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Stud Bot: Conversational Chatbot for Students

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ABSTRACT

With the latest developments in deep learning and artificial intelligence, all major disciplines using computers in any type of work are trying to use deep learning methods to make the task easier. Due to its many applications, such as health care, sports, automation and education. The system proposed in this paper is for educational use where teaching and student evaluation will be done by the machine. The technology behind this is natural language processing and deep learning technology, which is an advanced and efficient solution for understanding real world problems and providing solutions for them. The proposed system is an all-in-one conversational chatbot capable of answering questions, assisting students with their study, and providing information on their studies. The system uses Naïve Bayes model for solving the recognized problem. So, the goal of this project is to create a chatbot for learning students that will act as a companion to them while they study, allowing them to obtain aid and make their studies more efficient and fascinating.

Keywords—Conversational chatbot, Naïve Bayes, Artificial Intelligence (AI), Natural Language Processing(NLP)

Introduction

In 21st century everything is getting digitized also everyone needs assistance to tackle the problem. Advancement in the education sector is essential to accommodate evolving lifestyles, economy, technology and student's needs. Also, the increased scarcity of teachers in the education system have made the integration of advanced technology in our education system essential. As due to pandemic students are facing issue to find the help or guidance as teachers can't be always there to help. Everyone is learning education online in this epidemic situation. There are numerous disadvantages to these systems, the most significant of which is that student-teacher interaction is reduced. A chatbot is one of the most convenient ways for students to learn, and it can also resolve student questions at any moment without the need for human assistance. Thus, we have come up with an idea to create a system which can assist student at any time.

Related Survey

The system creates an academic chatbot using NLP and ML that may be used by a variety of educational institutions. There are two options available: audio and text. Instead of being placed on the inquiry disk's waiting list, consumers can communicate with the bot. The accuracy of a question is tested by asking the same question in different ways[9].

Deep learning algorithms were used to create an online video lecture assistant. By using many chatbots from different perspectives for the same video, it improves the quality of Q&A data[10].

The plan is to use intent categorization and natural language processing to create an interactive user interface and a chatbot. The model was created with the goal of comprehending and producing SPARQL queries from user inquiries[12].

According to the research, the instructional chatbot for the Facebook Messenger platform is effective. An effective way for determining discoverability as well as features such as language, subject matter, and developer platform[13].

Architecture

- *Data Set*

• **Tag:** Keyword for the question
• **Pattern:** Possible different question frames
• **Response:** What are the different types of answer
• **Context:** Related to the dataset(if required).

- *Data Pre-processing*

The process of converting raw data into a comprehensible format is known as data preparation. We can't work with raw data, so this is a key stage in data mining. Before using machine learning or data mining methods, make sure the data is of good quality.

Tokenization:
Take input from sentence and spilt it word by word.
For example: “What is data mining” is tokenised to “What”, “is”, “data”, “mining”.
Stemming:
Stem each word to prevent any repeated word that has similar meaning.
For example: “Organization”, “Organize”, “Organizer” is equal to “Organ”.
Bag of words:
The words that are stemmed would be turned into vectors with the bag of words technique.
Lemmatization
Lemmatization is one of the most widely recognized content pre-preparing procedures utilized in Natural Language Processing (NLP) and AI as a rule. Lemmatization is the process of combining a word's several inflected forms into a single item that may be studied. Lemmatization is similar to stemming, but it gives the words context. As a result, it connects words with similar meanings into a single term.
For example: “rocks” = “rock”
“ran”= “run”
The lemmatizer is used to parse lower-case words, yielding the root word. This also aids in the reduction of recursive words.
Word Pickle
For serialising and de-serializing object structures, the pickle package is utilised. Pickling, serialisation, flattening, and marshalling are all terms for the process of converting any type of Python object (list, dict, etc.) into byte streams (0s and 1s).
Sequential Model
The actual neural network procedure is the sequential model process. The system layer will be updated based on the dataset.
Trained Model
The prepared dataset is sent to the build sequential model, which is then assigned to the process's weight.
Save the Model
Save the trained model of the system for deployment.

