

Personal Smart Travel Planner Service

Ki-Beom Kang¹ Myeong Gyun Kang² Seong-Hyuk Jo² and Jeong-Woo Jwa³

¹National Federation of Fisheries Cooperatives, Jeju, Korea

²Student, ³Professor, Department of Telecommunication Eng., Jeju National Univ., Korea
e-mail : kbb8671@gmail.com, {2015108101, polim0209, lcr02}@jejunu.ac.kr

Abstract

The smart tourism service provides tourists with personal travel planner services and context-awareness-based tour guide services. In this paper, we propose the personal travel planner service that creates my travel itinerary using the smart tourism app and the travel planner system. The smart tourism app provides recommended travel products and POI tourist information used to create my travel itinerary. The smart tourism app also provides the smart tourism chatbot service that allows users to select POI tourist information easily and conveniently. The travel planner system consists of the smart tourism information system and the smart tourism chatbot system. The smart tourism information system provides users with travel planner services, recommended travel products, and POI tourism information through the smart tourism app. The smart tourism chatbot system consists of named entity recognition (NER), dialogue state tracking (DST), and Neo4J servers, and provides chatbot services as a smart tourism app. Users can create their own travel itinerary, modify the travel itinerary while traveling, and then register it as a recommended travel product to users, including acquaintances.

Keywords: Smart travel planner service, Recommended travel products, Smart tourism chatbot service, Pre-learning language models (PLMs), Smart tourism app.

1. INTRODUCTION

Smart tourism can provide tourists with an easy and convenient personalized travel planner service and a context-aware tour guide service. The personal smart travel planner service allows tourists to create their travel itinerary before traveling, modify it while using a tour guide service during the trip, and provide it as a recommended travel product to other users, including acquaintances, after the trip. Users who use travel products recommended by acquaintances can create their own travel itinerary based on their acquaintance's travel experiences. The travel itinerary of the travel planner service includes point of interests (POIs) such as tourist destinations, restaurants, accommodations, and means of transportation [1]-[3]. The smart tour guide service provides geotagged storytelling content using the Text-to-Speech (TTS) service using my travel itinerary created by the travel planner service [4][5]. To develop travel planner services, we are developing tourism app services [6], artificial intelligence (AI)-based chatbot services [7]-[12], and Instagram and YouTube contents [6]. The smart tourism app service provides not only travel planner services, but also recommended travel products, POI tourist information, and the chatbot service. Users create their travel itinerary using recommended travel products and POIs selected in the smart tourism app. The smart tourism chatbot service is a tool for users to efficiently create their travel itinerary through the travel planner service. The AI-based chatbot service uses the tourism information NER (Named entity recognition) and DST

Manuscript Received: September 7, 2023 / Revised: October 10, 2023 / Accepted: October 20, 2023

Corresponding Author: lcr02@jejunu.ac.kr

Tel:+82-64-754-3638, Fax: +82-64-755-3610

Professor, Dept. of Telecommunication Eng., Jeju National Univ., Korea

Copyright©2023 by The International Promotion Agency of Culture Technology. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>)

