Development Of Chatbot As An Undergraduate's Career Advisor

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*Abstract:*A Chatbot is a service, which is governed by certain indispensable rules that are based majorly on Artificial Intelligence (AI) and Machine Learning algorithms that you use to interact with a chat interface. The Chatbot which is to be implemented accepts natural language input (text) from users, navigates through the Information Repository and responds with course information in natural language in a University environment which is particularly useful for students looking for information regarding various courses offered by the University. Students are guided by the Chatbot to choose their courses judiciously by asking questions essential in achieving the intent or goal of the system, which are further analyzed, appropriate keywords are searched, and an output is generated thereby fulfilling the intent. The Chatbot has the ability to garner more information by itself, by leveraging the properties of Amazon Lex and AWS Lambda to the fullest, and hence can be labeled as self-learning. The developed system thereby provides course/s to the user (student) with an accuracy of about 85% as supported by the Holland's Theory.

IndexTerms -**Chatbot, Artificial Intelligence,University environment, Courses**

I. INTRODUCTION

After higher secondary education every student faces this tough dilemma of choosing a stream which is of his/her utmost interest. In a world filled with career choices ranging from medicine to mass communications, engineering to event management, marine biology to information technology, the confusion teenagers face over which career to pick is understandable. A large number of students continue to choose a career without much discretion or as per stereotypes due to a myriad of factors such as peer pressure, fulfilling,and market boom, to name a few .This, however, may not be the best way to go about it.

Students are often hesitant to approach anyone when it comes to discussing and weighing their options as per their credentials. Moreover the usage of internet for choosing something as tailor-made as an undergraduate course which is pretty much the crux of your career isn't favored. The vast information available on the internet isn't filtered and hence can tend to bewilder the students. This is an issue which is faced by most of the students in our country. Choosing the wrong course might even jeopardize the future prospects as according to a NASSCOM report, each year over 3 million graduates and post-graduates are added to the Indian workforce. Of these, only 25 percent of technical graduates and 10-15 percent of regular graduates are considered employable by the industry.

Having experienced the same quandary at a personal level, to develop any entity which satisfactorily provides answers to the students' queries was our driving force. In addition the internet answering engines currently in the internet are also attempting to develop many applications of Chatbot which is often aimed for such purposes or just entertainment. The implementation of this project on a University environment is particularly useful for students' looking for information regarding various courses in a University.

The platform which seemed suitable to build the chatbot after a lot of survey is Amazon Lex.Amazon Lex is an AWS service for building conversational interfaces for applications using text. Amazon Lex enables any developer to build sophisticated, natural language ChatBot into any new or existing applications. Amazon Lex manages the dialogue and dynamically adjusts the responses in the conversation. We can add the conversational interfaces to bots on mobile devices, web applications, and chat platforms (for example, Facebook Messenger).Amazon Lex provides pre-built integration with AWS Lambda, using which we can easily integrate it with many other services on the AWS platform.

Amazon Lex offers various functionalities which make it suitable to build a custom made chatbot.The public availability of Lex with NLP capabilities for mobile devices, web apps, and chat services as well as its integration with AWS Lambda make it better to use. It is a fully managed service as it runs on Amazon infrastructure, thereby making it easier to scale based on demand, and hence there are no operational overheads. Moreover Amazon Lex also provides seamless integration with AWS Lambda and other services provided by the platform such as Amazon RDS which is an inherent part of the chatbot developed.

II. RELATED WORK

The paper [1] analyses the dialogue design with conversation knowledge in a domain-specific chatterbot named as University FAQbot (UFAQbot).It makes use of ALICE as a knowledge delivery and acquisition platform and the information repository is specified in AIML (Artificial Intelligence Markup Language). The chatbot helps the students find information regarding admission in University and its course curriculum. This paper successfully addressed the problem of evaluating a low level dialog

system.

E business does all or most of the transactions over the internet. The main concern of E business is attracting customers and thereby increasing the sales. The paper [2] uses AIML and Latent Semantic Analysis (LSA). The chatbot does the work of browsing and searching for retrieving the information. The dialogue based system helps in decision making process and guides the customer according to his/her requirements.

