELSE repeat step 1

4.2 TRAINING THE SYSTEM

Since, the training for ML algorithms is provided by Dialogflow; this section discusses how the intents, entities & fulfillment are used for training.

[5]Intents:

In intents, we define possible utterances of user that can trigger the intent, what to extract from them and how to

respond. Each intent represents one turn of dialog within the conversation. Intents helps to map user input to a corresponding response as a single thing by a user can be asked in multiple ways. Intents have 4 components: Training phrases, Action & Parameters, Responses & Fulfillment.

Training Phrases:

It defines examples of what users can say. Using these training phrases, extension to many similar phrases is done so as to build a language model that accurately matches the user input. A more robust model is built using more training and ML.

Action & Phrases:

It improves intent's language model, we annotate training phrases with entities or categories of data that we want the system to match. This ensures that we don't just match the literal or free-form user inputs rather match a particular type of input. Thus, the system extracts matched entities as parameters from Training Phrases. These parameters are further processed to customize a response to the user.

Responses:

They define a text or speech response to the user which indicates the user in a way that lets them know where the conversation is headed or if it is ending. They can be pre-defined or generated. Responses provided are such that further user input can be matched to one of the predefined intents

Fulfillment:

Fulfillment is used because the system uses generative model for answering. This is the part responsible for providing non-defined responses to user query and serving it back to user. NLP has the feature which directly responds with a simple text by inferring the intents and entities but since, we deal with real-time environment, an external environment is required to compute the correct response. This environment, hooked via NLP, is called Webhook for fulfillment where the parameters from intents are extracted and their values are passed to fulfillment. Then, the response from Webhook will be served as an actual response.

Entities:

Entity basically represents a concept in a Chatbot. In this system, it can be college, courses, etc. Without entities, the system will try to find the exact training phrase that matches the user input.

As the program gets more trained, the accuracy of each response in relation to the input statement increases. The program selects the closest matching response or will generate an answer if no input-response pair can be matched from the knowledge base.

5. CONCLUSION

As the name suggests, NEEV means foundation & so, this intelligent Chatbot for career counseling and obtaining suggestions, will help user in choosing the right career by giving an appropriate response to user's query. It is an intelligent system which will think in a way as the humans would usually think. This system will be helpful in reducing the overall pressure on the students of going on different websites for searching about the possible options. Due to an accurate knowledge base, quick and faithful answers will be given to user.

6. FUTURE SCOPE

In future this Chatbot can be expanded by adding several features like multilingual capability. By adding this feature the Chatbot will be more user friendly. Also the career options that are left for now can be added to it. It can also be expanded by adding college information for a particular course and the admission process for that particular college. A rating and comment section can be provided for the same.

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