Question Answering System For VIT Chennai Website -Chatbot

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Abstract

Question answering (QA) is intended to answer questions defined in natural language. The question answering system provides an automated approach to getting a solution for natural language queries. Many QA surveys classify question-answering systems basedon a variety of criteria, including: A more comprehensive overview of the QA scheme is essential to a complete understanding of the QA scheme, how it has grown to meet current QA requirements, and the need to expand to meet future expectations. In this project we will do a quick survey of the general QA framework in terms of question analysis, passage search, answer extraction, and some important questions related to the QA system. To utilize software programs, we can use command line, graphical user inter-face (GUI), menu driven, form-based, natural language, and other user interfaces. Although the most common user interfaces are GUI and web-based, there are times when a different user interface is required. This is where a conversational user interface chat bot based on Question Answering System comes in handy. They usually offer a stateful service, which implies that each session's data is preserved. It's common to be unsure where to go on collage website for information. The answer is an inquiry chat bot, which is a quick, simple, and informative wid-get that improves collage website's user experience while also giving important information to the user. Chat bots are sophisticated algorithms that communicate with humans using artificial intelligence (AI) and natural language processing (NLP) techniques.

1 Introduction

Question Answering (QA) is intended to automatically provide a solution for natural language queries. Question answering systems aim to get the expected answer to a question, rather than ranking the documents as in most information retrieval systems. The idea of a question answering system shows remarkable progress in information retrieval technology, especially in the ability to naturally access knowledge resources by simply querying and retrieving the correct answer. Our Chat Bot is a computer program that can talk to humans in natural language, the way we interact with each other. It can replace a human for many queries response tasks. A chatbot is an agent that interacts with the user using natural language. One of the main goals of our chatbot is to look like a human and make it difficult for the recipient of the conversation to under- stand how it actually works and provide related useful information for the queries that the recipient has posted. Chatbot enable customers to have a better experience by simplifying com-plex services and interactions. These chatbots can trick users into believing they are" talking" to a human, but they are limited in their ability to build their knowledge base in real time.For this limitation Chatbots makes use of ma- chine learning to reach artificial intelligence helping them to understand the user query and provide an appropriate response. The chatbots

are developed using the Artificial Intelligence Markup Language for communicating or interacting with the user. This consist a software which will be made up using Artificial Intelligence and will help user to chat with machine.

2 Literature Survey

[1] AI BASED CHATBOT, Prof. Nikita Hatwar, Ashwini Patil, Diksha Gondane International Journal of Emerging Trends in Engineering and Basic Sciences (IJEEBS) ISSN (Online) 2349-6967 Volume 3, Issue 2 (March-April 2016) - This paper demonstrates the creation of an artificially intelligent chatter bot with whom humans may communicate by speaking to it and receiving a response from the bot via its voice synthesiser. The goal of this study is to demonstrate how a chatter bot may be utilised in a variety of disciplines, including education, healthcare, and route help. It is a statistical model and chatter bot that uses Microsoft voice synthesiser for speech recognition and natural language processing and is trained using AIML (Artificial Intelligent Markup Language) structure.

[2] Adoption of AI-based chatbots for Hospitality and Tourism, Rajasshrie Pillai, Brijesh Sivathanu, Pune, India (2020). This research provides critical insights for practitioners and managers by providing the factors of AIN of chatbots in tourism. This study highlights some of the manager's viewpoints, which can be considered to comprehend the adoption of chatbots in the tourism industry. Marketers and designers of tourism chatbots need to ensure that chatbots are easy and simple to use as well as useful in the tour planning and travel management.

[3] AI-based chatbots in customer service and their effects on user compliance, Martin Adam1 & Michael Wessel2 & Alexander Benlian1, (2020) In this study, they conducted an online experiment to show that both verbal anthropomorphic design cues and the foot-in-the-door technique increase user compliance with a chatbot's request for service feedback. their study is thus an initial step towards better understanding how AI-based CAs may improve user compliance by leveraging the effects of anthropomorphism and the need to stay consistent in the context of electronic markets and customer service.

