I.J. Information Technology and Computer Science, **2022, 3, 23-33**
Published Online June 2022 in MECS (http://www.mecs-press.org/)
DOI: 10.5815/ijitcs.2022.03.03

Development of a Mobile-Based Hostel Location and Recommendation Chatbot System

Folasade Olubusola Isinkaye[1], Imran Gbolahan AbiodunBabs[2], Michael Tobi Paul[3]
[1,2,3]Department of Computer Science, Ekiti State University, Ado-Ekiti, Nigeria
E-mail: [1]folasade.isinkaye@eksu.edu-ng, [2]habnarmtech@gmail.com, [3]Michaelpault68@gmail.com

Received: 12 August 2021; Revised: 11 October 2021; Accepted: 01 December 2021; Published: 08 June 2022

Abstract: A Chabot is a conversational intelligent agent that has the capability of engaging in human-like interaction with its users. A lot of chatbots have been developed, but to the best of our knowledge, there are few or no chatbots that have been developed for hostel location integrated with a recommendation component to ease the cost, time, and stress of identifying suitable hostels for students, especially at higher institutions of learning. Therefore, this work develops a location-based chatbot system enhanced with recommendation capabilities to allow students to locate hostels that satisfy their needs in an easy and efficient way. The chatbot system was designed as a cross platform compatibility application with different tools and technologies which include Python, HTML and CSS with JavaScript to enhance the interactivity and attractiveness of the system. PHP provides access to MySQL database. The chatbot system provides good experience to its users in terms of loading speed, user friendliness, interface appearance, platform compatibility and recommendation accuracy as it allows them identify suitable hostel speedily and as well provides personalized recommendation of hostels to them.

Index Terms: Chatbot-system, Hostel location, Recommendation, Mobile-based, Content-based filtering.

1. Introduction

Chabots are conversational, automated intelligent agents that have the potential to engage in human-like interaction with users. They usually harness the capabilities of natural language processing to comprehend both the voice and text inputs given by users [1]. Chatbots can be embedded within websites or messenger applications, and in some cases, they are developed as standalone applications. Chatbots usually have four key elements that include, text understanding, dialogue manager, text generation, and knowledge base (KB) [2] as shown in Fig. 1. The text understanding (TU) module of a chatbot system helps to understand and extract the semantic representation of intent and enties from the user's request. The dialog manager (DM) module directs the flow of a conversation with other sub-systems and units in order to choose a suitable action concerning a specific policy. A text generator (TG) is a vital module in a DM as it usually receives a communicative act from the DM and generates a matching textual representation. Also, the different kinds of information used by a chatbot are generally stored in the knowledge base [3]. Recently, the advent of computer vision and mobile devices hives increased the popularity and spread of chatbots in different domains such as e-commerce, the health sector, and educational systems [4]. Also, since smart devices such as smartphones or tablet PCs have become necessities in our daily life, and lots of people are familiar with how to operate these devices, a lot of high specification smartphones have been released recently. They do not only receive and make phone calls, voicemail, and text messages but also have different types of advanced functionality, such as accessing the internet, accessing digital media, taking high-quality photos, and etc. Harnessing this technology could help in the introduction of an application that has an inbuilt chatbot system that could help in solving the hostel location problem that is prevalent in higher institutions of learning today in developing nations.

Apart from guiding users to locate hostels, a recommendation system could also be incorporated into a chatbot system in order to make recommendations of appropriate hostels for students to choose from. The recommendation system is one of the most successful practical stories of AI [5], and its key objective is to produce tailored recommendations based on the user's preferences and interests. The recommender system is also aimed at sifting unsolicited information and providing precise information to individual users [6,7]. Recommender systems (RSs) can use two major techniques for information filtering, which include content-based filtering and collaborative filtering [8]. Content-based filtering techniques work based on the description of the item and the profile of the user's preferences, while collaborative filtering estimates user preferences for items by learning historical user–item relations from a group of users that have similar interests. Also, hybridized filtering techniques can be used by combining two or more filtering techniques in different ways to improve the correctness and effectiveness of the recommender systems [9]. The strength

of RSs can be explored to design a hostel chatbot that can make relevant suggestions of hostel accommodation to students.

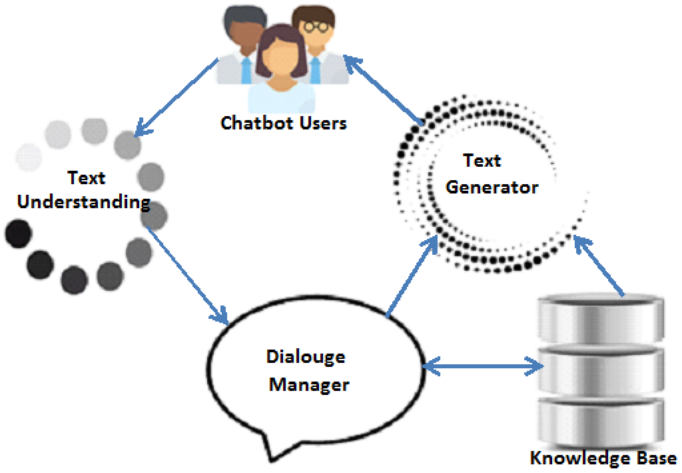


Fig.1. Elements of a chatbot system

In recent times, locating hostels in higher institutions of learning has become a very tedious and stressful task in developing nations. This problem affects a lot of students in many ways, for example, it prevents newly admitted students from quickly resuming to school because they have nowhere to stay and keep their belongings. In addition, lot of students end up living in a hostel with unwholesome environment which could have a negative impact on their academic career as well as their way of life. Consequently, an informative, reliable and precise location chatbot application is very important in this technological era. A location based mobile application that could search the appropriate environment for student hostels and returns detailed and suitable information regarding the hostels cannot be overemphasized.

