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DEVELOPMENT OF A CLOUD BASED STUDENT INFORMATION CHATBOT SYSTEM

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ABSTRACT

The development of chatbot system is an algorithm that analyzes the student queries and reply messages. In this system, artificial intelligence is built to answer the query of the student. The specific objectives are to determine the required features for the construction of knowledge base, design and implement the model, evaluate the performance of the developed system. Samples of Frequently Asked Questions (FAQ) was collected from the department of Student Affairs, Admission Office and Information Management and Technology Center (IMTC) of the university. The collected sample was analyzed based on the category of question and the model was designed using Unified Modeling Language (UML). The model was implemented with python programming language, HTML, CSS, JavaScript for the client sever side, and also Artificial Intelligence Markup Language (AIML) () and MySQL for the back end. The developed system performance was evaluated using Alpha Beta testing. The proposed system was successfully tested to denote its effectiveness and achievability. It totally eliminates the manual process of retrieving information about a particular domain and reduces manpower, time, for any individual. The developed system will provide adequate assistance to the student on FAQ, thereby reducing the time in visiting the college to enquire about the information in respect of school activities. It will also provide an enabling environment for the students to keep them updated about the school activities.

Keywords: Artificial Intelligence Markup Language (AIML), Chatbot, College, Faculty, Frequently asked questions

1. Introduction

The development of any institution lies in the level of information accessibility. The use of artificial intelligence has replaced most tasks that are conventionally performed by human being. Artificial Intelligence has revolutionized all aspect of our daily lives. This is because most of our daily activities have designed and evaluated using devices and applications through what is called intelligent agents which can perform functions beyond human capabilities (Sharma and Gayatri, 2021). A chatbot is an artificial intelligence program that is designed or constructed to simulate an intelligent conversional discussion. It can also be defined as human computer interaction model where computer program offers intelligent interaction between users and computer using a well-defined or everyday language. Cloud based student information chatbot system is an artificial algorithm that analyzes the student queries and reply messages (Patel, 2020). In this system, artificial intelligence is built to answer the query of the student.

The virtual chatbots are able to imitate human conversations, and therefore help an institution to save time and effort through the automation of the system (Davis,1989). The system when fully integrated will not only answer the student queries but provide adequate and immediate solution to manual process of enquiring information. In Nigeria, most university has not adopted the use of an intelligent chatbot information system for sharing information among students and the public. In this study, a cloud-based information chatbot was developed with the aim to provide prompt response to any queries of the student through the university website. The main objectives are to determine the required features for the construction of the knowledge base, design a chatbot model, implement the model and validate the developed system. However, the developed chatbot necessity is to keep students updated about the activities of the university, thus providing enabling environment for the students.

2. Related Works:

Griol et al., (2014) developed a multimodal conversational agent for an enhanced e-learning experience that helps children to appreciate and protect

their environment. This was done by means of a modular and scalable framework that eases building pedagogic conversational agents that can interact with the students using speech and natural language. In this work, the Voice Extensible Markup Language was used as the standard for implementing interactive voice dialog for human-computer interaction for speech communication. It resulted in a web-based interactive software with a friendly chatbot that can be used as a learning resource for children to study about the urban environment. However, twelve (12) of the preliminary results were not validated. Hussain et al. (2019) worked on chatbot enquiry system using machine learning. The bot uses Node.js for script, web hook for joining the bot with Facebook page, virtual spirits and Application Programming Interface (API) for designing the bot. The bot is a learning data which is stored in the API.ai virtual cloud storage server. The system made use of integrated Artificial intelligence to reply to the question supplied by means of api.ai and the bot was implemented in the Facebook for the end user. However, the system implemented is fully trained with the system dataset but only works with the Facebook system, which makes it difficult for users without a Facebook account to make use of it.

Doshi et al. (2017) proposed an artificial intelligence chatbot with open source program-o and developed an android based chatbot which interacts with the user using text and voice response. This system made use of open source AIML engine written in PHP, which is an interpreter for the AIML script of the chatbot, and uses MySQL database to store the bot details. It also makes use of Google's speech recognizer API of the android for converting voice into text. The result shows that an android application was able to effectively interact using voice. This application can be used to chat with the bot through voice and text also but, the chatbot is only available to be used by android users and cannot be accessed through web. Salve et al. (2015) developed a college enquiry chatbot which takes input from the user in the form of text. In the wake of taking contributions from the client it is preparing into a book recognition and begin conversing with the client, this system uses a predefined set of rules for the training of the system and made use of HTML, CSS, AIML, SQLite for the implementation of the bot. Result shows that the total required time used to perform all the task, including visit to the college, standing in queue, and enquiry are reduced with the help of their system. Nonetheless, the developed system cannot handle large volume of data due to the database management system used, SQLite.