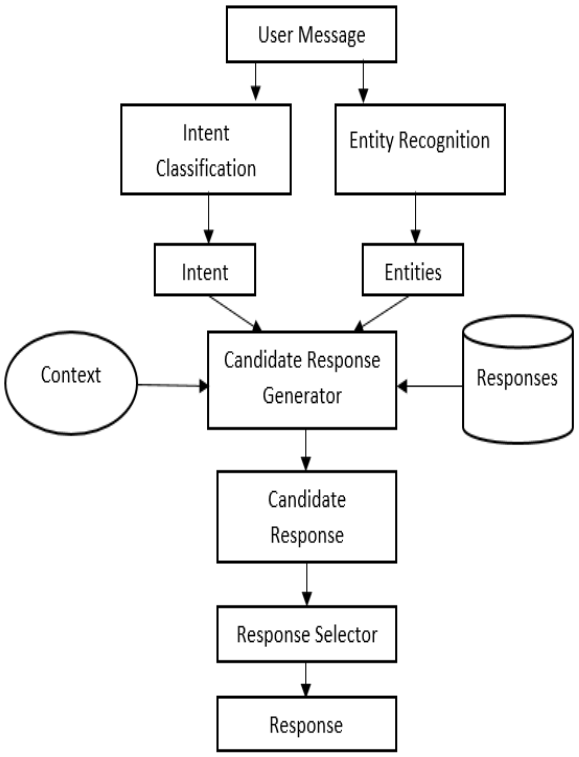
[4] Parsing and Question Classification for Question Answering, Ulf Hermjakob Information Sciences Institute University of Southern California, (2017) This paper describes machine learning based parsing and question classification for question answering. We demonstrate that for this type of application, parse trees have to be semantically richer and structurally more oriented towards semantics than what most treebanks offer. They empirically show how question parsing dramatically improves when augmenting a semantically enriched Penn treebank training corpus with an additional question treebank.

3 Proposed System

We propose a question answering system based chatbot which can be embedded into the college website which helps to solve the drawbacks of a traditional collage website where users or students find it difficult to find the information which they are looking. The university question answering system-based Chat- bot will provide an answer by summarizing the question and providing the relevant answer. It also provides selective information about what the user wants. A university chatbot willprovide all the answers related to areas like admission, test box, bulletin board, attendance, placement box and others. We have taken a lot of pre-defined questions relating to all the possible queries that a user would like to know or ask a chatbot in a collage website or university perspective domain. And in the pre- defined query dataset we have divided all the queries or questions into a certain class where they would fit and for all the available question sentences, we have divided it into unique lemmatized words and when a query is posted the ML algorithm will take the query and find all the unique lemmatized words and match it with the available query dataset and will classify it into any one of the available classes and respond with a suitable more precise answer.

4 Architectural Design

An architecture of Chatbot requires a candidate response generator and response selector to give the response to the user's queries through text, images, URL's, documents, etc.



5 Working of the Model

So, the flow of the chatbot is as follows:

1. First we have a file called 'intents.json', in this file we have a set of predefined questions and answers. All questions and answers can be separated by 'tags'. 'tags' here means a specific topic or category of a question. For ex, tag=Canteen means the question asked by the user falls into canteen category.

2. We have a neural network which will train on the questions, obviously we need to convert text into bag-of-words representation in order to do that. Here, we will learn the association between the question and the tag. Which means our feature variable is Bag of words representation of the questions and our target variable is the tag associated with those questions. Yes, it is a classification task.

3. Once we find the tag, we just need to return an answer for that tag entry through the json file.

A unique pattern must be available in the database to provide a suitable response for each kind of question. A hierarchy is created with lots of combinations of patterns. Algorithms are used to reduce the number of classifiers and create a more manageable structure. This is called Reductionist approach.

For example, let us see at the set of sentences that belong to a particular class. With new input sentences, each word is counted for its occurrence and is accounted for its commonality. Then, each class is assigned a score. The highest scored class is the most likely to be associated with the input sentence.

Example of Sample Training Set:

Class: Greetings

"How are you doing?" "Good morning"

"Hi, there!"

Sample Input Sentence Classification:

Input: "Hello, good morning."

Term: "Hello" (no matches)

Term: "Good" (class: Greetings)

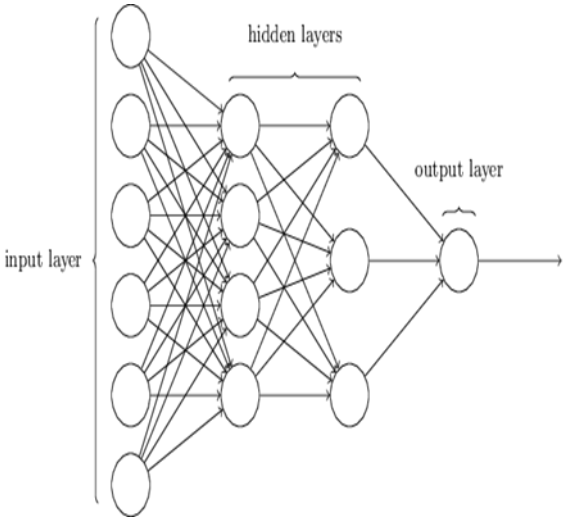
Term: "morning" (class: Greetings)

Classification: Greetings (score=2)

With the help of an equation, word matches are found for the given sample sentences for each class. The classification score identifies the class with the highest term matches, but it also has some limitations. The score signifies which intent is most likely to the sentence but does not guarantee it is the perfect match. The highest score only provides the relativity base.