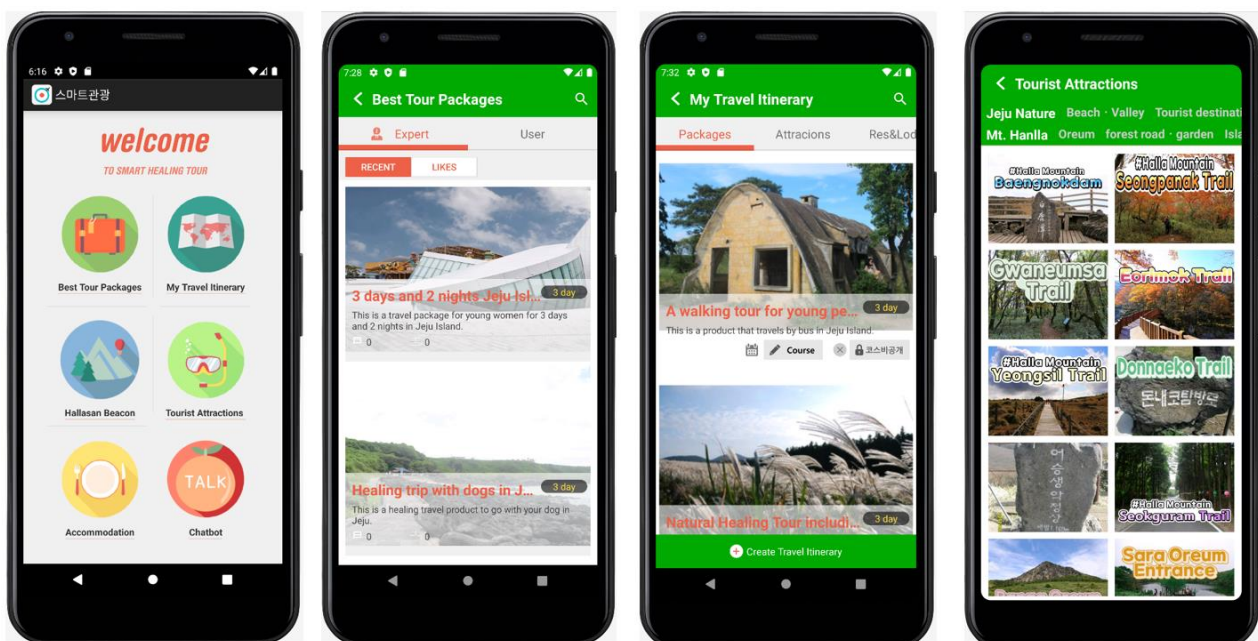
(Dialogue State Tracking) models that perform transfer learning of the pre-trained language models (PLMs), and the tourism information knowledgebase of Neo4J graph DB. In this paper, we propose a personal smart travel planner service that creates my travel itinerary using recommended travel products and POIs selected by the user. Users can select POIs to create their travel itinerary using the task-oriented smart tourism chatbot service.

2. Related Works

We have been developed the smart tourism apps using the smart tourism service platform to provide smart tourism services to users. Smart tourism apps provide not only the app service such as personal smart travel planner service, recommended travel products, and POI tourist information, but also the smart tourism chatbot service that allow users to use app services easily and conveniently. The smart tourism service platform consists of the smart tourism information system for the app service and the smart tourism chatbot service system for the chatbot service.

2.1 Smart tourism apps

The smart tourism app consists of six menus: Best Tour Packages, My Travel Itinerary, Hallasan Beacon, Tourist Attractions, Accommodation, and Chatbot. Figure 1 shows the main menu, Best Tour Packages, My Travel Itinerary, and Tourist Attractions menus of the smart tourism app. The Best Tour Packages menu provides users with travel products created by travel experts, local travel experts, and other users. The user can check recommended travel products in the Best Tour Packages menu and select travel products for creating my travel itinerary. The Tourist Attractions menu classifies tourist attractions into three levels of large, medium, and small, and provides POI tourist information to users. The user can select POI tourist information to create my itinerary from the Tourist Attractions menu. In this paper, we propose the travel planner service in which the user selects recommended travel products and POI tourist information from the Best Tour Packages and Tourist Attractions menus and creates a personalized travel itinerary from the My Travel Itinerary menu. After traveling, the user can register his travel itinerary as a recommended travel product in the My Travel Itinerary menu.



(a) main menu (b) Best Tour Packages (c) My Travel Itinerary (d) Tourist Attractions

Figure 1. Smart tourism app including the My Travel Itinerary menu

2.2 Smart Tourism Service Platform

The smart tourism service platform consists of the smart tourism information system and the smart tourism chatbot system as shown in Fig. 2. The smart tourism information system uses the following MySQL DB tables: my travel itinerary, selected travel products and POI tourism information, recommended travel products, POI tourist information, lodging, and restaurants DB tables. My travel itinerary DB table stores my travel itinerary created by the personal travel planner service proposed in this paper. The selected travel products and POI tourism information DB table stores what the user selects from the Best Tour Packages, Tourist Attractions, Accommodation, and Chatbot menus in the recommended travel products, tourist information, lodging, and restaurants DB tables. The selected travel products and POI tourism information DB table is used to create a travel itinerary in the My Travel Itinerary menu.