Sayed et al. (2016) developed an android chatbot system for hotel reservation and the technologies used include PHP, AIML, Java and SQLite for the implementation, the system makes use of AI calculation which the chatbot checks whether input provided by the user is inappropriate, insufficient, complete or conversational. If the input is inappropriate the user is notified that it has entered a wrong input andif the input is insufficient the user is notified to enter the missing parameter. If the input is conversational the chatbot undergoes casual chat with the user. While if the input is complete, it provides a precise output for the user. The limitation of the developed system is that it does not support multi-user environment because of the SQLite used for storing the database unlike that of MySQL.

Hanisha et al. (2021) worked on an intelligent conversational agent based on a robust system. It was implemented using Diaglogflow technology, the method for the system was being categorized into different phases such as data gathering, data manipulation, data augmentation and response generation. The system was implemented using diaglogflow which can only provide a webhook to an application unlike having multiple webhooks. The use of diaglogflow , however, is not flexible for developers to use and it is only available for the use of MCA department in the college and not for general service of the school.

Lakshmi et al. (2019) implemented and designed a student chatbot using AIML. The use of Latent Semantic Analysis (LSA) implemented in python programming language makes the system voice input and text input appropriate to answer queries. The pattern matching makes the system to behave like artificial human brain by utilizing natural language handling strategies and as a modern intellectual. This system gives up to 90% accuracy and helps the user to get the response in shorter time and with appropriate result, but the collected data is not well analyzed and only limited to the current student of the college and does not serve purpose for prospective candidate of the college. Barletta et al. (2019) created a software tool which will be used by any college to help the students to freely upload their queries. It uses the artificial intelligence algorithm to fetch the suitable answers for the user queries, the chatbot uses AIML as background to knowledge for processing the response, The system fetches information from the AIML file database, finally it produced a software tool used by college to help the students to freely upload their database, however the system does not make use of a standard database management system.

Lin et al. (2016) developed a web-based platform for collection of human-chatbot interaction, the web

server is written in python, utilizing the tornado framework, the main method of communication between the server and chatbot was made using HTTP protocol in JSON format. But the data annotation and evaluation of the developed system was not well facilitated. Nie (2020) developed a human-chatbot interaction system, the NLP based tool was implemented using python and SQL, in which the tool accepts the user typed message as an input, data pre-processing applied to the user typed message. It resulted in to an android based application that does not allow the user to send inappropriate or improper messages to the participant. However, the developed application is only available on the goggle play store and restricted to non-android users.

The above reviewed works have considered human-chatbot interaction system that focused on commercial messages between users and the system. Works on the student chatbots only stored information relating student who have gained admission. Students seeking admission are not considered. This study developed a student chatbot containing information of both students who have already gotten admission and prospective admission seekers.

3. Materials and Methods

This section discussed various materials and methods employed for the implementation of the design of the proposed rule based artificial intelligent system.

3.1 Chatbot Model

The model design is divided into two modules: Online Enquiry and Online ChatBot. The Online Enquiry contain queries related to the College and Faculty. The Online ChatBot provides responses to query regarding Returning Students, Freshers, and Applicants. Also, users that want to enquire about the College at the time of admission or any aspect held in the college can query the chatbot.

Figure 1 shows the process flow diagram of the chatbot system. When a query is entered, the system applies Natural Language Processing (NLP) technique, and then checks if the question is within the scope and if yes it generates a response by establishing a connection between application and cloud server. Also, the database will be checked for query, if the query is valid, it will display the response to the query. If the query is not valid, the user will need to input another query.