The paper [3] shows the collected facts as prepared references for the chat pattern and conversation uses Indonesian language. The language divides the phrases in Phrase of Noun (PhN), Phrase of Adjective (PhAdj), Phrase of Adverb (PhAdv), and Phrase of Prepositional (PhPrep). This pattern template is stored with the help of RDBMS and process of pattern matching is handled by SQL. In this paper the sentence similarity calculation is done by the bigram, may be provided to initiate transmission from the transmitters in order to specify the position of each tier.

III. SYSTEM DESIGN AND IMPLEMENTATION

A chatterbot or Chatbot aims to make a conversation between both human and machine.The aim of the Chatbot developed is to assist the student to choose a course which is fairly appropriate for him/her.

3.1 Holland's Theory

The use of Holland's theory is favoured which provided us with the much needed mechanism to elicit the interest of the student. The questions asked to identify the eventual interest of the student belong to a variety of categories of personality as suggested by the Holland's theory. Holland's theory [7] states that people can be categorized as: Realistic, Investigative, Artistic, Social, Enterprising and Conventional (RIASEC which symbolises Holland Code) depending on their innate characteristics. For example, a Realistic person likes to build or fix things,is athletic and has a practical approach,etc. Each Holland Code reflects specific career choices to choose from for the student.

In the chatbot developed we have asked some questions on each of these types which will confirm the student's interest. When the student answers questions based on the Holland's theory, then the interests of the student are also identified discreetly. For more accuracy we are considering three of the nearest matching traits to provide the student with more than one suitable course. For example if the user answers most questions of the types Realistic, Investigative and Conventional then the career courses for these three types will be displayed. These courses are perfect for the individual according to Holland's Theory.

3.2 Data and Data source

We have a central repository of data which houses the list of various courses and questions pertaining to the Holland code. This central repository is nothing but a service provided by AWS which is called the Amazon RDS. Amazon Relational Database Service (Amazon RDS)[8] makes the structuring, operation, and scaling of a relational database in the cloud, easy .This framework for storing the data provides us with the freedom to focus on the chatbot being developed by boosting its performance, availability, security and compatibility. We have chosen the MySQL database engine provided under the Amazon RDS to store the data.

3.3 Amazon Lex and its basics

The platform used in for this chatbot is Amazon Lex. Amazon Lex includes a set of entities which are pivotal in the implementation and the working of the chatbot, namely: - Intent, Slot, Utterance and Prompts. An essential overview of these terms is essential in comprehending the working of the bot as it is essentially enables to capture the data from the user and respond satisfactorily:-

- Intent: - It can considered as the building block which portrays an action which aims to fulfill the student's request.
- Slot: - It is the piece of data, which is transformed into information, which the student must supply to satisfy the intent.
- Utterance: - It represents a structured text that functions to link the intent to phrases which are likely to be typed by the student.
- Prompt: - It comprises of certain questions which in turn are asked by the chatbot to gain more information and insight to cater to the student more efficiently.

After discussing the basic framework of the chatbot we'd like to shed light on the crux of the functionality of the chatbot which is nothing but AWS Lambda.