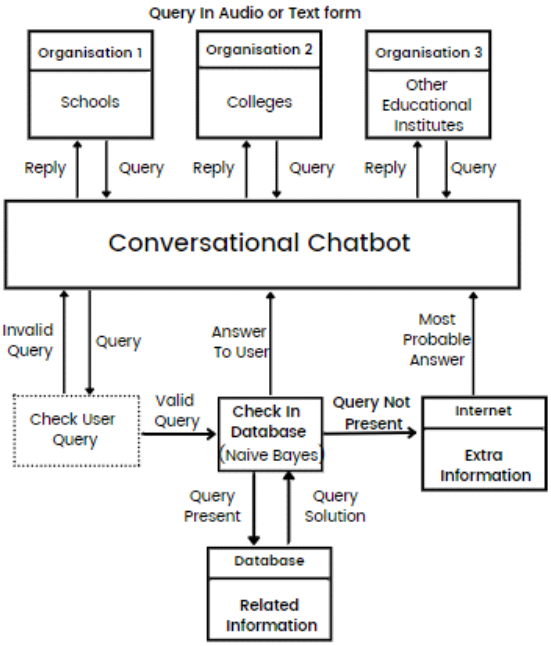

Fig 1 : Architecture diagram of conversational chatbot for real-time usage by the Students.

Algorithm for the System

Input:
Set of questions or commands provided by the user.
Output:
Set of answers or actions provided or performed by the system.
Step 1: Obtain inputs from the user via voice or text
Step 2: Perform data pre-processing procedures like tokenization, stemming etc on the input
Step 3: Perform Lemmatization on the input provided
Step 4: Check whether the query is present in dataset by the trained model
Step 5: If present, provide the output via text and audio format
Step 6: If not present, perform web scrapping and fetch the solution
Step 7: Update the database and provide the output with the fetched solution
Step 8: Wait for next command

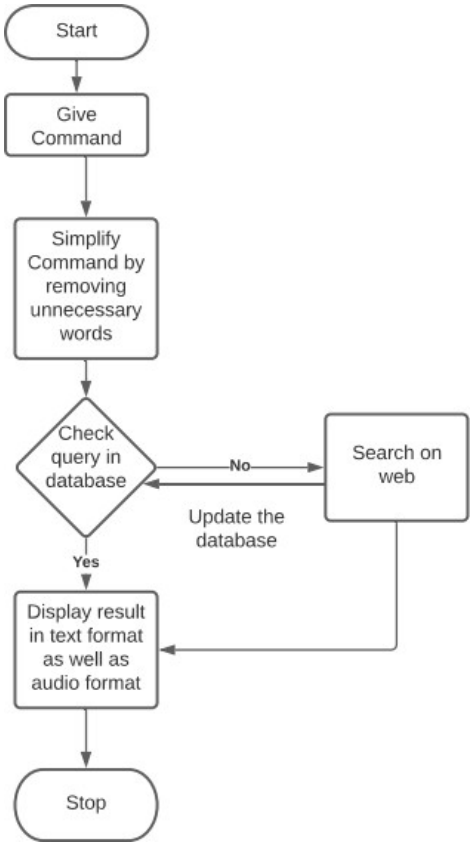

Fig 2 : Flow chart diagram for conversational chatbot.

Performance Analysis

Performance analysis of a system is the process of checking space, time, and other factors required by that system. It estimates the number of interconnections between the chatbot and the user. Our system aims to provide effective decision power to the user.

- *Chatbot activity volume*

It estimates the number of interconnections between the chatbot and the user. Our system aims to provide effective decision power to the user.

- *Target audience session volume*

This criterion is important for determining whether the system has met its objective. Our system is consistent and produces effective results because when a user asks a question, it responds with the correct answer based on the user's query.