Therefore, the aim of this work is to provide a location-based chatbot application that allows students to locate hostels that satisfy their needs in an easy and efficient way. The chatbot application will be able to suggest hostels tailored to the students' needs using content filtering recommendation techniques.

2. Related Works

A chatbot's purpose is to simplify interactions between humans and computers, and it is quickly becoming an essential component of upcoming user services [10]. With the use of chatbots, computers are able to understand and respond to human input through spoken or written languages [11]. Chatbots can be utilized in diverse application domains such as health care, education, e-commerce, banking, agriculture and etc [12]. For example, ELIZA was the first chatbot to be developed. It utilized keyword matching and minimal context identification techniques to search for specified keywords from the user's input. Artificial Linguistic Internet Computer Entity (ALICE) [13] is another chatbot built with Artificial Intelligence Markup Language (AIML) derived from Extensible Markup Language (XML). Some other prominent AI-driven chatbot applications include Bold 360, LivePerson, Watson Assistant, Ada, Inbenta, Vergic, and Rulai [14].

Different chatbot systems have been created in the health care system to accomplish different purposes. For example, [15] proposed a personalized chatbot-oriented dialogue system that utilizes learning algorithms to facilitate and provide personalized assessments based on a user's symptoms. In their work, [16] developed a Multilingual Voice Application based on Natural Language Processing. The application provided primary healthcare education and advice to chronic patients and pregnant women that needed antenatal care using AI techniques. To make the screening process of healthcare workers for COVID-19 symptoms and exposures prior to every clinical shift simple and efficient, [17] designed and implemented a digital chatbot-based workflow. The bot enables daily screening of healthcare personnel to prevent the spread of COVID-19 in the healthcare environment. A mobile health intervention that utilizes a complete automatic text-based health care chatbot (TBHC) was also developed by [17] to provide an advanced method to build a working alliance between a participant and the TBHC as well as to deliver coping strategies and psychoeducation for pain management.

In the e-commerce setting, [18] introduced a chatbot with the focus of selling physical and digital items as well as providing services to users. Their chatbot was created purposely to improve the interactions of users on social media, hence allowing social media marketing to be more effective for speedy ordering of goods and services. Also, [19] developed a SuperAgent customer service chatbot for e-commerce websites. The chatbot has three different components, which are the FAQ search engine for Questions & Answers (QA), an opinion mining & text question answering engine for Customer Reviews (CR), as well as a chit-chat engine as the back-fill to make conversations flow easily. [20]

proposed a suitable interaction and interface design for chatbot-based conversational commerce using a user-centered design approach that allows the application development process to emphasize the user's goals, needs, and preferences. In an attempt to provide accurate and speedy response for users of e-commerce, [21] proposed an intelligent chatbot based on AIML. The Chatbot was applied to the Telegram application. The chatbot allowed input questions from users to be processed through three stages, viz., parsing, pattern matching, and crawling data.

Chatbots have also been deployed in tourism for booking hotels close to tourist centers [22] and also locate sights, activities, or even complete travel plans. In the travel industry, chatbots were used as digital assistants to provide medical support to travelers by matching pharmaceutical products that they were not familiar with with similar products from the traveler's home market [23]. [24], proposed a framework that could deduce user action by capturing relevant information needed to train machine learning algorithms to automate complex decision making and hence eliminate human error. According to them, the proposed framework is expected to be deployed in the hospitality industry to bring about a significant gain in user choice and experience, as well as efficiency in resource management and revenue optimization. [25] proposed a chatbot system that enables users to understand history easily. Instant Messenger LINE was used as a platform to communicate while artificial intelligence markup language and the Full-Text Search techniques were used to develop the system. The artificial intelligence markup language was used to extract the characteristic of questions and answers. The Full-Text Search technique was used to match answers to the user input.

Different from the reviews considered above, in this work, a hostel location-based chatbot that explores the potential of recommendation systems not only to locate hostels but also to generate a ranked list of hostel accommodations from which students can choose from is proposed. This was achieved with the integration of a recommendation module into the developed chatbot.

3. Design of the Chatbot System

The proposed hostel location and recommendation chatbot application is described in this section. This includes the architecture of the chatbot system **(**Fig. 2**)**, the description of the chatbot system, as well as the hardware and software requirements of the system.

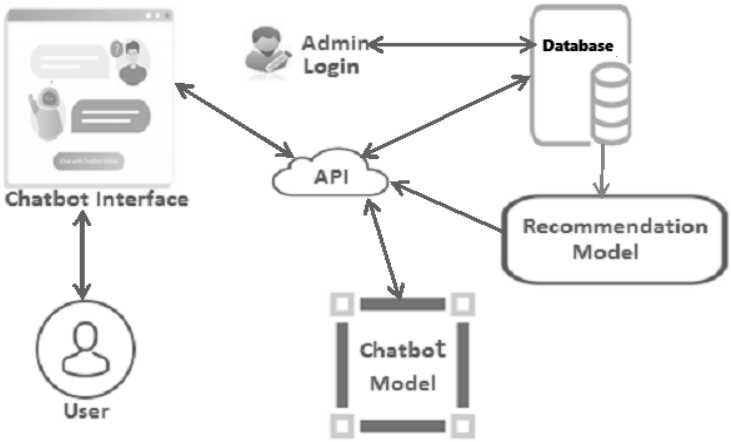


Fig.2. Hostel location and recommendation chatbot architecture

3.1. Description of the chatbot system

The chatbot interface serves as a bridge between the user and the chatbot model, which sends and collects detailed information from the database. The chatbot interface was developed using HTML, CSS and bootstrap. The API serves as an interface between different systems. It allows multiple systems to connect to a database without physically being connected. The API for the proposed system was built using PHP and Flask. The data from the chatbot interface is sent through the API to the chatbot model, which then carries out the necessary processes and sends responses back to the user through the API.

