

A Study on the Restaurant Recommendation Service App Based on AI Chatbot Using Personalization Information

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Abstract

The growth of the mobile app markets has made it popular among people who recommend relevant information about restaurants. The recommendation service app based on AI Chatbot is that it can efficiently manage time and finances by making it easy for restaurant consumers to easily access the information they want anytime, anywhere. Eating out consumers use smartphone applications for finding restaurants, making reservations, and getting reviews and how to use them. In addition, social attention has recently been focused on the research of AI chatbot. The Chatbot is combined with the mobile messenger platform and enabling various services due to the text-type interactive service. It also helps users to find the services and data that they need information tersely. Applying this to restaurant recommendation services will increase the reliability of the information in providing personal information. In this paper, an artificial intelligence chatbot-based smartphone restaurant recommendation app using personalization information is proposed. The recommendation service app utilizes personalization information such as gender, age, interests, occupation, search records, visit records, wish lists, reviews, and real-time location information. Users can get recommendations for restaurants that fir their purpose through chatting using AI chatbot. Furthermore, it is possible to check real-time information about restaurants, make reservations, and write reviews. The proposed app uses a collaborative filtering recommendation system, and users receive information on dining out using artificial intelligence chatbots. Through chatbots, users can receive customized services using personal information while minimizing time and space limitations.

Keywords: *personalization information, AI chatbot, restaurant recommendation service app, collaborative filtering*

1. Introduction

The growth of the mobile app market has made it popular among people who recommend relevant information about restaurants [1]. Eating out consumers use smartphone apps for finding restaurants, making reservations, and getting reviews and how to use them. As a result, the types of restaurants recommend service apps are increasing, and various contents are being newly added. In companies or public institutions in various

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industrial sectors, interactive services are added and functions are being expanded through the website, mobile apps, and SNS services. Interactive service based on artificial intelligence chatbot aims to secure better service competitiveness or internal work competitiveness within the same industry while providing users or customers with various access channels and allowing them to select and use them [2]. Research on information recommendation using user profile analysis, query language extension, collaborative filtering, and similar document clustering techniques has been carried out in many other areas than the restaurant recommendation service [3]. However, the use of personalization information for situations in which individual search intentions change in the restaurant industry is insufficient. Therefore, in this paper, we are going to propose an artificial intelligence chatbot-based restaurant recommendation service app that utilizes personalization information. Proposal apps offer similar-minded customers a form of service that cross-recommends restaurants that have not yet visited each other or recommend related products according to personalization information. And you can check the restaurant's real-time information, make reservations, and finally write a review. The advantage of the AI chatbot-based restaurant recommendation app is a two-way exchange method that sends and receives information which users want through an interactive interface rather than one-way information delivery. Accurately, identify users' needs and the information they need and receive customized information. The next chapter introduces personalization information related to this paper, AI chatbot, and restaurant recommendation system. Chapter 3 introduces the system proposal used in the paper and shows the interface screen. We conclude in Chapter 4.

2. Related Research

2.1 Personalization Information

Personalization further highlights a personalization system that allows users to quickly and accurately find the information they want by selecting information that meets the needs and interests of the user among the myriad of information. The main purpose of personalization information is to use user profiles to analyze user-used search terms, order of web page visits, and user behavior within web pages, store and apply text analysis materials to improve search performance, thereby providing the user's interest or preference and the information they want more conveniently [4]. The methods of personalization include the Rules-based filtering method, the leading agent method, and the collaborative filtration method [5]. In this study, the process of deriving personalization information is used to enhance the satisfaction of recommendation by using the collaborative filtering method.

2.2 AI Chatbot

Chatbot is a compound word that combines chat + robots and combines them with mobile messenger platforms, and is an artificial intelligence-based communication software that answers questions properly through 1:1 voice or text messages or provides relevant information that users want [6]. Chatbots serve as an important link between numerous companies and individuals by properly finding the information and services people need. Chatbots are a new trend that people can easily access the information they want and use it to make decisions, starting with digital approaches [7]. Chatbots are divided into chatbots, voice recognition bots and personal secretaries according to the order method. The latest chatbot research aims to establish an intelligent personal assistant. Currently, chatbot technology is function-oriented, making it impossible to communicate intelligently. The future outlook will enable natural communication with users due to the development of artificial intelligence [8]. In this paper, we would like to propose an app that recommends customized information that users want through real-time chatting using AI chatbot.