6 Artificial Neural Networks

Neural Networks are a way of calculating the output from the input using weighted connections, which are computed from repeated iterations while training the data. Each step through the training data amends the weights resulting in the output with accuracy.



As discussed earlier here, each sentence is

broken down into individual words, and each word is then used as input for the neural networks. The weighted connections are then calculated by different iterations through the training data thousands of times, each time improving the weights to make it accurate.

7 NLU (Natura Language Understanding)

NLU helps the chatbot understand the query by breaking it down. We have used two specific concepts in building our college chatbot:

1. **Entities:** An entity represents keywords from the user's query picked up by the chatbot to understand what the user wants. It is a concept in your chatbot. E.g., 'Where is VIT's Location?' has the word 'Location' as an entity.

2. **Intents:** It helps identify the action the chatbot needs to perform on the user's input. For instance, the intent of "Where is VIT" and "What is VIT Location? and "Where is VIT located" is the same. All of these user's texts trigger a single command giving users options for t-shirts.

8 NLP (Natural Language Processing)

Natural Language Processing (NLP) chatbot takes some steps to convert the customer's text or speech into structured data to select the related answer. Some of the Natural Language Processing steps which we have used are:

- **Tokenization:** The NLP divides a string of words into pieces or tokens. These tokens are linguistically symbolic or are differently helpful for the application.
- **Named Entity Recognition:** The chatbot program model looks for categories of words, like the name of the product, the user's name or address, whichever data is required.

Like most applications, the chatbot is also connected to the database. The knowledge base or the database of information is used to feed the chatbot with the information required to give a suitable response to the user.

The information about whether or not your chatbot could match the users' questions is captured in the data store. NLP helps translate human language into a combination of patterns and text that can be mapped in real-time to find appropriate responses.

9 Conclusion

Artificial Intelligence (AI) is the world's fastest-growing technology. Using Artificial Intelligence and Knowledgeable Databases. We have the ability to alter pattern matching and help virtually.

This method is building a chatbot for a university in order to reduce website traffic. It is made up of a mix of artificial intelligence, knowledge databases, and virtual assistance. We can build a chat bot that transforms between human and machine speech and responds to the user's question.

10 References

[1] AI BASED CHATBOT Prof.Nikita Hatwar 1, Ashwini Patil , Diksha Gondane 3 123 (Information Technology, Priyadarshini College of Engineering,Nagpur/ RTMNU,India)International Journal of Emerging Trends in Engineering and Basic Sciences (IJEEBS) ISSN (Online) 2349-6967 Volume 3, Issue 2 (March-April 2016)

[2] Y. Wu, G. Wang, W. Li, and Z. Li, "Automatic Chatbot Knowledge Acquisition from Online Forum via Rough Set and Ensemble Learning," Proc. IEEE of 2008 IFIP International Conference on Network and Parallel Computing, 2008, pp. 242-246, doi:10.1109/NPC.2008.24.

[3] J. Bang, H. Noh, Y. Kim and G. G. Lee, "Example-based chatoriented dialogue system with personalized long-term memory,"2015 International Conference on Big Data and Smart Computing (BIGCOMP), Jeju, 2015

[4] Y. Chen, W. Wang and Z. Liu, "Keyword-based search and exploration on databases," 2011 IEEE 27th International Conference on Data Engineering, Hannover, 2011

[5] Sanda Harabagiu, Marius Pasca and Steven Maiorano 2000. Experiments with Open-Domain Textual Question Answering In Proceedings of COLING2000, Saarbrucken.

[6] Srihari, C. Niu, and W. Li. 2000. A Hybrid Approach for Named Entity and Sub-Type Tagging. In Proceedings of the conference on Applied Natural Language Processing (ANLP 2000), Seattle.

[7] Ed Hovy, L. Gerber, U. Hermjakob, C.-

Y. Lin, D. Ravichandran 2001. Towards Semantics-Based Answer Pinpointing In Proceedings of the HLT 2001 Conference, San Diego

[8] Wu M., Zheng X., Duan M., Liu T. and Strzalkowski T., "Question Answering by Pattern Matching, WebProofing, Semantic Form Proofing". NIST Special Publication: The Twelfth Text REtrieval Conference (TREC),p. 500-255. (2003)

[9] Laurent D., Séguéla P. and NègreCross S., "Lingual Question Answering using QRISTAL for CLEF 2006". Lecture Notes in Computer Science, Vol. 4730, 2007, pp. 339-350.