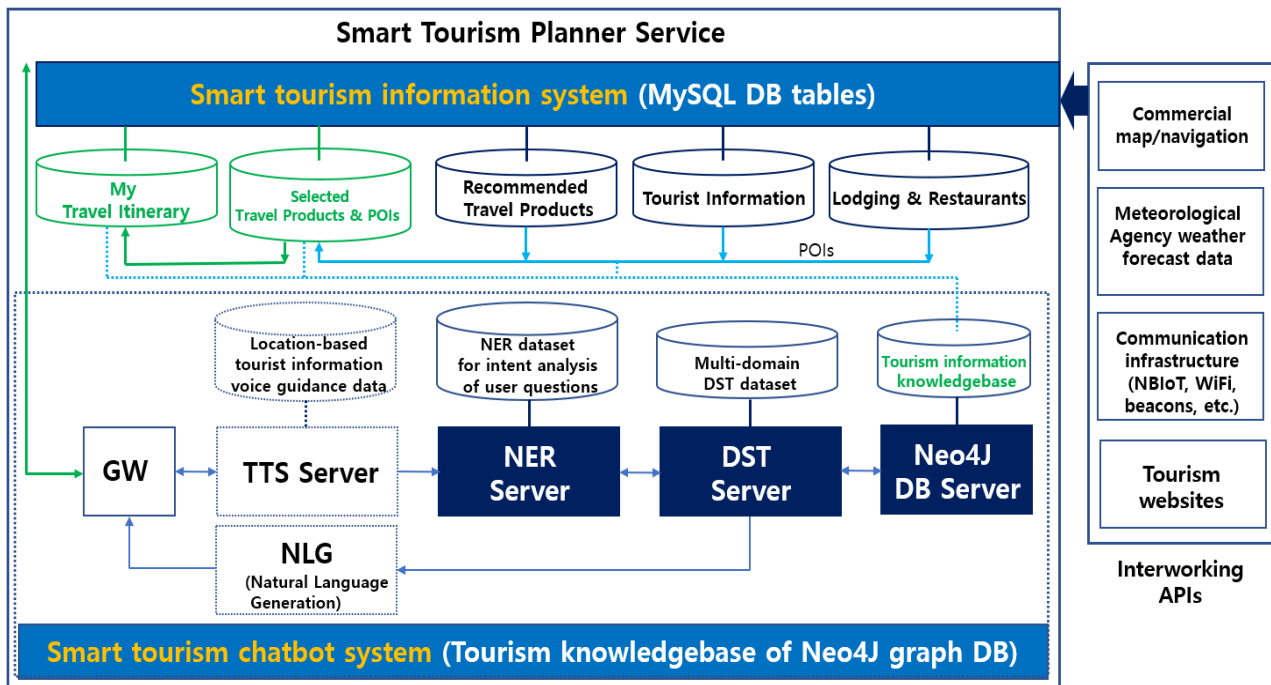


Figure 2. The smart tourism service platform for the personal smart tourism travel planner service.

2.3 Smart Tourism Chatbot Service

The smart tourism chatbot service is provided to users through the chatbot menu in Fig. 1(a). In [], we proposed the task-oriented smart tourism chatbot system that uses tourism information NER and DST models as shown in Fig. 2. The smart tourism chatbot system consists of NER, DST, Neo4J DB servers, and tourism information knowledgebase. The task -based smart tourism chatbot service is performed in two steps as follows (1) In the smart tourism chatbot system, the intention of the user's question is identified using the NER and DST models, and the POI ID is searched in the tourism information knowledge base of Neo4J graph DB and delivered to the Chatbot menu (2) The Chatbot menu uses the POI ID to search for medium -category POIs from the POI tourism information MySQL DB table of the smart tourism information system and provides them to the user. The user checks the POI tourism information and selects the POI tourism information necessary for creating his travel itinerary. The user can create his travel itinerary using the selected POI tourist information in the My Travel Itinerary menu.

3. Personal Smart Travel Planner Service

Smart tourism provides the personal travel planner service and context-aware tour guide service. In this paper, we propose the personal smart travel planner service that creates my travel itinerary using the smart

tourism apps and the smart tourism service platform. Figure 3 shows the process of creating my travel itinerary in the personal smart travel planner service. Users can use the tour guide service using geotagging storytelling contents in my travel itinerary and modifying the travel itinerary during the trip. Creating my travel itinerary in the personal smart travel planner service is performed through the following process:

- (1) Select POIs using the Tourist Attractions, Accommodation, and Chatbot menus
- (2) Select recommended travel products from the Best Tour Packages menu
- (3) Create my travel itinerary using the selected recommended travel product and POIs
- (4) Modify the travel itinerary while using the tour guide service during trip
- (5) The User can register his travel itinerary after the trip as a recommended travel product.