The Chatbot Model is responsible for controlling the main parts of the system. The system first accepts the user sentences and then sends the sentences to the API, which saves the sentences into a database so that they can be used to update the system. Once this is achieved, the sentences are sent to the machine learning API where the following operations begin: text processing, intent classification, name entity recognition, and finally, JSON Formation. Under text processing, user sentences are converted to lower case to make their processing easier, stop words which are not relevant in user sentences are removed, punctuation and double space are removed, tokenization, on the other hand helps in breaking sentences into words using the Natural Language Processing Tool Kit (NLTK) python library, next is lemmatization, which is a feature that allows the base form of words to be derived. Finally, part of speech tagging is

carried out. The spacy package tool is responsible for getting the part of speech of all the words in the user sentences, such as the noun, adjective and, etc. In intent classification, users' sentences are analyzed and categorized into intents such as purchase, distance, time, image request, etc. This is done to understand the intentions behind students' queries, texts, and chat conversations. Next is name entity recognition (NER), which helps to locate named entities in unstructured text and then classify them into pre-defined categories. Our system tags words based on their part of speech, such as "place", "money", etc. The system tags hostel names as "place". The names that are added to it when agents add hostels are detected in the sentence as "place". For our system to handle intent classification, intents, which are the keywords that describe exactly what a sentence means, are defined. For example, the question, "what is the lowest hostel price at iworoko?" is tagged as Cost, Price etc. The following is a list of intent tags with the words that determine the sentence's intent.

- **Distance**: meter, kilometer, Miles, distance, length, space, range, extent, gap, far.
- **Price**: Cheap, Cost, high, pay, price, charge, fee, expenses, sum, total, amount, rate, worth, bill, estimate, quotation, fair, expensive
- **Amenities**: parking, space, pool, amenities, kitchen, bathroom
- **Apartment**: flat, self-contain, apartment, face me, data, network, electricity, light. spacious, comfort,
- **Pay type**: yearly, monthly, interval
- **Water**: borehole, well, water
- **Security**: secure, security, safe, depend, reliable.
- **Availability**: available, occupied, rent, obtain, on sale, stock, filled.

The intent tag list is updated as the user interacts with the system. Pattern matchers like regular expressions are used to check the words in a user's sentence. If any of the words are detected, then the system tags the sentence. The next phase after intent classification is the JavaScript Object Notation (JSON). This phase helps to detect the request of the user which is then sent to the SQL query. Once the appropriate information is selected from the database, it is sent back to the chatbot and is displayed to users in a JSON format. This is seen in the algorithm in Table 1.

The recommendation phase of the system uses a content-based filtering algorithm [26] to suggest a relevant ranked list of hostels to students. The system first collects data from all hostels added to the database and then converts it to vectors with the support of the Term Frequency Inverse Document Frequency (TF-IDF). Once the hostel details are converted to vectors, the system also converts the user's data gotten from their chat into vectors and then compares them with the main hostel details vectors to see which of the vectors are closest. It then gets the top 5 closest vectors and sends the hostel details of the vectors which are recommended to users. This is indicated in the algorithm in Table 2. The agent/admin is responsible for updating each hostel's details, such as availability, cost, etc. This helps the chatbot to provide recent and accurate information to the users. The admin login page allows admin to see different activities going on in the system, and be able to ban any hostel owner with fake details if reported by users.

Table 1. Hostel Location Chatbot Algorithm

Algorithm 1
1: A user starts the chat application by asking the chatbot about a hostel in text format.
2: The chatbot takes the input and uses Natural Language Processing to extract the intent from the statements and phrases used while chatting
3: After intent extraction, chatbot sends a request with the keywords to the Database system for further processing and to search for an appropriate answer.
4: The database returns a response that contains all the information that has been fetched from the database using MySQL in JSON format.
5: All the data from the database are then sent to a response JSON file.
6: The response JSON file now has processed data from the database. The chatbot parses all the relevant information from the JSON response and provides a meaningful and conclusive answer to the guest in text format with images attached, and a lot of details and links about the hostel.
7: IF the conversation has ended Then STOP ELSE repeat step 1

Table 2. Hostel Recommnedation Chatbot Algorithm

Algorithm 2
1: Get chat data and hostel details data
2: Extract keywords from chat data using NLTK
3: Send keywords extracted from chat data and hostel details to recommendation model
4: Extract hostel names from recommendation model
5: Send the top-5 recommended hostels to the API for users to choose their choice

3.2. System modeling

A use case diagram is used to depict the activities of the system. The use case diagram for hostel enquiry, availability, and prices, is described in Fig. 3.