- *Goal completion rate*

Epoch is the measurement to measure the attainment rate of a given action.

```
27/27 [==============================] - 0s 4ms/step - loss: 0.2595 - accuracy: 0.9185
Epoch 284/300
27/27 [==============================] - 0s 4ms/step - loss: 0.4718 - accuracy: 0.8815
Epoch 285/300
27/27 [==============================] - 0s 3ms/step - loss: 0.1742 - accuracy: 0.9259
Epoch 286/300
27/27 [==============================] - 0s 3ms/step - loss: 0.1754 - accuracy: 0.9556
Epoch 287/300
27/27 [==============================] - 0s 4ms/step - loss: 0.1057 - accuracy: 0.9704
Epoch 288/300
27/27 [==============================] - 0s 3ms/step - loss: 0.1922 - accuracy: 0.9407
Epoch 289/300
27/27 [==============================] - 0s 3ms/step - loss: 0.3226 - accuracy: 0.8815
Epoch 290/300
27/27 [==============================] - 0s 4ms/step - loss: 0.1839 - accuracy: 0.9333
Epoch 291/300
27/27 [==============================] - 0s 4ms/step - loss: 0.1306 - accuracy: 0.9704
Epoch 292/300
27/27 [==============================] - 0s 4ms/step - loss: 0.1963 - accuracy: 0.9333
Epoch 293/300
27/27 [==============================] - 0s 4ms/step - loss: 0.2029 - accuracy: 0.9481
Epoch 294/300
27/27 [==============================] - 0s 4ms/step - loss: 0.2298 - accuracy: 0.9481
Epoch 295/300
27/27 [==============================] - 0s 3ms/step - loss: 0.2025 - accuracy: 0.9481
Epoch 296/300
27/27 [==============================] - 0s 4ms/step - loss: 0.2203 - accuracy: 0.9333
Epoch 297/300
27/27 [==============================] - 0s 4ms/step - loss: 0.2840 - accuracy: 0.9259
Epoch 298/300
27/27 [==============================] - 0s 3ms/step - loss: 0.1564 - accuracy: 0.9630
Epoch 299/300
27/27 [==============================] - 0s 4ms/step - loss: 0.1684 - accuracy: 0.9556
Epoch 300/300
27/27 [==============================] - 0s 4ms/step - loss: 0.2040 - accuracy: 0.9407
model created
```

Fig 3 : Screenshot of the Epoch value

- *Turn around time*

Time required by the system for performing the task provided and returning its attention to the user. Our system is efficient and convenient because it provides answers to the users frequently.

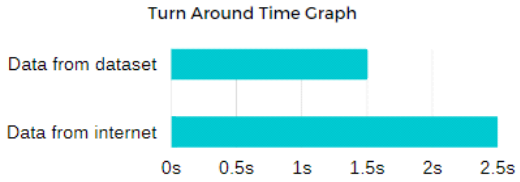

Fig 4 : Chart diagram of chatbot turn around time

- *No response rate*

This is a scale that represents the total number of times a chatbot has failed to respond to a question. The system's outcome is determined by the activity undertaken by the user at the time. This type of situation occurs when user provides a task which is not present in dataset of the chatbot.

- *Most frequently asked questions*

This element is used to improve the chatbot's response quality. The system will provide the users' inquiries in a timely manner.

Results

Table 1 : Performance table for analysing the chatbot efficiency

Sr. No.	Performance Table		
	Parameters	From Dataset	From Web Scrapping
1.	Accuracy	97%	94%
2.	Turn around time	1.5s	2.5s
3.	No response rate	17%	15%

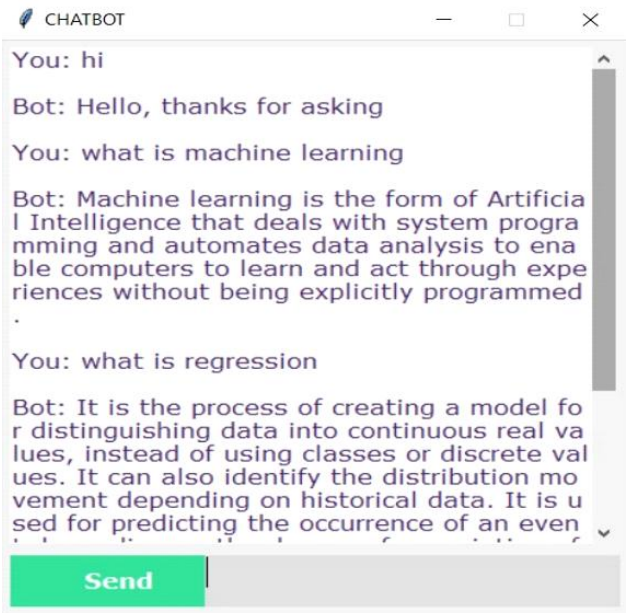

Fig 5 : Working example of text based chatbot

Fig 6 : Working example of voice over based chatbot

- *System Requirements for using the software:*

Hardware Requirement: Any modern CPU with 2.0 GHz of clock speed, Harddisk: 20GB minimum, RAM: 1GB.
Software Requirements: Windows / Linux /macOS operating system and a web browser. VS Code IDE, Python, Keras, Tensorflow.