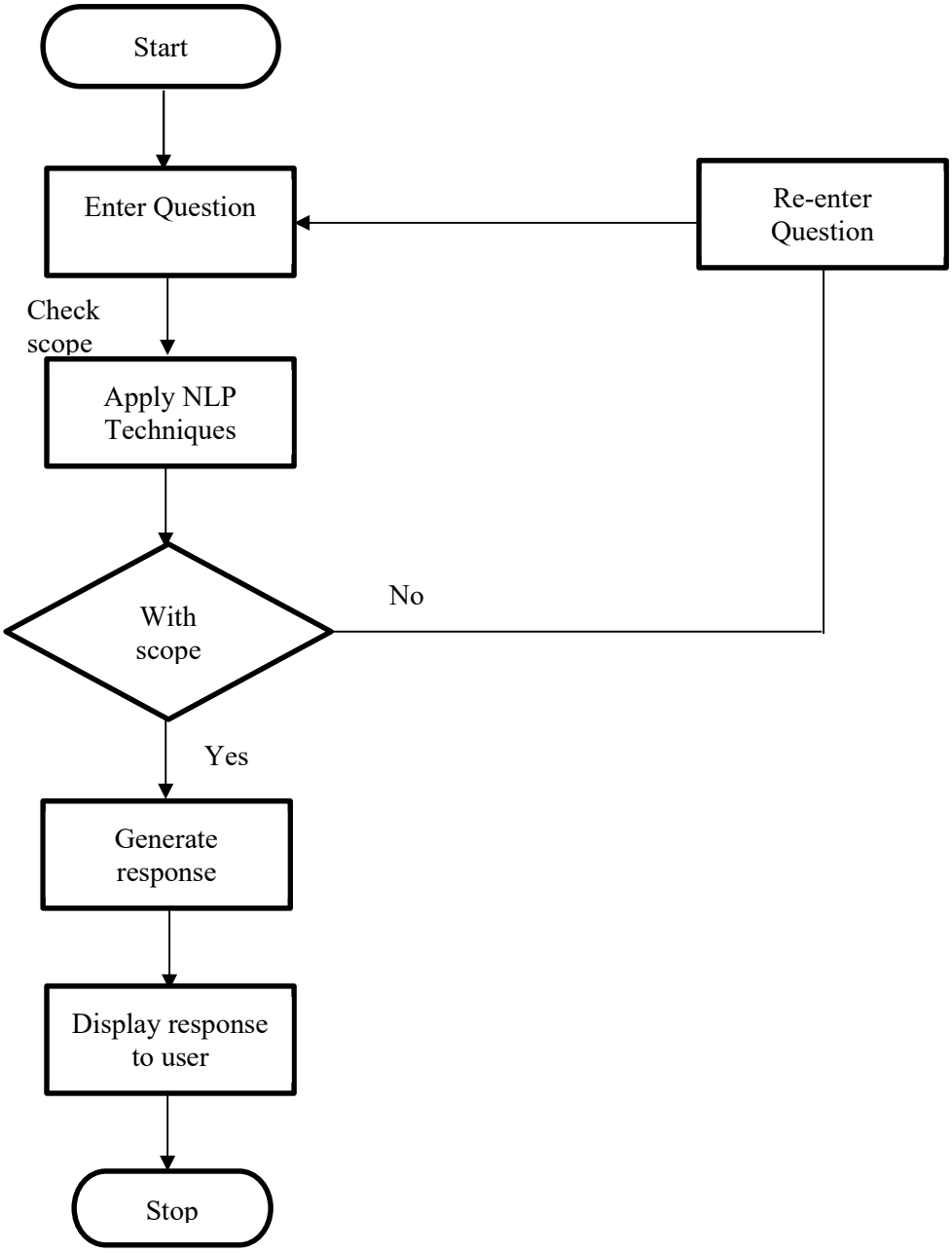

Figure 1: Process Flow Diagram

3.2 Data Collection

Frequently Asked Question (FAQ) data were sourced and acquired from the department of student affairs, Admission Office, Information Management and Technology Center (IMTC) of the university. This is to provide information required in the preprocessing stage as a preparatory level for the preparation of the chatbot to be developed. The nature of data collected are all student related data. Example of FAQs data that were collected are shown in Tables 1, 2 and 3 for admission , portal and registration issues respectively.

Table 1: Sample of Data for Admission Issue

S/N	ISSUE	FAQ	RESPONSE
1.	Admission Issue	How can I register for an Application??	Candidates are to register on-line by accessing the University web-site http:/www.uniosun.edu.ng or http://admissions.unisoun.edu.ng to complete and submit an applica-tion. They are expected to print two (2) copies of the application form after submission.
2.	Admission Issue	What are the require-ments for admission?	Uniosun admits candidates who made at least five (5) credit passes in SSCE/NECO/NABTEB in the relevant subjects at not more than two sittings expect for Medicine , Nursing and Law, where candidates are expected to have at least five (5) credit passes in SSCE/NECO in the relevant subjects at one sitting.
3.	Admission Issue	Should applicants up-load their 0'level de-tails?	Yes candidates should meticulously provide their 0'level details on the University portal.