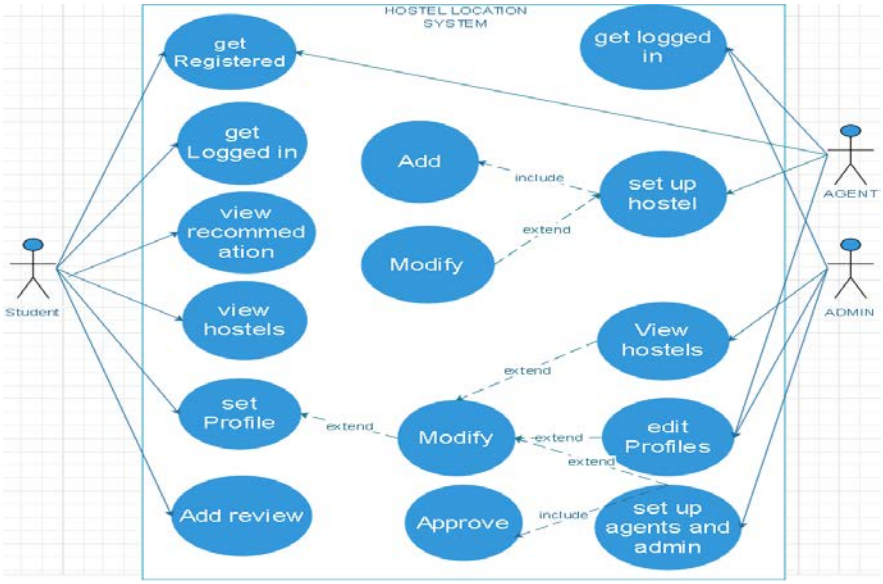


Fig.3. The use case diagram of the hostel chatbot system

3.3. Hostel chatbot database design

The database used to store data for future reference is PHPMYADMIN. It was used to hold all the data for the system, which included text, files, integers, etc. The following data types were used in the database:

- Integer: To store integer values, this holds data such as matric number, ids, admin number, phone numbers, etc.
- Varchar: To store strings, letters, characters, this holds the names, email, gender, faculty name, department name, etc.
- Timestamp: this is used to store time such as dates and time.

A Relational database model (RDM) was used for the system because our data relations were saved in a table format with their entities. We divided the information used on our system into tables with different names, such as hostel details, students, etc. These tables were linked together based on the relationship between them. The following diagram (Fig. 4) explains in full detail the relationship and cardinalities between each table. In the diagram, PK stands for primary key, which is the key that is unique to a certain table, and also FK stands for foreign key, which is the key that is used to reference a table from another table. The entity relationship diagram (ERD) was created using the Lucidchart tool.

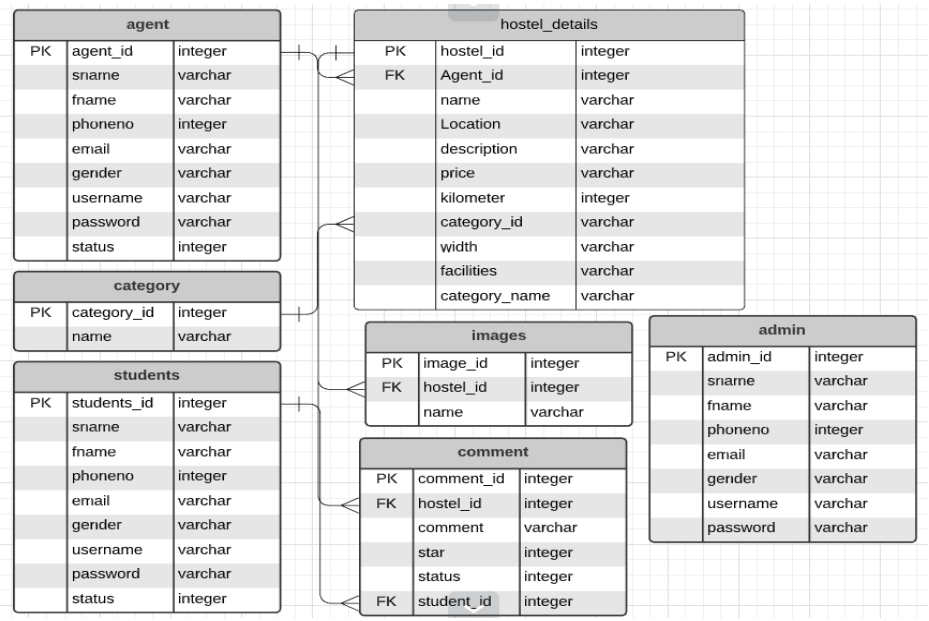


Fig.4. The database model

3.4. Hostel chatbot hardware and software requirements

This requirement describes the least physical features needed to implement the chatbot system. They include the following:

Processor: Intel Core i5 CPU @2.9Ghz and above
RAM: 8 GB
Hard Disk: 500 GB HDD

The minimum software requirements to implement the hostel chatbot are listed below:

Operating system: Windows 10
DBMS: MYSQL
Software tools: Visuals studio, Android studio and Anaconda
Implementation languages: Dart, Python, HTML and JavaScript

4. System Implementation

The following section describes the implementation and testing of the proposed hostel location and recommendation chatbot. The screenshots of the different activities within the chatbot system are thus presented.

Fig. 5 shows the log in page as well as the navigation drawer that allows users to easily move around the system. This navigation bar contains links to different pages such as hostels, contact us, dashboard and etc.

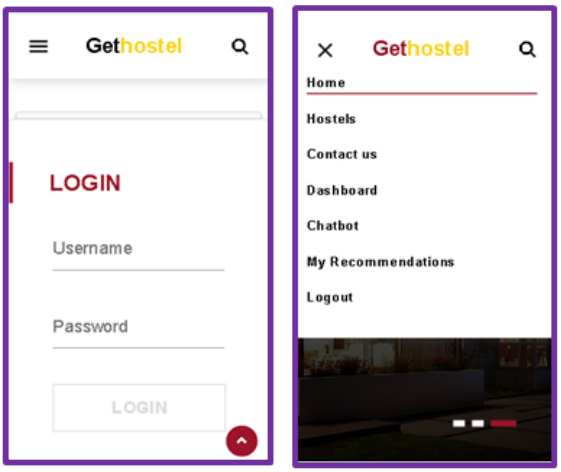


Fig.5. Log in page and navigation drawer

Fig. 6 shows the page where users are allowed to register either as a student or as an agent. Agents are hostel owners, so they also register through the register page.

