Chatbot for Career Guidance Using AI

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Abstract— Chatbots are computer programs that simulate intelligent human conversation. The development and creation of new applications have been possible because of the design and production of interactive chatbots that help in a better way for the progress of the people. This project will describe current efforts in the development of an intelligent Career Counselling Bot. Career counselling project is built using artificial intelligence algorithms that are used for analyzing user's queries and understand the user's message. It provides some valid result to the query of the user. The User can query any career related queries through the system. The user does not have to personally go to a career counsellor for the same. The System analyses the question and then answers to the query as if it is answered by the counsellor. This system helps the user to choose the right career that they should follow according to their interests and capabilities.

Keywords—Chatbot, NLP, Artificial   Intelligence, Machine Learning, Intent, Dialog Flow

I. INTRODUCTION

AI (Artificial Intelligence) is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions) and self-correction. Particular applications of AI include expert systems, speech recognition and machine vision. A chatbot is a program that communicates with you. It is a layer on top of, or a gateway to, a service. Sometimes it is powered by machine learning (the chatbot gets smarter the more you interact with it). Or, more commonly, it is driven using intelligent rules (i.e. if the person says this, respond with that). The services a chatbot can deliver are diverse. Important life-saving health messages, to check the weather forecast or to purchase a new pair of shoes, and anything else in between. The term chatbot is synonymous with text conversation but is growing quickly through voice communication… "Alexa, what time is it?" (Other voice-chatbots are available!)The chatbot can talk to you through different channels; such as Facebook Messenger, Siri, WeChat, Telegram, SMS, Slack, Skype and many others. Consumers spend lots of time using messaging applications (more than they spend on social media). Therefore, messaging applications are currently the most popular way companies deliver chatbot experiences to consumers.

The Paper includes various sections such Section I which gives introduction about the paper, Section II which includes various undergone survey and their outcome, Section III consists of the methodologies and algorithms used to build the Chatbot, Section IV consists of the system architecture of the career bot and dialog flow integration ,Section V consists of the result and displays the conversation of the bot and user, Section VI concludes the paper with the future enhancements which can be done to improve the bot's utility and the last Section consists of various references and books used .

II. LITERATURE SURVEY

Jeff Barr et al. [1] A proposal is carried on to know Customer service chatbots can be roughly categorized into two types: first-party and third-party. First-party chatbots refer to conversation engines developed by large enterprises for their own business to improve customer service quality and reduce overall customer service budget. This often happens in consumer-driven industries such as banking, telecoms, and e-commerce. One example is the recently launched chatbot Erica from Bank of America, which helps customers with banking-related problems. A case study of Super-Agent AT&T support chatbot that helps people answers FAQs related to different business questions. Third-party chatbots refer to open source building blocks that help developers to build their conversation engines, such as Microsoft Bot Framework 3, Facebook Messenger, Google Assistant, and Amazon Lex. These chatbot makers build and connect intelligent conversation engines to interact with customers naturally wherever they are. In addition, they are highly customizable in terms of real scenarios with third-party data.**Balbir Singh Bani, Ajay Pratap Singh et al. [2]** A proposal is carried on to explain the design of a chatbot specifically tailored as an application which is going to help new students to solve all the problems they face and the questions which arise in their mind during and after the admission. In particular, the proposal investigates the implementation of ALICE chatbot