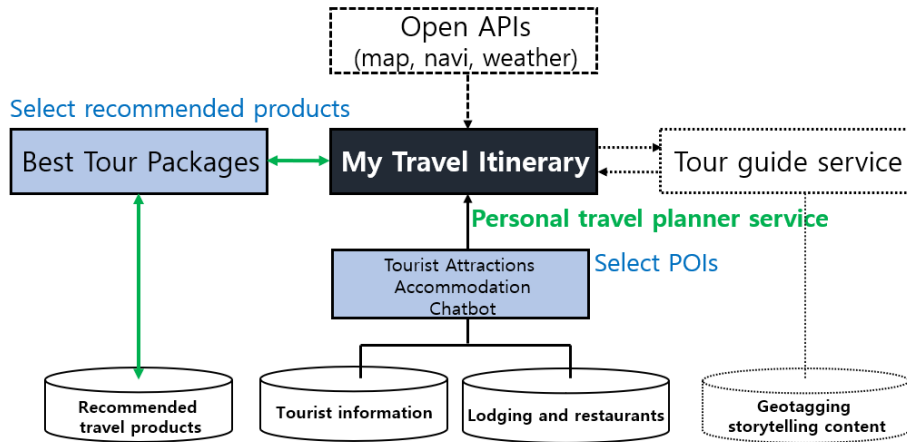


Figure 3. The personal smart travel planner service

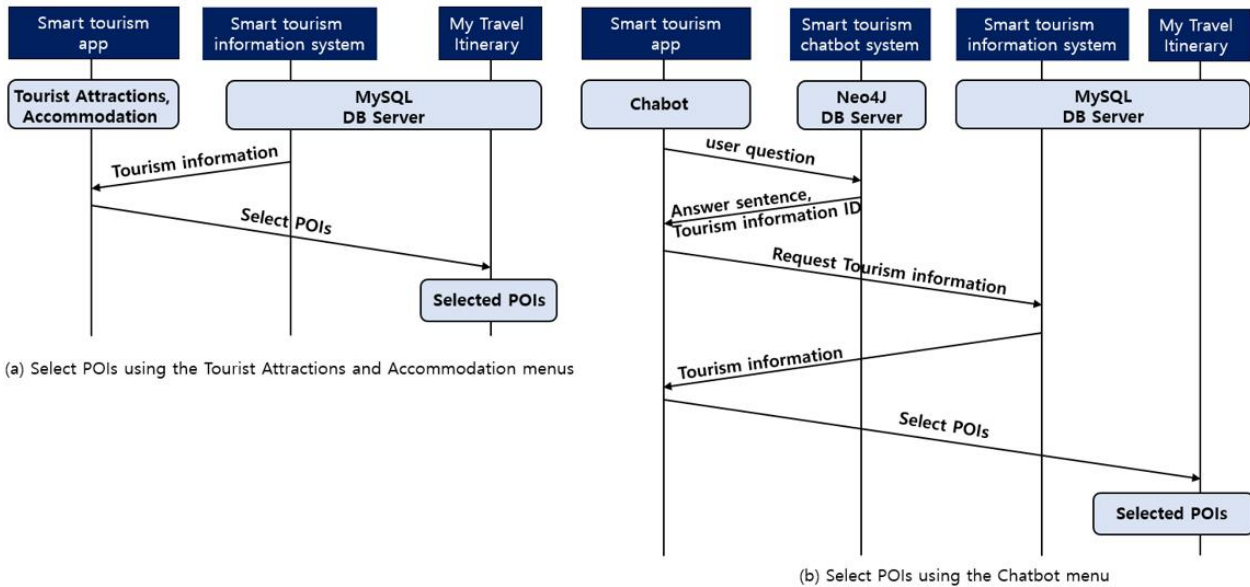


Figure 4. Procedure for selecting POIs in the smart tourism app

3.1 Select POIs using the smart tourism app

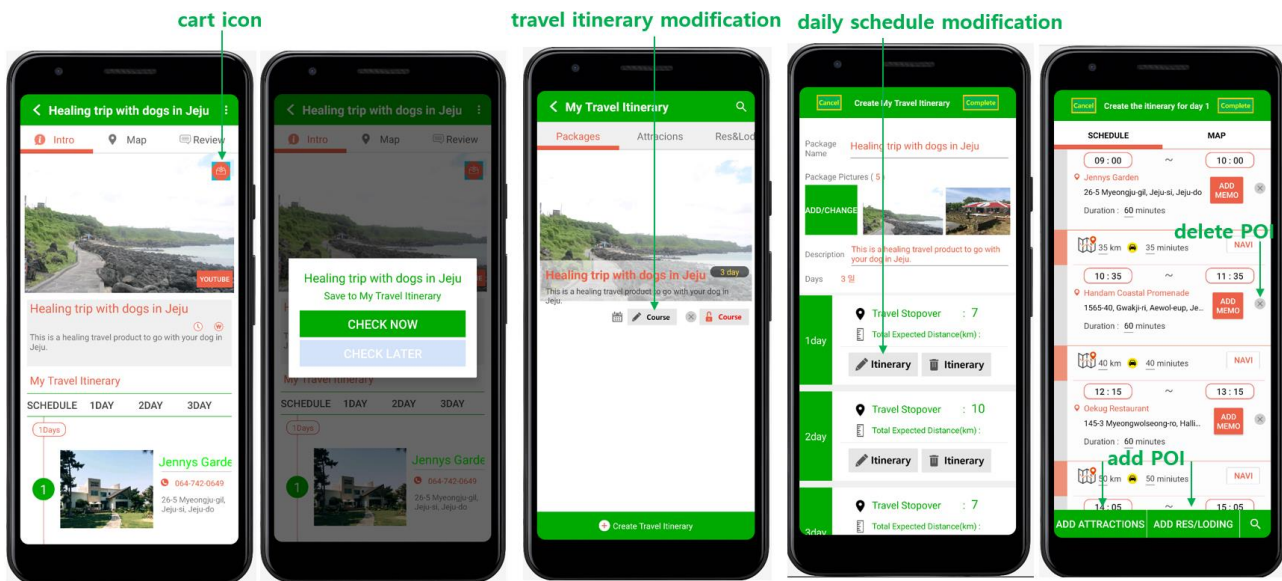
Users can check POI tourist information and select POIs to create their travel itinerary using the Tourist Attractions, Accommodation, and Chatbot menus as shown in Fig. 1. Users can also check the selected POIs in the My Travel Itinerary menu. Figure 4 shows the procedures for selecting POIs in the smart tourism app. The smart tourism information system provides POIs stored in the POI tourist information, lodging and

restaurants MySQL DB tables to a user through the Tourist Attractions and Accommodation menus of the smart tourism app as shown in Fig. 4(a). The user checks the POI tourist information provided by the smart tourism information system and selects POIs using the cart icon to create my travel itinerary. The user can also select POIs using the Chat menu as shown in Figure 4(b). The smart tourism chatbot system identify the intent of the user's question using NER and DST models, retrieves the POI ID from the tourism information knowledge base of Neo4J graph DB, and delivers it to the Chatbot menu. The Chatbot menu searches POIs using the POI ID in the MySQL DB of the smart tourism information system and provides them to the user. The user checks POI tourist information and selects POIs to create his travel itinerary. The P POI tourist information includes duration, fees, etc. required to create my travel itinerary.

3.2 Creating My Travel Itinerary using the Selected Recommended Travel Product

The Best Tour Packages menu provides recommended travel products created by travel experts, local guides, and other users. Users can easily create their own travel itinerary using the selected recommended travel products. Figure 5 shows the process of selecting a recommended travel product using the cart icon in the Best Tour Packages menu and creating my travel itinerary in the My Travel Itinerary menu. Users can select recommended travel products using the cart icon in the Best Tour Packages menu as shown in Fig. 5(a). The user selects a travel itinerary by referring to POIs, map view, and review of the recommended travel product. The user checks the recommended travel product selected from the My Travel Itinerary menu as shown in Fig. 5(b) and modifies the travel itinerary using the procedure shown in Fig. 5(c). The user can modify the travel itinerary daily. Creating the personal travel itinerary using recommended travel products is carried out as follows:

- (1) Select a recommended travel package in the Best Tour Packages menu
- (2) Select POIs in the Tourist Attractions, Accommodation, Chatbot menus
- (3) Edit the travel itinerary using the Course and Itinerary icons in the My Travel Itinerary menu
- (4) Use the Delete, Add Tourist Attractions, and Add Restaurant/Lodging icons to delete and add OIs and move them to the desired order.