2.3 Restaurant Recommendation System

Recent the advances in information technology have led to the explosive growth of many apps because of the speed, portability, and accessibility of smartphone media, and the most progressive digital tool to satisfy the enjoyment and satisfaction of food and place [9]. Eating out consumers will visit restaurants on a touch-by-touch basis using smartphone's restaurant-related app, making reservations, and receiving reviews, methods of use, and discount information posted by other customers. Smartphone restaurant recommended service apps include Mango Plate, Dining Code, and Hot Place which provide restaurant information using big data, and new apps are emerging. These restaurant recommendation service apps are convenient because users can easily get information about various local restaurants from the user's point of view as they can get information on restaurants, phone numbers, menus and directions at a glance through their smartphones. From the restaurant's point of view, it also has the advantage of increasing advertising effectiveness through the app [10]. As the level of interest in the restaurant recommended services app is increase, research on the behavioral level of experienced users and the study of restaurants are reached through a blog, etc. like web situation [11]. The recommendation app is a system that suggests content that is likely to be highly prefer by filtering to suit the user's preferences [12]. Typically, it can divide into a collaborative filtering technique and a content-based recommendation technique. Collaborative filtering will determine the direction of customer service by grouping customers with similar patterns of preferences/interest based on the basic information of customers and their preferences/expression of interest. In other words, products that have not been purchased with one another to customers of similar tastes will be provided with services in the form of cross-recommendation or recommending related products according to the customer's taste or lifestyle classified [13]. The following Figure1 is a collaborative filtering concept that recommends items to users with similar preferences. User1 and User2 have common that they like Item1 and Item2. Therefore, they are classified as similar tastes. So, user1 is recommended item 3 of User 2 which has not been experienced to user1. In this study, we propose a recommendation service app design using personalization information and collaborative filtering techniques in recommending restaurant.

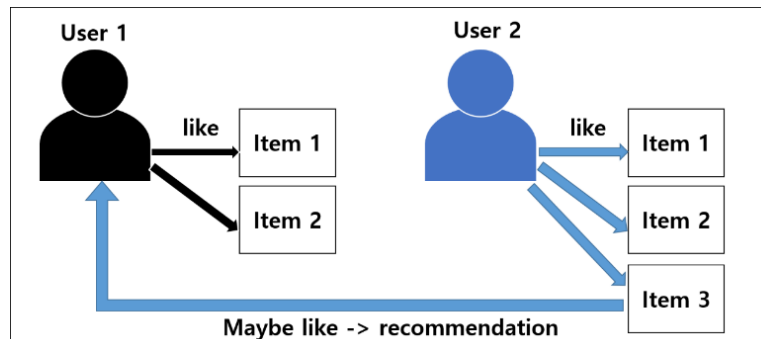


Figure 1. Concept of collaborative filtering

3. Proposal

3.1 System proposal

The system of the restaurant recommended app based on artificial intelligence chatbot utilizing personalization information proposed in this paper is as follows. First, Android Studio and JAVA were used to implement the system. And using an API called chatbot API, we implemented an artificial intelligence chatbot-based restaurant recommendation app that recommends restaurants. Also, cross-recommend products that have not yet been purchased by each other to customers of similar tastes using collaborative filtering. or,

the Act provided a service that recommends related products according to the customers' tastes or lifestyle. The sequence of systems is as follows. First, launch the recommendation App for restaurant based on artificial intelligence chatbot that utilizes the proposed personalization information. And after entering personalization information according to the membership registration procedure, you access the chat room. In the chat room, we exchange messages with artificial intelligence chatbots and ask them whether they will reserve a restaurant or ask for information about the restaurant. Accordingly, for restaurant reservations, detailed information about the restaurant is provided or a reservation system is provided immediately. At this time, recommended restaurants based on location and personalization information are recommended. When requesting information about a restaurant, the recommendation of a list of restaurants is made based on personalization information. The following procedure is shown in Figure 2. This shows the flow chart from beginning to end of the recommended application for restaurant based on artificial intelligence chatbot using personalization information.