system as an application named as college enquiry chatbot. A keywords-based human-computer dialogue system makes it possible that the user could chat with the computer using a natural language. The main inference point is it will be easier to build machine learning for ALICE since it uses simple patterns, templates to represent input and output. Elizabeth uses more complex rules for which you need to write input transformation, Output transformation and keyword patterns to represent a user input and Elizabeth answer. You can do that by simple pattern template using ALICE. Another important point used by ALICE is the ability to partition the user input of splitting it into two sentences and then combines the answers. This is an important issue in language processing. Elizabeth does not provide this facility. According to Elizabeth structure, it will be difficult to do the splitting. **M. Dahiya et al. [3]** A proposal is carried on to know a chatbot is widely popular nowadays and catching speed as an application of computer communication. Some programs respond intelligently like a human. This type of program is called a Chatbot. This paper addresses the design and implementation of a Chatbot system. We will also study another application where Chatbots could be useful and techniques used while designing a Chatbot. A chatbot is a computer application which uses artificial intelligence to mimic human conversation. It helps the user by answering the questions asked by them. The program is implemented using Java programming language. Particularly Java applets are used. Applets are used because it is easy to create the dialogue box required for the conversation between the user and the bot. **Boris Galitsky, Dmitry Ilvovsky et al. [4]** A proposal is carried on to build a chatbot with iterative content exploration that leads a user through a personalized knowledge acquisition session. The chatbot is designed as an automated customer support or product recommendation agent assisting a user in learning product features, product usability, suitability, troubleshooting and other related tasks. To control the user navigation through content, we extend the notion of a linguistic discourse tree (DT) towards a set of documents with multiple sections covering a topic. For a given paragraph, a DT is built by DT parsers. We then combine DTs for the paragraphs of documents to form what we call extended DT, which is a basis for interactive content exploration facilitated by the chatbot. To provide cohesive answers, we use a measure of rhetoric agreement between a question and an answer by tree kernel learning of their DTs. We conclude that using a chatbot with extended discourse tree-driven navigation is an efficient and fruitful way of information access, in comparison with conventional search engines and chatbots focused on imitation of human intellectual activity. The command- line demo1 and source code are available online under Apache License. (https://opennlp.apache.org/). Since Bing search engine API is actively used for web mining to obtain candidate answers, a user would need to use her own Bing key for commercial use available at (https://datamarket.azure.

com/dataset/bing/search. **Andrew Thompson et al. [5]:** A proposal is carried on to work on Novel technology can be a powerful tool for enhancing students' interest in many learning domains. However, the sustainability and overall impact of such interest are unclear. This study tests the longer-term effects of technology on students' task and course interest. The experimental study was conducted with students in foreign language classes (n=122): a 12- week experimental trial that included pre- and post-course interest, and a sequence of task interest measures. Employing a counterbalanced design, at three-week intervals students engaged in separate speaking tasks with each of a Human and "Chatbot" partner. Students' interest in successive tasks and in the course (pre-post), were used to assess differential partner effects and course interest development trajectories. Comparisons of task interest under different partner conditions over time indicated a significant drop in students' task interest with the Chatbot but not Human partner. After accounting for initial course interest, Structural Equation Modelling indicated that only task interest with the Human partner contributed to developing course interest. While Human partner task interest predicted future course interest, task interest under Chatbot partner conditions did not. Under Chatbot partner conditions there was a drop in task interest after the first task: a novelty effect. Implications for theory and practice are discussed**. Lei Cui, Shaohan Huang, Furu Wei, Chuanqi Tan, Chaoqun Duan, and Ming Zhou et al. [6]** A proposal is carried on to work on Conventional customer service chatbots are usually based on human dialogue, yet significant issues in terms of data scale and privacy. In this paper, we present Super-Agent, a customer service chatbot that leverages large-scale and publicly available e-commerce data. Distinct from existing counterparts, Super-Agent takes advantage of data from in-page product descriptions as well as user-generated content from e-commerce websites, which is more practical and cost-effective when answering repetitive questions, freeing up human support staff to answer much higher value questions. We demonstrate SuperAgent as an add-on extension to mainstream web browsers and show its usefulness to the user's online shopping experience. We have developed SuperAgent, a customer service chatbot for e-commerce websites. Compared to conventional customer service chatbots, SuperAgent takes advantage of large- scale, publicly available, and crowd-sourced customer data. In addition, SuperAgent leverages state-of-the-art NLP and machine learning techniques, including fact QA, FAQ search, opinion-oriented text QA, as well as chit-chat conversation modelling. Usability analysis shows that SuperAgent has improved the end-to-end user experience in terms of online shopping. It is more convenient for customer's information acquisition especially when a product page contains too much user-generated content **J Cahn et al. [7]** A proposal is carried on to work on to offer sophisticated development environments allowing the

building of intelligent conversational agents with complex, goal-driven behaviour. In 'Lingubots' both the words and the grammatical structure of the user's input are analysed using customised templates. This facilitates the development of a user model, which is used in conjunction with the conversational context and specific words in the dialogue to determine the chatbot's response. Responses might include a further conversation with the user, reading or writing to external systems (for instance to open a web page or update a database), or a combination of these. This rich range of responses allows for intelligent conversation with the user and provides the ability to steer the user back to the task in hand if they stray from the designated discussion content for too long.