3.3.1 AWS Lambda

AWS lambda [9] is the serverless computing platform that runs the code in response to events and automatically manages the underlying compute resources for the developer. It validates the student's input and re-prompts if necessary. Prompting is essential as it enables the chatbot to learn more and more about the student and hence equips them with a personalized experience. In the chatbot which we've developed we have chosen to code Lambda in NodeJS's version 6.10. The actual functionality of the chatbot and its underlying logic is enveloped by AWS Lambda.
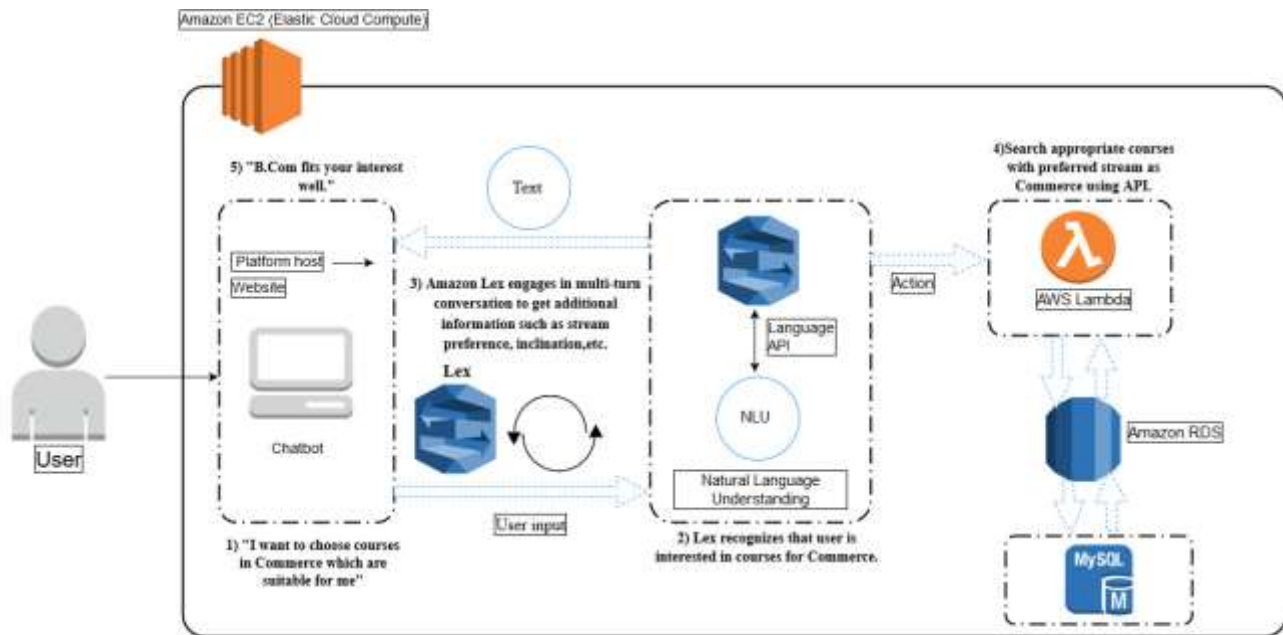
Fig.1 Detailed System Diagram.

Figure.1 depicts the system diagram as per which we decided the following flow for our chatbot:-

- The student's input is given to the chat UI which then passes it along to the chat engine.
- The chat engine traverses through the central repository using AWS Lambda to respond accordingly.
- As a match of characteristics of the student is deciphered as mentioned previously and the corresponding interest is identified, the chatbot then responds with the courses suitable for the student.

Initially when the student interacts with the chatbot, the chatbot tries to evoke the direct purpose of the conversation. While doing so, the chatbot tries to identify the interest of the student by asking him a series of questions which are a part of the various personality traits under the Holland's theory. **Figure.2** shows this,

> *Chatbot: Are you a detailed person who is organised, accurate and*
> *efficient?*
> *Student: Yes*
> *Chatbot: Do you like solving social problems?*
> *Student: No*
> *Chatbot: Do you like building things?*
> *Student: Yes*

Fig.2 User interactions with our chatbot.

AWS Lambda is an essential part of this process as it identifies the appropriate slots to invoke and stores the responses of the student using certain local variables. After analyzing the student responses lambda successfully grasps the probable personality of the student. It eventually returns the list of courses which best suit the three most probable personality types possessed by the student.

IV. EXPERIMENT AND RESULT

Lastly the student has the liberty to ask further questions about the course/s returned as the result. The results returned are satisfactory owing to an accuracy of 85%.

V. CONCLUSION AND FUTURE SCOPE

The Design of An Undergraduate's Career advisor chatbot is aimed at implementing course specific bot so that it helps students as an academic advisor.

Our chatbot is learning from the students' queries which possesses different synonymic words thereby leveraging artificial intelligence. The developed system strives to assist the students in efficiently choosing the courses of their interest judiciously.

Owing to the student interactions conducted, our chatbot gathersdata which comprises of helpful pointers about student behavior, which are analyzed and the student is provided with course/s as per his/her interests.

However, we faced challenges in terms of usability wherein it is essential for the student to have basic conversational skills in English in order to interact with the chatbot. Moreover another obstacle can be the accuracy of the result produced. Owing to the lack of a predefined algorithm, which would enable us to produce the exact result required, the system hence might not be able to produce a result having 100% accuracy. In future the proposed system can be improved by adding more domain specific knowledge. Finally, measuring the quality of user-suggested knowledge would be worthwhile.

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