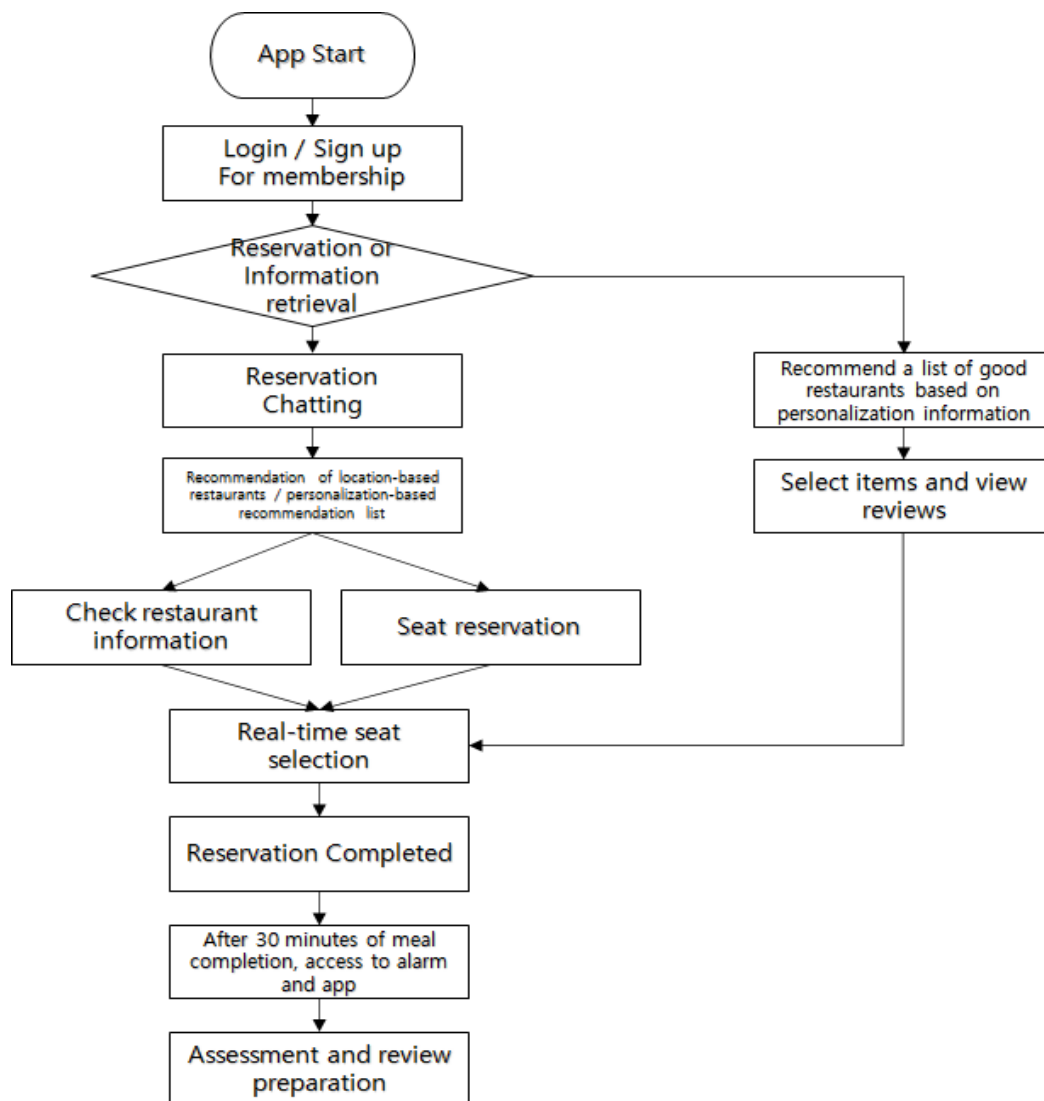


Figure 2. Flowchart of the proposal system

In addition, the system was constructed for the recommended application of the restaurant based on artificial intelligence chatbot, which utilized the proposed personalization information. This is based on Chat System with Collaborative Filtering System, User Interface, personalization information, and database containing real-time information. The functions of each system shown in Figure 3 are as follows.