Ranoliya et al.[8] The paper presents a chatbot design implemented to be able to answer FAQs regarding university-related questions in an efficient and accurate way. The implemented chatbot is based on AIML and the researchers have the goal to further improve the capabilities by eventually also using Latent Semantic Analysis. The bot works well to provide 24/7 service to students or others interested in the university. It provides content from other knowledge sources Give recommendations about learning material Hold topic specific conversation Ask student questions Answer student questions. **Huyen Nguyen, Tessera Chin, And David Morales et al. [9]** A proposal is carried on to work on **Conversational** modelling is an important task in natural language processing as well as machine learning. Like most important tasks, it's not easy. Previously, conversational models have been focused on specific domains, such as booking hotels or recommending restaurants. They were built using hand-crafted rules, like Chat Script, a popular rule-based Conversational model. In this paper, we experiment building open-domain response generator with personality and identity. We built chatbots that imitate characters in popular TV shows: Barney from How I Met Your Mother, Sheldon from The Big Bang Theory, Michael from The Office, and Joey from Friends. A successful model of this kind can have a lot of applications, such as allowing people to speak with their favourite celebrities, creating more life-like AI assistants, or creating virtual alter-egos of ourselves. The model was trained end-to-end without any hand-crafted rules. The bots talk reasonably fluently, have distinct personalities, and seem to have learned certain aspects of their identity. The results of standard automated translation model evaluations yielded very low scores. However, we designed an evaluation metric with a human judgment element, for which the chatbots performed well. We are able to show that for a bot's response, a human is more than 50% likely to believe that the response actually came from the real character. **Fonte et al. [10]** A proposal is carried on to present a system consisting of two parts, an android application and a server platform. The android application implements a chatbot which interacts with both the student and the server.

The objective for the system was to enable the student to carry out several actions related to their studies like consult exams questions, receive recommendations about learning materials, ask questions about a course, and check their assessed exams. The purpose of the chatbot is thus to provide a friendly interface which can be interacted with using natural language.

III. METHODOLOGIES

Algorithm
- The system will take input from the user either in text or speech or voice format.
- The Voice format will be converted to the text format and the text format will be considered as it is.
- Process the received queries using the response generation module which makes use of an Intent repository.
- Search in Intent appropriate answer.
- Display results in Speech as well as in Text.

Module
1. Bot Chat Module
This is a JavaScript Web SDK for Dialog flow. Dialog flow processes a natural language query and returns structured, actionable data as a result. It is an end-to-end development suite for building conversational interfaces for websites, mobile applications, popular messaging platforms, and IoT devices that is powered by machine learning. Dialog flow enables users with ways to interact with products by building voice and text-based conversational applications. It consists of:
Bot Response-The answer given by the bot as the intent with context is matched.
User Queries -The text given by user either by voice or keyboard.
Speech to Text Control-This is the button pressed to initiate speech to text
User Input area-The Place where the user can write text queries.

2. Text to Speech Module
Acoustic Modelling of Speech Recognition Unit
The acoustic model describes how the speech signal is expressed. Recently, the frequently used acoustic model is HMM (Hidden Markov Model). Each HMM models temporal and spectral variation of a speech recognition unit. We estimate the parameters of acoustic models using training data. The choice of speech recognition units
Whole-words: Context Independent, Context Depend.
Subword segments: phone, syllable, semi syllable, triphone, diphone etc.
The training of speech recognition unit model
○ Baum-Welch algorithm
○ Discriminative training

Statistical Language Modelling

The probabilistic relationship among a sequence of words can be directly derived and modelled from the corpora with the statistical language models. We mainly use the bigram or trigram language model as an n-grams language model.

Word Network

We use two kinds of networks i.e. linear lexicon and lexical tree. Linear lexicon is composed of words in parallel and used for small vocabulary recognition. The lexical tree holds previously listed pronunciations in common and is used for large vocabulary recognition.

Lexical Decoding

Lexical decoding of continuous speech is to find the word sequence of the highest score out of all possible word sequences given observations sequence, acoustic model and language model using word network. In evaluation (recognition), Viterbi decoding and the forward-backwards algorithm are used.