Table 2: Sample of Data for Portal Issues

S/N	ISSUE	FAQ	RESPONSE
1.	Portal Issue	I can not view my re-sults on my school por-tal, please what can I do to resolve this?	Lodge the complain to your Head of Department (H.O.D).
2.	Portal Issue	How can I correct a mistake in my personal information while ap-plying for the institu-tion?	You will have to write a letter to School Registrar, attached to the letter will be evidences.
3.	Portal Issue	How can I update my details on my student portal?	Login to your student portal us-ing your matriculation number and password, click on My personal Profile and update your necessary details you wish to update.

Table 3: Sample of Data for Registration Issue

S/N	ISSUE	FAQ	RESPONSE
1.	Registration Issue	What is the maximum unit of course I can make in a semester?	24(Twenty-four) unit.
2.	Registration Issue	Can I make any course registration without paying the access fee?	No, you have to pay the one thou-sand naira (1,000) access fee first before the registration
3.	Registration Issue	What is the minimum unit of courses I can register in a semester?	15 units, except during the SIWES year for programmes eligible to par-ticipate in the SIWES programme.

3.3 Student Information Chatbot System

The developed model was implemented in a web application using python, CSS, Html, JavaScript and also MySQL for the database as well as AIML for training the database. The web application provides an interface for the user to communicate with the model. The user gets appropriate answers to their questions. The implementation of the human interface was done with AIML which makes it easy to interact with the system. The Linguistic Communication Understanding processor accept AIML rules to investigate and response to the text queries through the chatbot. Figure 2 shows the flowchart of the AIML based chatbot can work with a range of input, which essentially represents the texts with identical meaning.

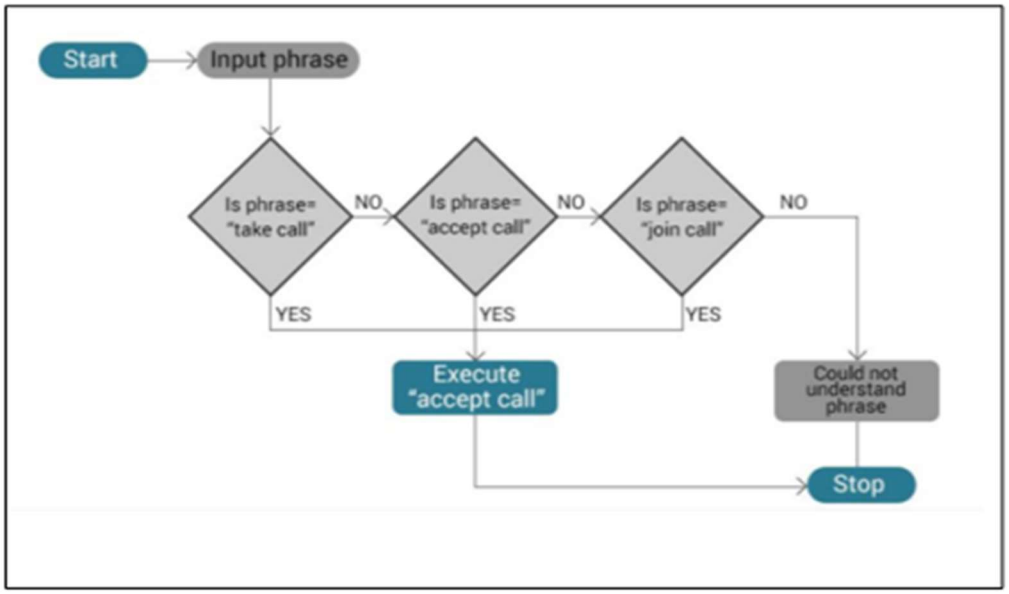

Figure 2: Flowchart of the AIML used (cite)

3.4. Pseudo-Code of the Chatbot System

The pseudo-code of the proposed chatbot system is shown in Table 4. The algorithm describes how the methodology is being implemented. To create kernel and learn the AIML, the AIML file is being imported and stored into the kernel and the kernel files is then created. The kernel learns the AIML rules and gives the appropriate response to users within the already set rules. The kernel also learns the startup Extensible Markup Language and responds to all loaded AIML files. The Function Ctrl-C used is to break the loop, while true, the kernel controls the bot and gives a response to the user to input whatever query the user has in mind, this is done through an input box with a prompt message" Enter your message". If the user gives a quit message to the bot, the bot exit, else if the user decides to save up the chat the bot saves the messages, else the user continues to have a conversation with the bot.