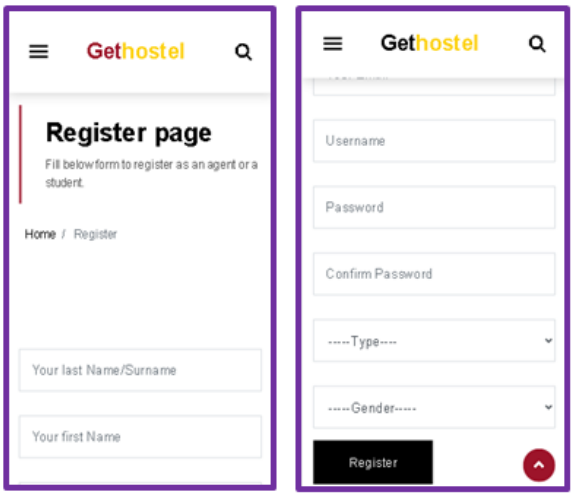


Fig.6. The student and agent registration page

Fig. 8 shows students' dashboards after they have logged in. The dashboard contains a list of hostels the agent just uploaded and also the list of recommended hostels for the student.

Fig. 9 shows the interfaces where a user was interacting with the chatbot system for direction to suitable hostel accommodation. The chatbot opens a conversation by asking a user what he or she wants, and the user supplies her requests until the necessary hostel is identified.

Fig. 10. shows the details of the hostel identified that suite the purpose of the user.

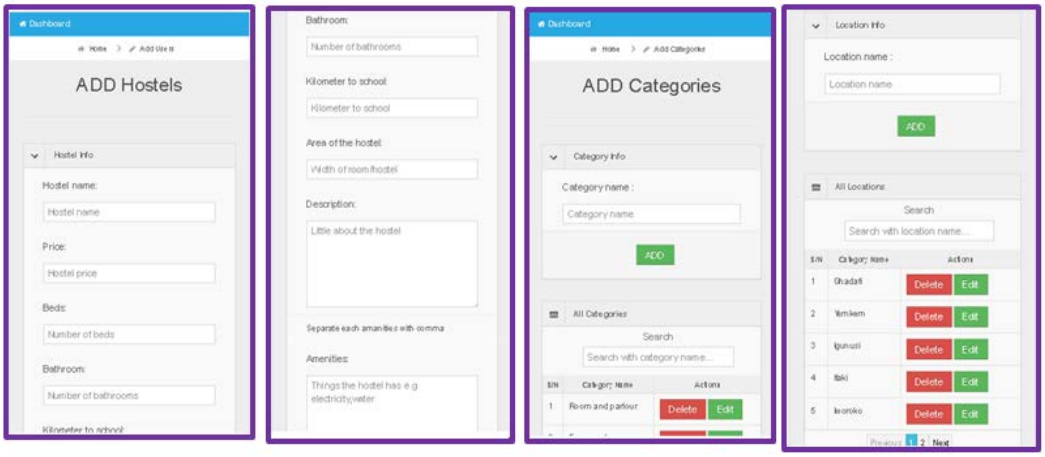


Fig.7. Hostel owners add hostel details of their hostels

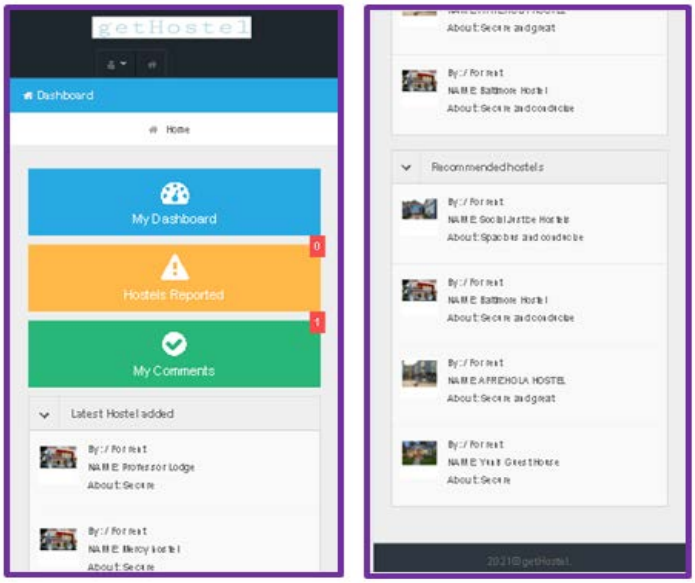


Fig.8. Student dashboard with recently added hostels and recommendation list

4.1. Evaluation of the hostel chatbot system

In order to evaluate the performance of our Hostel Chatbot Location and Recommendation System, Different criteria were used such as speed (which defines how fast the loads whenever it is lunched), user friendliness (which describes the capacity of the system to allow the users to perform tasks effectively and efficiently while enjoying the experience), interface appearance (which describes how the system appears visually to the users), platform compatibility (which describes the flexibility and sensitivity of the system across different browsers and operating systems), recommendation reliability (which describes the ability of the system to generate dependable recommendations for users) and recommendation accuracy (which describes the ability of the system to provide correct recommendation to users).

