

Education Related Query Answering Chatbot Based on RNN Model

Pavan K¹ Harshitha R² Vignesh Mallya³ Chinmayee P S⁴ Satish B Basapur⁵

^{1,2,3,4}U.G Student ⁵Assistant Professor

^{1,2,3,4,5}Department of Information Science & Engineering

^{1,2,3,4,5}Dr. Ambedkar Institute of Technology, Bangalore, Karnataka, India

Abstract— Chatbots are computer programs that provide virtual assistance to handle the conversation between humans in real life (human engagement) using AI. They are trained using ML algorithms and consist of massive amounts of data. Education-chatbot (E-BOT) is a chatbot that answers educational related queries. The purpose of this application is to provide assistance for students in their learning process. This chatbot can be used by an individual for interaction based on their field of interest. The task of machine is to fetch the answers from the stored database and Wikipedia based on the student query using TF-IDF algorithm and RNN model. Purpose of this system is to provide a friendly interface for student to interact with the web server for all kinds of education related information.

Keywords: Chatbot, RNN, Machine Learning

I. INTRODUCTION

In this era where there rapid evolving of technology every individual wants to get quick assistance to dissolve their query. Chatbot is a trending application which has made by Artificial Intelligence. It is being used in humanoid robots, personal assistant, car assistant etc. to make the human work easier. This Chatbot will provide the answer for educational based queries.

The time has come for new services to help users to take advantage of technology which has evolved to provide powerful capabilities for computation and connectivity with the independence of location and time schedule it offers. The New mobile ecosystems such as Android, iOS and Windows Phone allow us to use the web services and application facilities anytime and anywhere. This creates opportunities for application especially those related to e-learning. As all the “connected individuals”, we may benefit from these web-based applications to access and obtain queries based on any educational resources.

The proposed Educational Chatbot application is very helpful when it comes to educational purpose. This assistant system has two main parts: a Document Fetcher and a Document Reviewer. This web application is developed using flask and RNN algorithms. The E-BOT acts as an intermediate agent between a student and the server platform. The final objective of the assistant system is to make a student able to carry out several actions, such as: to consult ask questions from a database in accordance to specific query or any field of interest. This application provide result from previously stored entries present in the database and also from external resources which is Wikipedia. So it is possible provide the result about any topic.

II. RELATED WORK

This section presents an example of other chatbot that are used for various purpose. In addition, it mentions about TF-IDF algorithm which have been used in our proposed system.

A. Android Based Educational Chatbot for Visually Impaired People

The purpose of this android application is to provide educational based Chatbot for visually impaired people [2]. It will give an answer to the educational based queries asked by the visually impaired people. They can easily launch the application with the help of google voice search. Once the application is open, it will give a voice instruction to use an application. Output will be provided in voice form as well as in text form. So normal people can also use this application. In this application is made with an android platform. This application provides result from pre-defined entries and also from external resources which is Wikipedia. So it is possible to provide the result about any topic which is included in Wikipedia. Hence it may support speech recognition for the user input. This Chatbot application uses the MediaWiki API (Application Programming Interface) to link with Wikipedia. It also includes AB library which is provided by the ALICE (Artificial Linguistic Internet Computer Entity) which handles the AIML (Artificial Intelligence Mark-up Language) files which contains the pre-defined questions and answers. Further, in AIML information retrieval is based on four pattern matching techniques they are, symbolic reduction, divide and conquer, synonyms resolution, keywords detection. These methods are pre-defined in AB library. The proposed Chatbot gives great flexibility for the visually impaired people to learn easily without others help.

B. TF-IDF Algorithm

Term Frequency- Inverse Document Frequency algorithm is a numerical statistic that is intended to reflect how important a word is to a document in a collection or corpus. [4] It used by the search engines to understand the content that is better evaluated. One of the simplest ranking functions is computed by summing the tf-idf for each query term. Tf-idf can be successfully or efficiently used for filtering in various subject fields including text summarization and classification. Each term in the document has its respective TF and IDF score. The product of the TF and IDF scores of a term is called the TF*IDF weight of that term.

The Term frequency (TF) of a word is the frequency of a word (i.e. number of times it appears) in a document. The Inverse document frequency (IDF) is a measure of how much information the term provides, i.e., if it's common or rare across all documents. It is the logarithmically scaled inverse fraction of the documents that contain the word. (Obtained by dividing the total number of documents by the number of documents containing the term, and then taking the logarithm of that quotient). Then TF-IDF is calculated as the product of TF and IDF.

III. PROPOSED SYSTEM

The proposed web-based Educational chatbot application can answer any kind of queries or questions and provide information from the databases and Wikipedia. The students can ask any user-defined questions based on their educational curriculum or for their research. This platform serves as a new virtual system to help students learn with ease. The output of the query is given in the form of a text. Any device with browser and internet connectivity can run this application.