Table 4: Pseudo-code of the Chatbot Model

S/N	Pseudo-code
1	import aiml
2	# Create the kernel and learn AIML files
3	Kernel = aiml.Kernel
4	Kernel.learn("std-startup.xml")
5	Kernel.respond("load aiml b")
6	# Press CTRL-C to break this loop
7	While True:
8	Print kernel.respond(raw_input ("Enter your message"))
9	While True :
10	Messages = raw_input("Enter your message to the bot: ")
11	If message == "quit":
12	exit()
13	elif messages == "save":
14	kernel.saveBrain("bot_brain.brn")
15	else:
16	bot_response = kernel.respond(message)
17	# Do something with bot_response

4. Result and Analysis

The proposed system was tested to denote its effectiveness and achievability. It basically reduces the paperwork, manpower and time for any individual. In this study, we had developed a system which will interact with the users by means of reducing their time in visiting the college to enquire about the details or information regarding major Frequently Ask Questions (FAQ). The user can chat with the chatbot of any format. The user and student as well as the Admin can interact through the chatbot regarding any query. The questions which are not answered by the chatbot can be updated by the admin. The system has been fully built and has been successfully tested. Figures 3 and 4 show the home page of the Web chat application system and the chat screen respectively.

Figure 4: Landing Page of the Web Chat Application

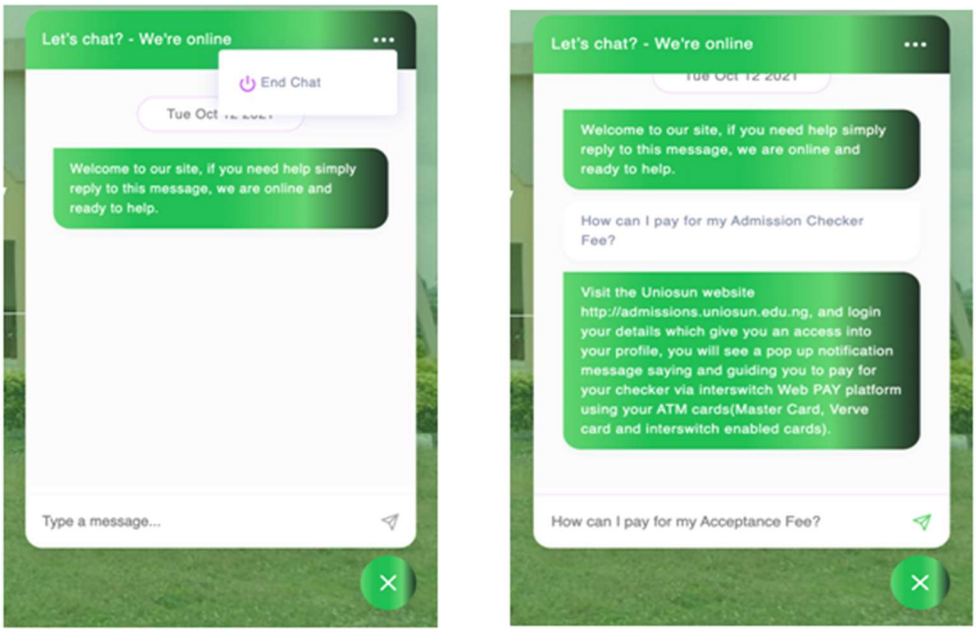

Figure 4: Chat Screen of the Web Chat Application

5. Conclusion

A chatbot is a rising trend and increases the effectiveness of business by providing a better experience with low cost. In this study, the chatbot information model was developed and implemented with python programming language, HTML, CSS, JavaScript for the client server side, and also AIML (Artificial Intelligence Markup Language) and MySQL for the back end. Samples of data relating to admission issues, portal issues and registration issues were collected from admission office, student affairs unit and Information Management Technology Centre respectively for the development of the chatbot system. The developed system provides an effective and efficient way of communication just as if we are communicating with our friends and love ones. This study provides information about admission frequently ask question (FAQ) as well as other information such as admission information, mode of payment for people home and abroad who are searching or in need of these vital information about Osun State University.

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