The system was launched for users to use on their Android phones. Then users rate the performance of the system through a Google form questionnaire that was lunched with the system using the criteria discussed above. The criteria were rated on a 1-4 rating scale, with 1 indicating poor and 4 indicating excellent. A total of 152 users, which included students from 100 level to 500 level in different departments of Ekiti State University, Ado-Ekiti, participated in the survey. Fig. 11 shows the results based on the different evaluation criteria used.

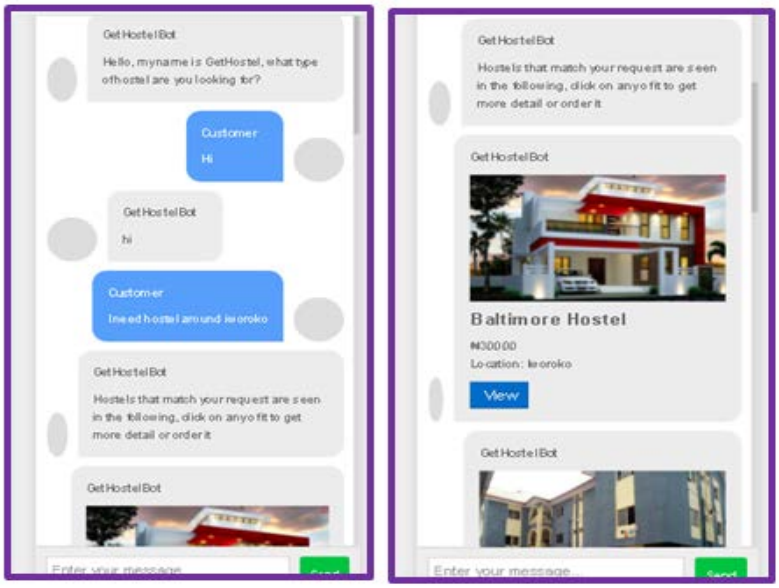


Fig.9. Hostel chatbot interacting with a user

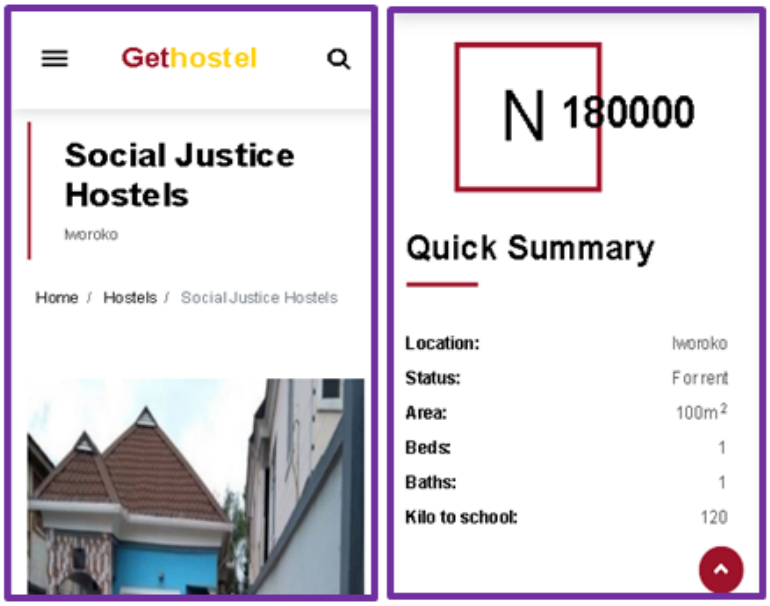
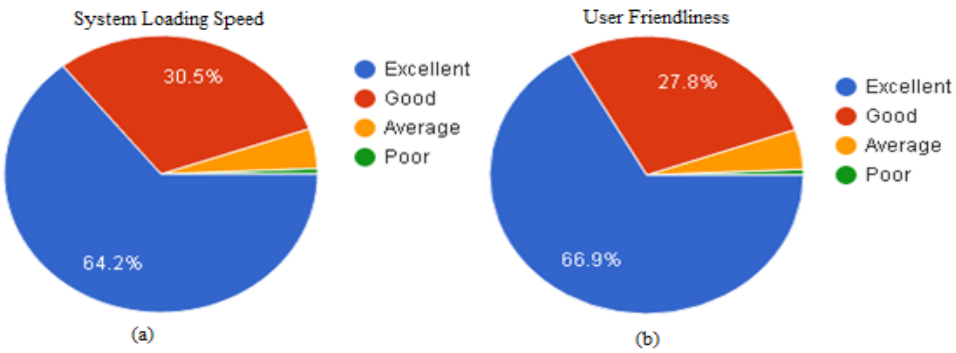