Conclusion and Future Scope

Conversational Student Chatbot provides an easy and efficient way to students for studying different concepts. It is time efficient and cost effective as the whole process is automated. The students will be able to learn the concepts and solve the doubts with the help of this conversational student chatbot. The chatbot will be an all-time companion for students in their study. It will involve features of finding the answers from its collection and also get solutions for new unknown questions also build up with friendly features which can be used for accessing the system. Students can store, edit notes with the help of system. So, in the experiment setup it is found that the system is performing well for student's query.
In future, the system will be a fully functional system which will involve connectivity with teachers as well as parents. It will notify you about the examination and recommend the concepts or questions to the students for scoring good marks on the basis of previous year question papers.

Acknowledgment

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References

1) Koundinya, Hrushikesh, Ajay Krishna Palakurthi, Vaishnavi Putnala, and Ashok Kumar. "Smart College Chatbot using ML and Python." In 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), pp. 1-5. IEEE, 2020.
2) Aguilar-Mejía, José Rafael, and Santa Tejeda. "Using a virtual assistant for learning selected topics of Physics." In 2020 IEEE Integrated STEM Education Conference (ISEC), pp. 1-4. IEEE,2020.
3) Sandu, Nitirajsingh, and Ergun Gide. "Adoption of AI-Chatbots to enhance student learning experience in higher education in India." In 2019 18th International Conference on Information Technology Based Higher Education and Training (ITHET), pp. 1-5. IEEE, 2019.
4) McTear, Michael. "Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots." Synthesis Lectures on Human Language Technologies 13, no. 3 (2020): 1-251.
5) Kasthuri, E., and S. Balaji. "A Chatbot for Changing Lifestyle in Education." In 2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV), pp. 1317-1322. IEEE, 2021.
6) Punjabi, Sunil, Vighnesh Scthuram, Vignesh Ramachandran, and Shivshankar Ravi. "Chat bot using API: Human to machine conversation." In 2019 Global Conference for Advancement in Technology (GCAT), pp. 1-5. IEEE, 2019.
7) Lalwani, Tarun, Shashank Bhalotia, Ashish Pal, Shreya Bisen, and Vasundhara Rathod. "Implementation of a Chat Bot System using AI and NLP." International Journal of Innovative Research in Computer Science & Technology (IJIRCST) 6, no. 3 (2018): 26-30.
8) Mondal, Anupam, Monalisa Dey, Dipankar Das, Sachit Nagpal, and Kevin Garda."Chatbot: An automated conversation system for the educational domain." In 2018 International Joint Symposium on Artificial Intelligence and Natural Language Processing (iSAI-NLP), pp. 1-5. IEEE, 2018.
9) Kumari, Sangeeta, Zaid Naikwadi, Akshay Akole, and Purushottam Darshankar. "Enhancing College Chat Bot Assistant with the Help of Richer Human Computer Interaction and Speech Recognition." In 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), pp. 427-433. IEEE, 2020.
10) Makhkamova, Ozoda, Kang-Hee Lee, KyoungHwa Do, and Doohyun Kim. "Deep Learning-Based Multi-Chatbot Broker for Q&A Improvement of Video Tutoring Assistant." In 2020 IEEE International Conference on Big Data and Smart Computing (BigComp), pp. 221-224. IEEE, 2020.
11) M. Naveen Kumar, PC Linga Chandar, A. Venkatesh Prasad and K. Sumangali, "Android based educational Chatbot for visually impaired people", In 2016 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), pp. 1-4, 2016.
12) A it-Mlouk, Addi, and Lili Jiang. "KBot: a Knowledge graph based chatBot for natural language understanding over linked data." IEEE Access 8 (2020): 149220-149230.
13) Smutny, Pavel, and Petra Schreiberova. "Chatbots for learning: A review of educational chatbots for the Facebook Messenger." Computers & Education 151 (2020): 103862.