- Chat System (Chat AI): The chatbot system is established by applying chatbot API and Collaborative Filtering system.
- User Interface: A total of 8 user interfaces are implemented in Android Studio development environment.
- Personalization Information DB: Database is built through personalization and inquires and stores the data.
- Real-Time Information DB: Database is established through real-time information service, and the data is inquired and stored.
- Query Generation: Creates a global query that can request data by using the repository in which the requirements delivered through the interface, standard schema data, and Enterprise 1's local schema data are mapped. and Converts the received global query back to a local query that can request data from DB using the above information.
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- Local Schema and Meta Schema: Standard schema data and Enterprise 1 local schema data are stored. The standard schema is standard defined based on the schema information of each locally connected DB.
- Global Query Request: The generated global query is transmitted to the data hub of each locally connected enterprise.
- Local Query Request: Transmits the converted local query to Enterprise 1's groupware DB.
- Data Conversion: Converts data imported from DB into document-oriented data by local query.
- Data Provision: The converted document-oriented data is supplied to the Data Hub system where the query is requested.
- Data Collection: Collects data transmitted from the Data Hub system of each enterprise.
- Data Integration: Collected document-oriented data is integrated, and duplicate data processing is managed by version method.
- Temporary Storage: Temporary storage of collected document-oriented data is used for data integration.

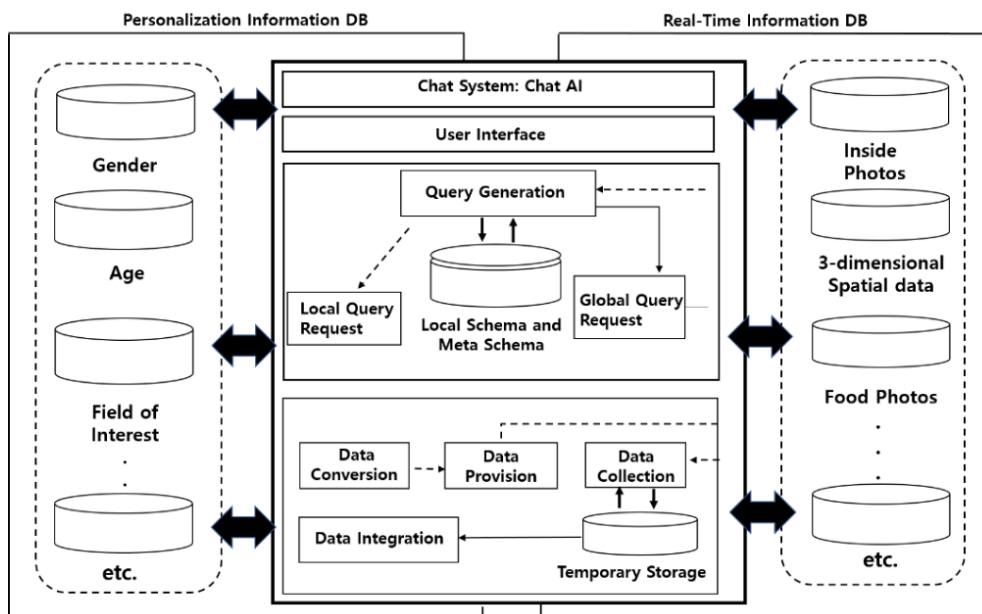


Figure 3. Proposal system configuration diagram

3.2 System implementation example

The system of the restaurant recommendation app based on artificial intelligence chatbot using the personalization information proposed through the system flow chart and configuration diagram shown in Fig. 2 and Fig. 3 was implemented as follows. First, Android Studio and JAVA were used to implement the system. Figure 4 shows the implementation in Android Studio environment. This is the implementation screen in Android Studio environment.