Fig.10. The hostel identified for the user after interaction



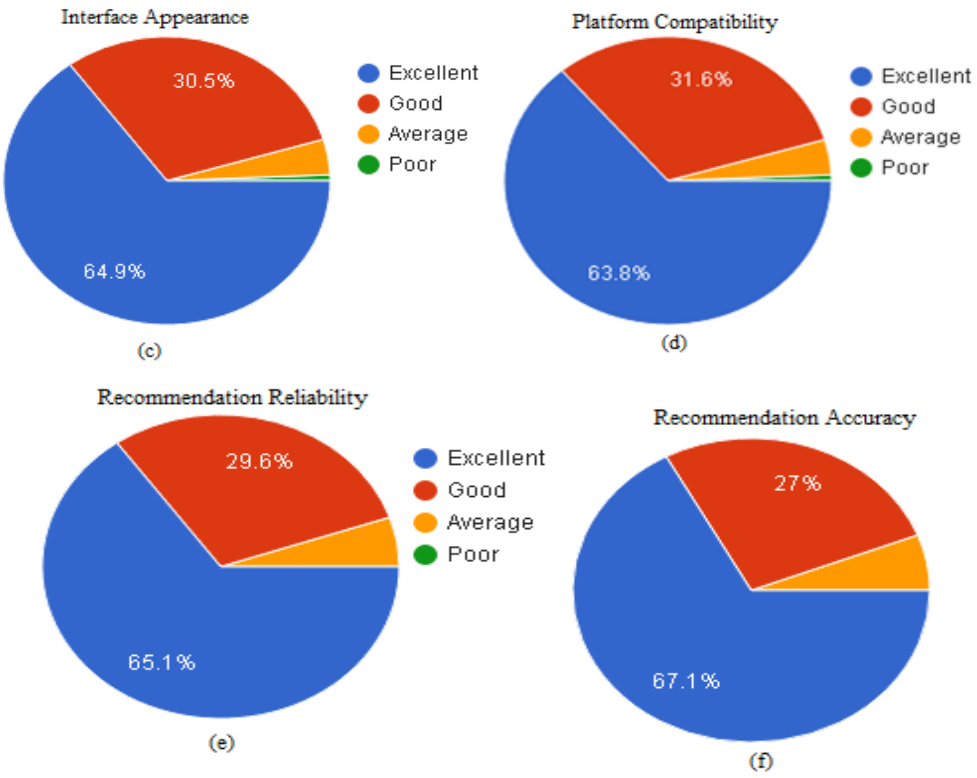


Fig.11. (a) 64.2% of users believe that the system's loading speed is excellent. (b) 66.9% agreed that the system is easy to use. (c) 64.9% thought that the interface appearance of the system was excellent. (d) 63.8% of the respondents support the fact that the system is platform compatible. (e) 65.1% are of the opinion that the recommendations generated for users are reliable. (f) 67.1% believe that the system's recommendation accuracy is commendable.

5. Conclusion

A Chatbot generally assists users to accomplish their recommendation-related intentions through a multi-turn dialogue. These systems simplify the interactions among individuals and services in order to enhance users' experience. They help to enhance users' engagement process and functioning effectiveness by decreasing the normal cost of user service. The recommendation system, on the other hand, is one of the most successful practical AI stories and its key objective is to produce personalized recommendations according to the user's preferences and interests. In this work, a hostel location-based chatbot that explores the potential of recommendation systems to generate a ranked list of hostel accommodations from which students can choose from was proposed. This was achieved with the integration of a recommendation module into the developed hostel-location chatbot. The chatbot system was designed as a cross platform compatibility application with different tools and technologies. To assess the performance of the system, it was launched for users to use on their Android phones. Users rate the performance of the system through a Google form questionnaire that was lunched with the system using criteria such as loading speed, user friendliness, interface appearance, platform compatibility, and recommendation accuracy. The effectiveness of the chatbot system cannot be overemphasized as it improves user experience by understanding their interests and responding to them with appropriate output. It eases users of the stress of identifying suitable hostels at higher institutions of learning, is cost-effective, and reduces time wastage in searching for hostels manually. Also, users do not have to rely on individuals to make recommendation of hostels for them as the system does it automatically. As future extension, additional functionality could be incorporated to the hostel chatbot such as the ability to comprehend intricate English structures and the ability to process other languages aside English language.

References

[1] V Oguntosin and A Olomo. Development of an E-Commerce Chatbot for a University shopping mall. *Appl. Comput. Intell, 2021*, doi:10.1155/2021/6630326

[2] Z Safi, A Abd-Alrazaq, M Khalifa and M Househ. Technical aspects of developing chatbots for medical applications: Scoping review. *J Med Internet Res*, 2020; 22, e19127.

[3] B Setiaji and FW Wibowo. Chatbot using a knowledge in database: human-to-machine conversation modeling. In: Proceeding of *7th International Conference on Intelligent Systems, Modelling and Simulation (ISMS)* 2016, p. 72-77.

[4] R Bhushan, K Kulkarni, VK Pandey, C Rawls, B Mechtley, S Jayasuriya and C Ziegler. ODO: Design of Multimodal Chatbot