IV. SYSTEM ARCHITECTURE

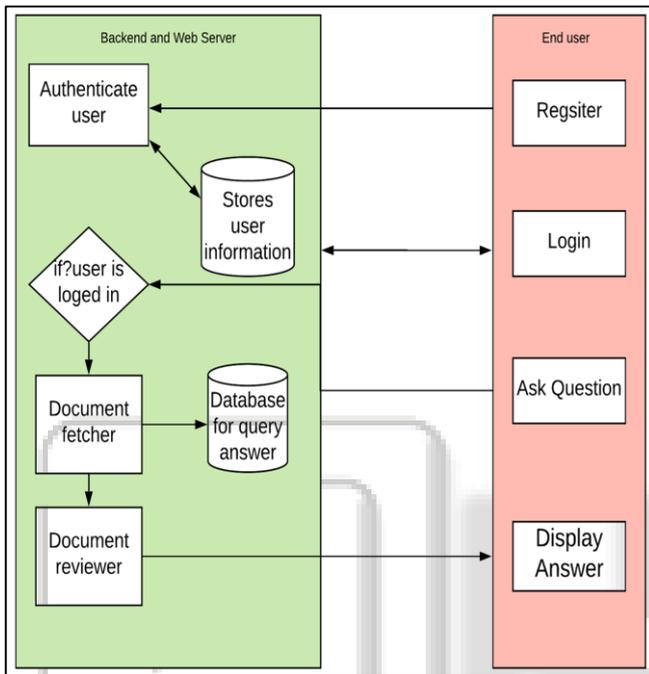


Fig. 1: System design

The system architecture is divided into 2 parts,

A. Back end

The back end consists of 2 parts: Document Fetcher and Document Reviewer. Which are connected using flask. The database is built using sqlite3 which contains various textbook data and Wikipedia data.

1) Document Fetcher

The document fetcher works as the first part of our model. It uses an efficient non machine learning algorithm to fetch data from the database called TF-IDF. TF-IDF (Term Frequency- Inverse Document Frequency) algorithm is used by the search engines to understand the content that is better evaluated. Information retrieval and text mining. Once the user submits his query, the fetcher breaks down the query and removes all the stop words (I.e.: what, which, who, why etc.) and the picks the

Primary keywords and searches the database based on that. After the related articles are found that provides them with scores based on TF-IDF algorithm. Based on the rankings it then passes the top 5 retrieved data on to the document reviewer.

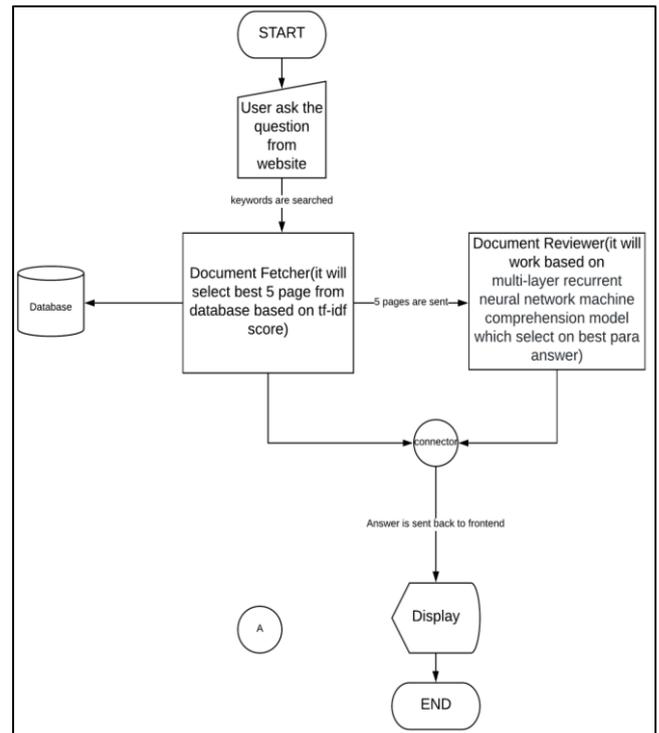


Fig. 2: Backend design

2) Document Reviewer

It is a multi-layer recurrent neural network machine comprehension model trained to do extractive question answering. That is, the model tries to find the answer to any question as a text span in one of the returned documents. The Document Reader was inspired by, and primarily trained on, the SQuAD dataset. It can also be used standalone on such SQuAD-like tasks where a specific context is supplied with the question, the answer to which is contained in the context.

B. Front end

The Front end is created using CSS, HTML, and Bootstrap. The system provides the register page, login details and different services to the users including more information about the E-BOT and the details of the developers of the application and page for feedback in case they are facing any issues or they want to give us the feedbacks.

Once the user registers using a unique id and a password, they can login and acquire information based on their query and get replied with a paragraph of answer within seconds. The query asked is sent to the backend using Flask. Flask acts as an intermediate to transfer the query and the answer to and forth from the frontend to the backend. The query is broken down into individual words and the keywords are selected and using with algorithms the answer from an article is retrieved.