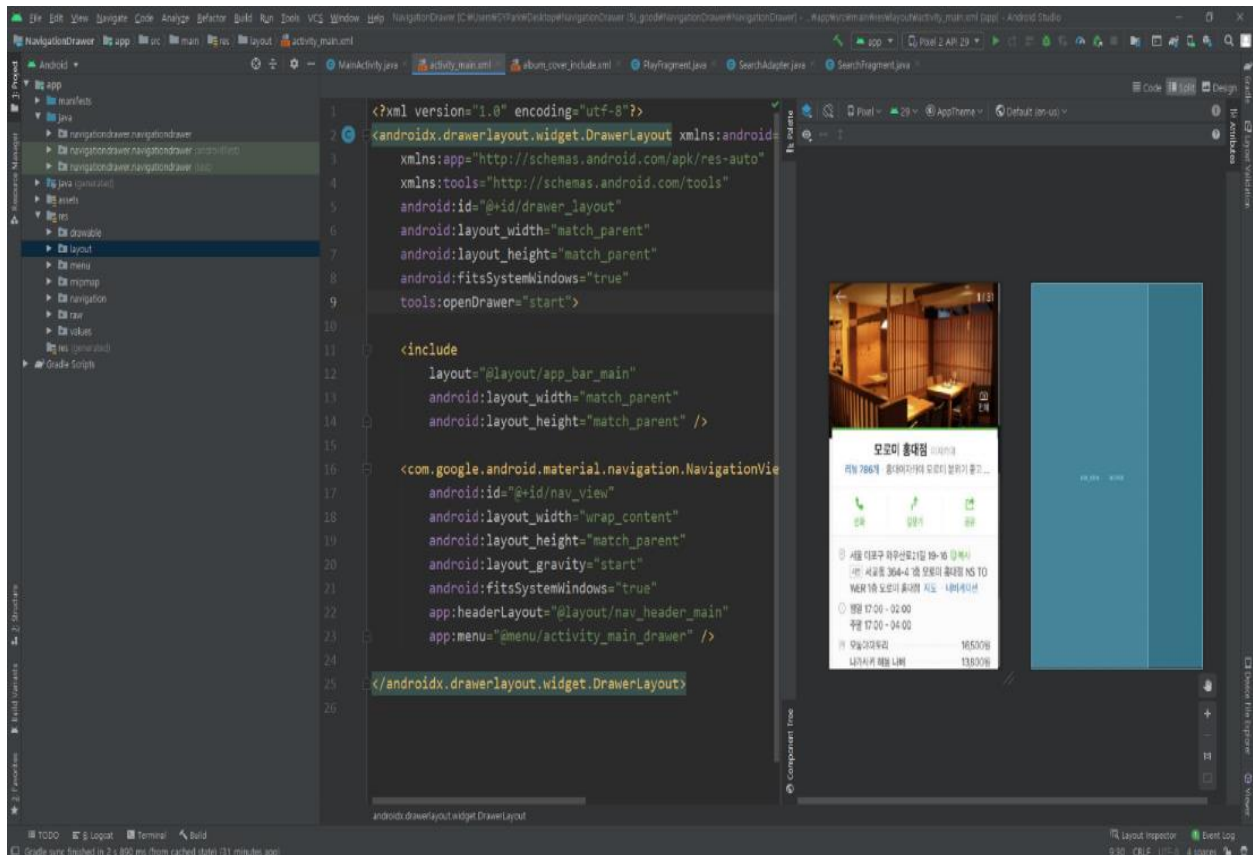


Figure 4. Implemented in Android Studio environment

The user interface of the restaurant recommended app is composed of a total of eight. Splash screen is an interface configured to show the loading screen when running the app for the first time, and the login screen is configured to input ID, PW, and personalization information. The Chat screen is an interface for chatting through AI chatbot. The Shop Information screen is an interface that displays information on restaurants. The Reservation screen is an interface to display the reservation system. The 3D View screen is an interface that allows you to check 3D information of a restaurant through VIEW. Through this, you can understand the structure of the restaurant. The Choice a Seat screen can distinguish between vacant and reserved seats based on the restaurant's seat. This allows you to make a reservation. The Review screen is an interface that allows you to evaluate the restaurant after using the reserved restaurant. Figure 5 shows the entire user interface of the proposal system.