for an Experiential Media System. *Multimodal Technol. Interact*, 2020, 4, *68.*
[5] D Jannach, A Manzoor, W Cai and Chen. A Survey on Conversational Recommender Systems. *ACM Comput. Surv. (CSUR)*, 2021, 54, 1-36.
[6] L Ravi and S Vairavasundaram. (2016). A collaborative location based travel recommendation system through enhanced rating prediction for the group of users. *Comput. Intell. Neurosci*. 2016, doi:10.1155/2016/1291358
[7] FO Isinkaye and YO Folajimi. Experimental validation of contextual variables for research resources recommender system. *Int. J. Intell. Syst. Appl*, 2018, 10, 50-57.
[8] FOIsinkaye, YO Folajimi and BA Ojokoh. Recommendation systems: Principles, methods and evaluation. *Egypt. Inform. J.* 2015, 16, 261-273
[9] S Bhaskaran, R Marappan and B Santhi. (2020). Design and comparative analysis of new personalized recommender algorithms with specific features for large scale datasets. *Math.* 8, 1106.
[10] A Argal, S Gupta, A Modi, P Pandey, S Shim and C Choo. Intelligent travel chatbot for predictive recommendation in echo platform. In: *Proceeding of the 8th Annual Computing and Communication Workshop and Conference (CCWC)*, 2018, p. 176-183.
[11] A Følstad, CB Nordheim and CA Bjørkli. What makes users trust a chatbot for customer service? An exploratory interview study. In: *Proceeding of International conference on internet science*, 2018, p. 194-208.
[12] KP Jadhav and SA Thorat. Towards designing conversational agent systems. In: *Computing in Engineering and Technology*, 2020, p. 533-542.
[13] A Khanna, B Pandey, K Vashishta, K Kalia, B Pradeepkumar and T Das. A study of today's AI through chatbots and rediscovery of machine intelligence. *Int. J. of u-and e-Svc, Sc. and Tech.* 2015, 8, 277-284.
[14] N Geoffrey O Kelvin and O Daniel. Artificial Intelligence Chatbot Adoption Framework for Real-Time Customer Care Support in Kenya. *Int. J. of Sci. Res. in Compt. Sci., Eng. and Inf. Tech. (IJSRCSEIT)*, 2020, 6, 100-117.
[15] S Ghosh, S Bhatia and A Bhatia. Quro: facilitating user symptom check using a personalized chatbot-oriented dialogue system. *Stud Health Technol Inform*, 2018, 252, 51-56.
[16] U Bharti, D Bajaj, H Batra, S Lalit, S Lalit and A Gangwani. Medbot: Conversational artificial intelligence powered chatbot for delivering tele-health after covid-19. In: *5th International Conference on Communication and Electronics Systems (ICCES)*, 2020, p. 870-875.
[17] TJ Judson, AY Odisho, JJ Young, O Bigazzi, D Steuer, R Gonzales and AB Neinstein. Implementation of a digital chatbot to screen health system employees during the COVID-19 pandemic. *J Am Med Inform Assoc* 2020, 27, 1450-1455.
[18] AR Asadi and R Hemadi. Design and implementation of a chatbot for e-commerce. *Info. Comm. Tech. and Doing Bus.*, 2018, 1-10.
[19] L Cui, S Huang, F Wei, C Tan, C Duan and M Zhou. Superagent: A customer service chatbot for e-commerce websites. In: *Proceedings of ACL, System Demonstrations*, 2017, p. 97-102.
[20] C Pricilla, DP Lestari and D Dharma. Designing interaction for chatbot-based conversational commerce with user-centered design. In: *Proceeding of the 5th International Conference on Advanced Informatics: Concept Theory and Applications (ICAICTA)*, 2018, p. 244-249.
[21] A Nursetyo and ER Subhiyakto. Smart chatbot system for E-commerce assitance based on AIML. In: *Proceeding of the International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)*, 2018, p. 641-645.
[22] P Suanpang and P Jamjuntr. A Chatbot Prototype by Deep Learning Supporting Tourism. *Psychol Educ J.* 2021, 58, 1902-1911.
[23] B Ruf, M Sammarco, J Aigrain and M Detyniecki. Pharmabroad: a companion chatbot for identifying pharmaceutical products when traveling abroad. In: *Information and Communication Technologies in Tourism*, 2020. p. 218-228.
[24] AS Imad. Remodeling hospitality industry through artificial intelligence. In *2019 13th International Conference on Software, Knowledge, Information Management and Applications (SKIMA)*, 2019, p. 1-7).
[25] Kadek Teguh Wirawan, I Made Sukarsa, I Putu Agung Bayupati, "Balinese Historian Chatbot using Full-Text Search and Artificial Intelligence Markup Language Method", *International Journal of Intelligent Systems and Applications*, Vol.11, No.8, pp.21-34, 2019.
[26] Muhammad Usman Ashraf, Mubeen Naeem, Amara Javed, Iqra Ilyas, " H2E: A Privacy Provisioning Framework for Collaborative Filtering Recommender System", *International Journal of Modern Education and Computer Science*, Vol.11, No.9, pp. 1-13, 2019.

Authors' Profiles

Folasade O. Isinkaye holds a BSc degree in Computer Science from the Ondo State University, Ado-Ekiti, (now EKSU), Nigeria. Her MSc and PhD degrees were obtained in Computer Science from the University of Ibadan, Nigeria, with a specialization in intelligent Systems. She is a lecturer at the Department of Computer Science, Ekiti State University, Ado-Ekiti, Nigeria. Her research interests include recommender systems, data mining, information systems, and machine learning. She is a member of professional bodies which include the Computer Professional [Registration Council of Nigeria (CPN)] and the Association for Computing Machinery (ACM). She was a visiting PhD scholar at the Laboratory of Knowledge Management, Dipartimento di Meccanica, Matematica e Management, Politecnico di Bari, Italy.

Abiodun Babs Imran has a BSc Degree in Computer Science from Ekiti State University, Ado-Ekiti, Nigeria. He currently works as a full-stack freelancer developer on Upwork. His research interests include artificial intelligence and machine learning. He has skills in HTML, CSS, PHP, JavaScript, Bootstrap, MySQL, Python, Flutter, and Dart.

Paul Michael Tobi graduated from the Department of Computer Science, Ekiti State University, Ado-Ekiti, Nigeria. He has a BSc degree in Computer Science. His research interests include artificial intelligence and graphic design. He loves to program using PHP, JavaScript, MySQL, and Python.

How to cite this paper: Folasade Olubusola Isinkaye, Imran Gbolahan AbiodunBabs, Michael Tobi Paul, "Development of a Mobile-Based Hostel Location and Recommendation Chatbot System", International Journal of Information Technology and Computer Science(IJITCS), Vol.14, No.3, pp.23-33, 2022. DOI: 10.5815/ijitcs.2022.03.03