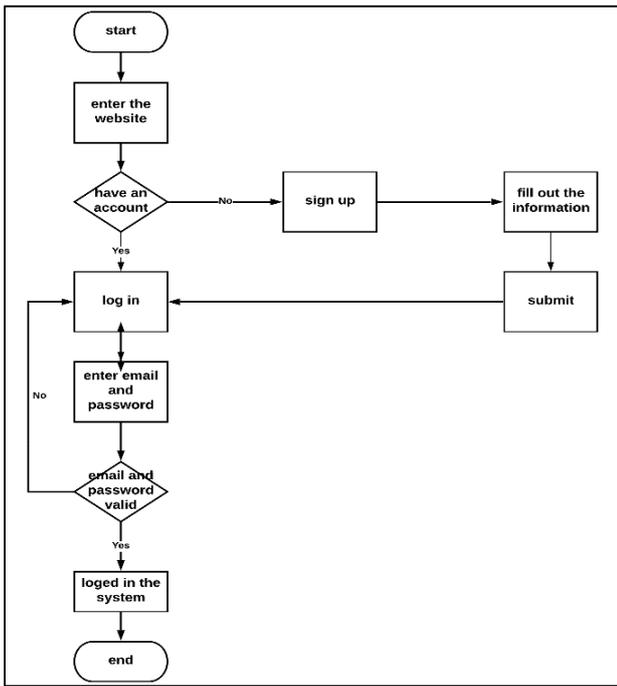


Fig. 3: Login design

V. EXPERIMENTAL RESULTS AND SCREENSHOTS

In the following developed system we have achieved a good percentage of accuracy of proper results for the queries asked by the students regarding their educational subject or any other field of interest for that matter. The E-BOT provides everyone with a paragraph of answer from the previously stored database or Wikipedia within seconds of time. The queries of the users can be solved anywhere and anytime of the day.

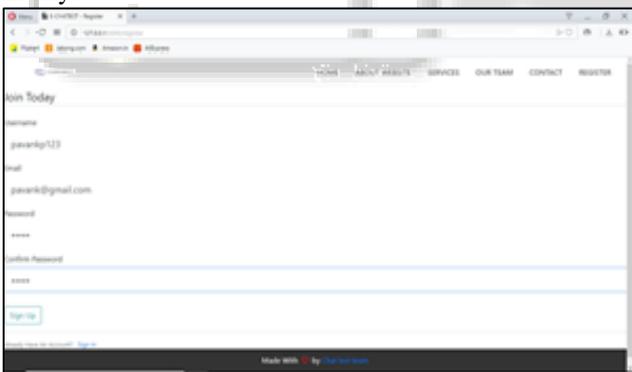


Fig. 4: Register page



Fig. 5: Home page

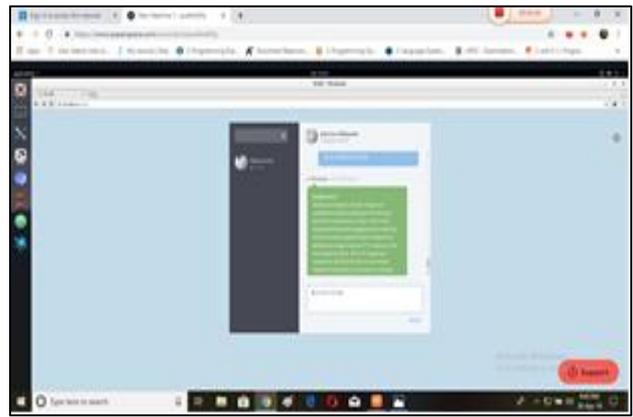


Fig. 6: Chatbot answering user query

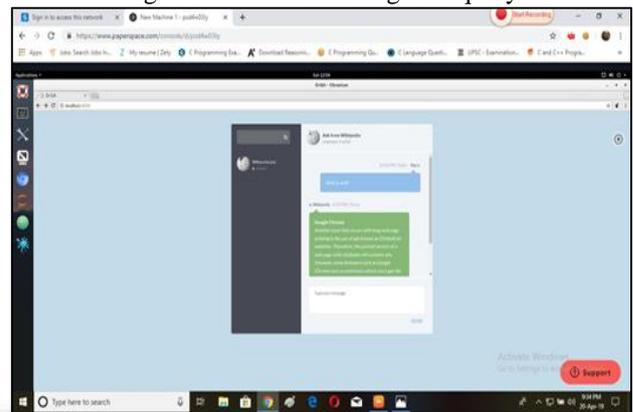


Fig. 7: Chatbot answering user query

VI. CONCLUSION

E-BOT are now new trending Applications! As we have discussed, this project brings the power of chatbot to student and enriches its usability. Chatbots can give a human like touch to some aspects and make it an enjoyable conversation they are entirely focused on completing the task for the students they interact with.

Artificial Intelligence conversational agents are becoming popular for web services and systems like scientific, entertainment and commercial systems, and academia. But more effective human-computer interaction will takes place by querying missing data by the user to provide satisfactory answer. In this paper we have proposed and implemented an interactive chatbot for students using RNN model.

In this report we proposed the Educational Chatbot for students and it can also be used by normal people. It can provide result from both stored data warehouse and Wikipedia. So user will be able to search for any topic. The further development of the application is focused on notification for students. Notification gives the information about the updates in their interested domain.

The system allows the students to ask questions directly to the E-BOT about the matter they are learning, which will be answered by the bot if suitable educational content has been previously loaded in its knowledge base.

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