Virtual International Student Assistant (VISA)

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Abstract*—** Technology has been booming with every iteration and the field of artificial intelligence is so huge that it is still evolving for more than 50 years. With new data available on the internet every now and then expectations also rise and with expectations come new products which can work in fast paced environments. Chatbots are one of the software products of Artificial Intelligence which can work in fast paced environment and can solve huge business problems which a lot of companies have to deal with human workforce. A student who wants to be an international student wherever he/she wants to pursue the studies needs VISA for that country and so is the name of our application ***V.I.S.A(Virtual International Student Assistant). With this product we would like to help the potential international students who'd like to study at the University of Windsor and would like to know about the program, course, work etc. A lot of people go at different websites and gather their information. A lot of people also believe that anything which is found on the internet is true but a lot of times students pick up information from discussion forums and believe that which may or may not turn out to be true so this is where our chatbot will have an advantage where all the information will be given through either the University's website or links to Canadian immigration page will be given . A lot of questions are also repetitive on the internet which will be taken care of in the chatbot and students will have to spend less time on the internet and can gather their information in minutes though this chatbot. This chatbot is also supposed to help the program coordinators who usually receive hundreds of e-mails from prospective students and they've to reply to all of them even if the query is available on the website.

I. INTRODUCTION

A. Overview

Since the time of Internet new technologies have been evolving and impacting different businesses around the globe. Solving business problems using technology is the way to leap forward and so is this project supposed to do. The education industry is one of them and when we consider education for a student who wants to study internationally the business of an "international student' comes into the picture. An international student needs loads and loads of information related to their education and immigration rules and so Educational institutions are making use of technology as much as possible and this project is somewhat a problem solver or a bridge between the student and the information he/she needs from the university. A chatbot here can be very beneficial to both the student as well the University to get response of their queries within seconds. Program coordinators are heavily loaded with work related to admission and students are loaded with questions. So, this chatbot can help a lot to both the sided with its functionality of giving answers to the user without any human interaction.

B. Motivation

The motivation behind this project is the students who are dealing with questions day in and out and sending out mails to their program coordinators and hoping to get a reply in the stipulated time limit of "4-5 business days". Being stuck in this situation ourselves the idea of a chatbot for the students using IMB Watson would be a great fit and so we did. In addition to the information given to the student, we've used a secret key method where we have provided admin access feature which will be used to change the content in the chatbot in case rules change in the future or anything about the course changes so that the chatbot remains dynamic and useful for a long way.

C. Significance

This project's significance will be to reduce load on the program coordinators and reduce the list of mails in their mailbox and on the other hand giving students the information they need.
The project also allows to use an admin featured view which can be controlled by the program coordinators to update the latest information in the chatbot in a more interactive, creative way.

D. Contribution

The contribution of the team members towards to various aspects of the project are given below.

- Data retrieval- Lavish
- Entities and intents creation- Sanyam and Karan
- Dialog flow- Sanyam
- Defining Admin Access dialog flow- Karan
- Creation of APIs to process admin requests- Karan
- Landing page development- Lavish
- Integration of bot with webpage- Lavish and Sanyam
- Application Deployment on Cloud- Karan
- Report and Presentation- Karan, Lavish and Sanyam
- Testing- Karan, Lavish

II. LITERATURE REVIEW

In the last decade, so many advancements in the tech world has given a new shape to the social media platform. Several companies are now using interactive platforms to help their customers save time. The patients expect faster responses from healthcare service providers. Delay in response time only annoys the patients and thus, to deliver the best services in time, healthcare firms are embracing technology trends such as embedding a chatbot to their website to stay at par with the latest trends and market needs. Such sort of automation in the healthcare industry has reduced the load on medical practitioners by manifold. Professionals can now better focus on valuable things while the chatbots assist patients with their medical queries, medication guidance, symptom checks, nutrition, and other matters. For their health-related issues, patients are turning to chatbots first as they have a quick response time and higher availability. Soon, a time will come when patients' first choice will be chatterbots for medical help. Chatbots do have huge potential for success in the healthcare industry. In the recent past few years, the number of health chatbots has seen a growth on graph.

III. PROJECT DETAILS AND METHODOLOGY

This section of the technical report presents the project details and the methodology that has been adopted for the development of this project.

a) Definitions

Major definitions essential for the appropriate understanding of this project are mentioned below: -

- Web Based System: A web-based system provides access to a software system using a computer and internet connection. [1]
- Artificial intelligence (AI): Artificial intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from experience. [2]
- Chatbot: A chatbot is an artificial intelligence (AI) software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile apps or through the telephone. [3]

b) Specifications

IBM Watson is a supercomputer platform of IBM. Watson can be used to create chatbots without explicit coding abilities. Some understanding of basic terminologies is required and off course an internet connection as Watson is a cloud-based based platform. The operating system used for IBM Watson is SUSE Linux Enterprise Server 11 and Apache Hadoop as the distributed system. IBM Watson runs on various modules such as intents, entities, dialogue flow etc.

c) Architecture

Figure 1. Architecture

The architecture of the IBM Watson can be clearly seen in the above image. To get a deeper view, some terms are defined below:

- Skill: A skill is an ability of a machine to do something well and in case of VISA, it refers to helping the users/customers.
- Assistant: It acts as a medium between the company and the customer to solve the problem in no time.
- User Dialog: A dialogue or a dialogue flow is a sentence that is displayed to the end-user. It makes use of the entities and intents to think what to return to the user as a reply. The response can be the answer to a question such as 'How can I apply a Canadian study permit?' The intent and entity should provide enough data to identify the correct response, or the dialogue can ask the user for more information to process it in a better way. For example, the user asks, 'What are some good restaurants near UWindsor?'. Now, since, it is not clear if the user prefers vegetarian or non-vegetarian food, the bot will ask 'veg or non-veg' and then process it accordingly with a relevant answer as input.
- Admin Dialog: The admin can access the admin dialog flow using a secret key in the chatbot. Once the bot recognizes the admin intent and the secret key, it will allow admin to enter the admin dialog flow. After the admin gets in, he can make operations on intents, entities, dialog flows and more. Using the admin panel, changes can be made throughout the bot without having to login to cloud. An entire new chatbot can be created by just using the admin dialog flow.
- Intents: Intents are purposes or goals that are expressed in a customer's input, such as answering a question or processing a bill payment. By recognizing the intent expressed in a customer's input, the Watson Assistant service can choose the correct dialog flow for responding to it. [4]
- Entities: IBM Watson Assistant provides several system entities, which are common entities that you can use for any application. Enabling a system entity makes it possible to quickly populate your skill with training data that is common to many use cases.
  For example: In ‘Show me details about MAC program’, MAC is an entity.

- Response: IBM Watson responds using intents, entities and dialogue flows.

- Platform: The chatbot is currently hosted on https://www.visabot.live. The website is fully responsive and is malware protected using SSL certificate.

- Design: The Tyrion-bot greets the user and is super friendly. It also asks for and store the name of the user for future reference. The user doesn't feel like there is no human on the opposite side.

Ⅲ. EXPERIMENTAL SETUP

a) Implementation details

1.Requirement analysis. Connecting to IBM Watson Assistant. Collection of data from University of Windsor website.
2. Create intents, entities and dialog flows as per the requirement.
3. Identifying responses on different conditions in the dialog flow nodes.
4. Creating the ADMIN dialog flow to give access to the admin through the chatbot to make changes to the Watson skill.
5. Creation of APIs to process the admin requests through webhook API calls and make changes to the Watson skill.
6. Hosting the application on cloud MS Azure.
7. Identifying improvements and keep updating, removing and feed more data to bot.
8. Testing of the application and APIs.

b) Testing:

- Unit Testing:

We shared the preview/testing integration link with our friends who are planning to come to University of Windsor for testing purpose.

Test case ID	Test case description	Test Result
1	Able to access the application	Pass
2	UI functioning	Pass
3	Welcome from the bot	Pass
4	Proper response from the bot on asking about program information	Pass
5	Able to go to the admin panel using key	Pass
6	Changes made to the bot using chatbot admin panel	Pass

- Facility Testing:

In this we checked the entire build model on the fully modified user-friendly website with build functionalities. Basically, we were testing our system as a whole.

Test case ID	Test case description	Test Result
1	Rich text	Pass
2	Responses from bot	Pass
3	Webhook API calls from bot	Pass

- Performance Testing:

Test Case ID	Test Case Description	Test Result
1	Understanding the user query	Pass
2	Responding to the user with the correct response	Pass
3	User happy with the response through feedback	Pass
4	Admin updating the bot through admin secret door	Pass
5	Admin Changes were accurate on cloud	Pass

- Stress Testing:

Stress test done using simulation tool LoadNinja. Several thousand requests were made at the same time to the bot and correct json response was observed. This ensures that our project has passed stress testing.

Test Case ID	Test Case Description	Test Result
1	Multiple users' access	Pass
2	24*7 availability	Pass
4	Platform independency	Pass

c) Challenges:

- One of the major challenges were to create the dialog flows in such a way that all the programs details were covered without having to create separate intents, entities for each.
- Other challenges included creating the Admin dialog flow to provide the admin an easier way to make the changes to the bot without having to login to the cloud.

d) Limitations:

- Not every question can be answered by the bot, if it's not trained on that area.
- If the bot doesn't understand any question, it will keep on asking to reword the statement.
- If there is a change in the information being provided, the changes have to be made in the dialog flow nodes. Either using the admin secret door in the chatbot or using the IBM cloud Watson user interface.

IV. CONCLUSION

This tool will help in reducing human effort and increase accuracy. A lot of things like IMB Watson, creating entities, how to introduce as a live chat option, HTML and CSS were learned by us. A chatbot is much more than just a computer talking to a person, it is a whole software embedded in the "chat" icon on websites where companies would like to interact with their customers for their queries, educational institutes giving answers to student's questions and much more in the coming years. Chatbots are going to be big in the coming years and more advancements is awaited by Computer Science enthusiasts.

V. FUTURE WORK

1. Extending the ***VISA*** support for all courses coming under University of Windsor, not only the in-demand courses
2. More control and features through admin panel
3. Admin access dialog flow as a product in itself
4. Automatic fetching of FAQs from the university website

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VII. Links for User Manual

https://cloud.ibm.com/docs/services/assistant?topic=assistant-api-dialog-responses
https://cognitiveclass.ai/courses/how-to-build-a-chatbot

VII. REFERENCES

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