3. Processing Module

Chatbot systems use two techniques to understand the natural language (user input) and break it into parts understandable for other systems:

Pattern matching is a technique of matching intentions based on a set of patterns that match it. The more patterns we provide,
the more the effectiveness of the chatbot increases.
Intent classification is a technique used to break down user input into categories, such as Hamburg is a city, or March 23 is the date. Because of this classification, our e-commerce system knows exactly all parameters needed to process a specific action.
On this basis, we can determine two main components of chatbot systems:
· **Intent** — specifies what the user wants to do
· **Entity** — defines a parameter important from the

Intent point of view.
The third and very important component is a way of storing state during the dialogue with the user. Such a "state" can be, that we used in the previous search. This state is provided to us through **Context**. For the core extension, there is a mapping of the main chatbot components, such as intent and context to the entities. Keeping these two components in the database has the following advantages:
The possibility of automatic detection of configuration changes in the chatbot (name of intent, list of contexts) and their automatic inclusion in our system. Some platforms like Dialog Flow can provide such a possibility through its API.

Ability to reuse entities (context) in other intents that are being created.
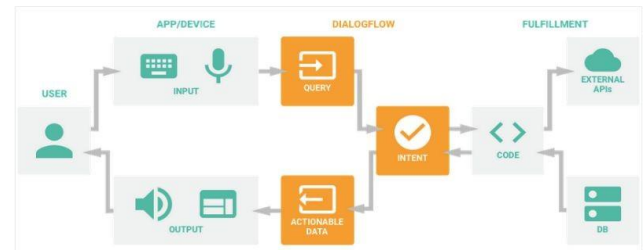
IV. SYSTEM ARCHITECTURE

Figure1: System Architecture

User: We people
Text / Voice: The user interacts with an app like Facebook messenger / google home to start the interaction with the bot.
Dialog flow: Bot platform
Agent: A module within dialog flow which incorporates Natural Language Processing to understand what the user meant and to figure out what "action" has to be carried out. The agent transforms the user request into machine-readable actionable data.
Intent: Support or the service that the user wants from the agent. The intent is configured by the developers. Intent determines the action by the code.

Fulfilment: This is the code. This part of the conversation lets you pass on the request from your bot to an external source and get a response and pass it back to the user. This is achieved via Webhook. Setting up a webhook allows you to pass information from a matched intent into a web service and get a result from it.factors we choose AISI 1018 for our chassis material.

V. RESULT

The career counselling bot is to carry out a conversation between both human and machine. Some knowledge has been embedded into the machine so that it identifies the sentences and making a decision itself as a response to answer a question. The response principle is to extract the tokens from the sentencing process that find the goal of the sentence by matching the input sentence from the user.
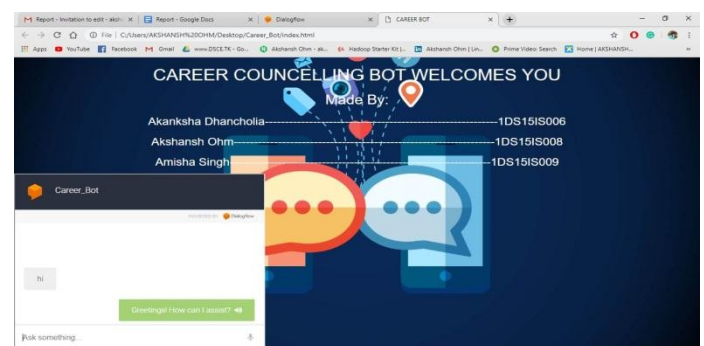

Figure 2: Bot Conversation

VI. CONCLUSION

This is an intelligent chatbot system for career counselling, which will help the user in choosing the right career by giving an appropriate response to the user's query. It is an intelligent system that will think like human beings. This system will be helpful in reducing the stress of the students. Due to an accurate knowledge base (intent and entity with context), quick answers will be given to the user. This System will take both voice and text as an input. This is done with the Google API (Dialog flow).

FUTURE ENHANCEMENTS

This project currently supports the guidance for class 12 and graduate students. We can include more range of students. The project only supports the English language. We can include the regional language and Hindi in future. The Bot can be made more accurate by taking ranks and interests from the user and then displaying the appropriate colleges and job preferences. The changing college preferences can be scraped from the top websites and displayed in the bot in the future to make the bot more real time.

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