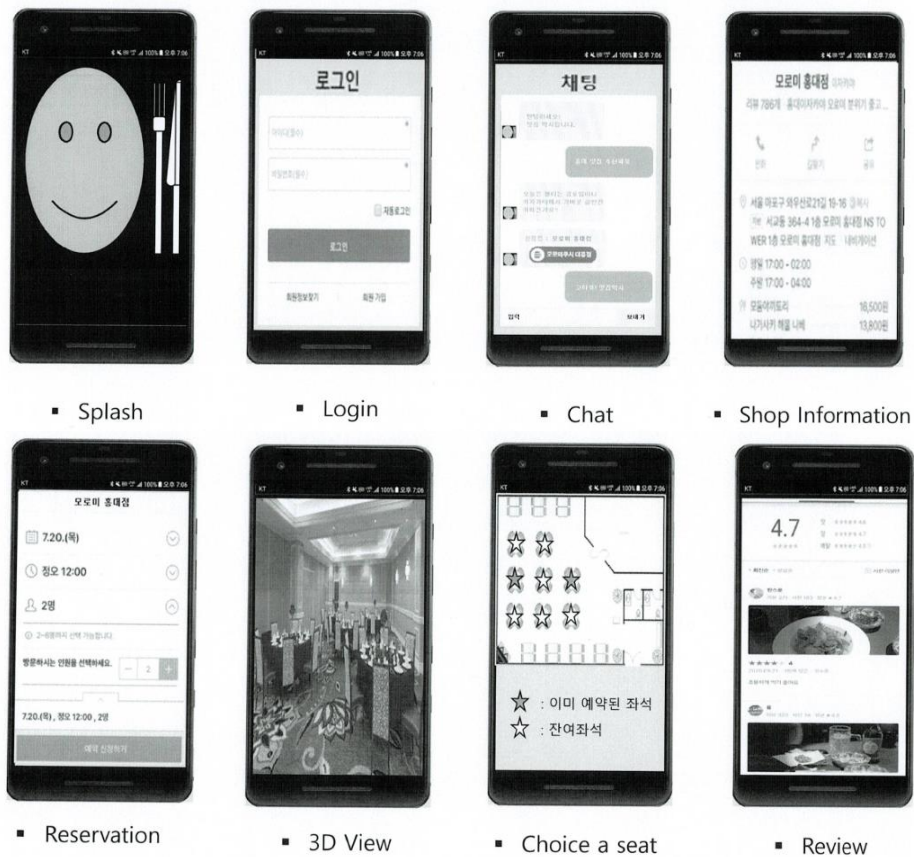


Figure 5. The entire user interface of the proposal system.

4. Conclusion

As smart devices and IT technology advancements enable the collection of personal customer information with various purchase details and behavioral records, the companies and the government pay attention to personalization services to provide differentiated services using them. However, the amount of data generated is increasing as the offline and online links become more active due to the development of various technologies. It requires a lot of money to process and analyze these data. In addition, despite the emergence of various smartphone apps and the explosive increase in the app market, many services using artificial intelligence-based chatbots are still lacking in the restaurant sector. In this paper, a recommendation app was proposed to provide information about the restaurant specialized for each user by providing appropriate answers to the questions desired by the user in real time through the chatbot. The chatbot of the proposed app can improve the convenience of users to search for real-time information. And users get more accurate information because the concept of virtual personal assistant, combined with the mobile messenger platform, provides the relevant information they want through 1:1 conversation with users. Proposal app recommends restaurant that using personalization information and collaboration filtering method. As a result, users can use artificial intelligence chatbots to get recommendations for the Restaurant, at the same time, receiving real-time information from the Restaurant, i.e. reservation status, seat information, menu information, etc. even though writing reviews. Proposed apps will be able to offer personalized recommendation services that are different from existing apps that provide simple information tip-off. In future research, we need to study the recommended chatbot interface and study the restaurant recommendation system that using various algorithms such as deep learning using personalization information.

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