(a) select a recommended travel product (b) My Travel Itinerary menu (c) schedule modification

Figure 5. Creating my travel itinerary using the selected recommended travel products and POIs

In Figure 5(c), the user adds selected POIs to the travel itinerary using Add Tourist Attractions and Add

Restaurant/Lodging icons. The user can check POI tourist information by clicking on the POI name and view the entire travel itinerary on the map through map view. The user can write additional descriptions for POIs using the Add Memo icon. Memos about POIs written by the user can be referenced by other users when creating their travel itineraries. In the timetable of the travel itinerary, the duration in POI is automatically created by POI tourist information. In the timetable of the travel itinerary, the duration of POIs is automatically created by POI tourist information, and the distance and travel time between POIs are entered directly by the user after confirmation with a commercial navi. The user can edit the package name, pictures, and description after editing the recommended travel itinerary. Photos of the travel package are selected from photos of POIs. After traveling, the user can register his travel itinerary as a recommended travel product using the Course sharing icon in the My Travel Itinerary menu.



(a) Create Travel Itinerary icon

(b) add POIs

(c) create the travel Itinerary

Figure 6. Creating my travel itinerary using the selected POIs

3.3 Creating My Travel Itinerary using the Selected POIs

Users can create their travel itinerary using only selected POIs without using recommended travel products. Figure 6 shows the process of creating my travel itinerary using the selected POIs in the My Travel Itinerary menu. The user creates his travel itinerary using the Create Travel Itinerary icon. The travel itinerary is created daily and the selected POIs are added to the travel itinerary using Add Tourist Attractions and Add Restaurant/Lodging icons. In the travel itinerary, the timetable is created in the same way as when creating a travel itinerary by modifying the selected recommended travel product. After creating the travel itinerary, the user adds package name, pictures, and description to create his travel itinerary as shown in Fig. 6(c). During the trip, the user uses the tour guide service according to the travel itinerary, modifies the travel itinerary, and registers it as a recommended travel product to acquaintances after the trip.

4. Conclusions and Further Study

Individual tourists can easily and conveniently use personal smart travel planner services and tour guide services using smart tourism services. In this paper, we propose the personal smart travel planner service that creates my travel itinerary using the smart tourism app. We have been developed the smart tour information system and the smart tour chatbot system to provide smart tourism services to users. The smart tour information system provides smart tourism app services and the smart tour chatbot system provides smart tourism chatbot services to users. The smart tourism app provides recommended travel products and POI tourist information so that users can easily create their own itinerary. The user selects travel products and POIs to create my travel itinerary while checking the recommended travel products and POI tourist information. The user can conveniently select POIs using the smart tourism chatbot service. The user can modify their travel itinerary while using the tour guide service according to the travel itinerary. After traveling, the user can register and provide his travel itinerary as a recommended travel product to other users, including acquaintances. The personal smart travel planner service proposed in this paper can provide various recommended travel products experienced by users. In the future, we plan to provide personal smart travel planner services using the smart tourism chatbot system. The smart tourism chatbot service that uses the NER and DST models will allow users to create their travel itinerary. We are also developing a tourism information QA service using the NER and koBigBird models without using a generative AI model.

ACKNOWLEDGEMENT

This research was also supported by the 2023 scientific promotion program funded by Jeju National University.

References

- [1] R. Jafri, A. S. Alkhunji, G. K. Alhader, H. R. Alrabeiah, N. A. Alhammad and S. K. Alzahrani, "Smart Travel Planner: A mashup of travel-related web services," 2013 International Conference on Current Trends in Information Technology (CTIT), Dubai, United Arab Emirates, pp.181-185, 2013. doi: 10.1109/CTIT.2013.6749499.
- [2] G. D'Aniello, M. Gaeta and M. Z. Reformat, "Collective Perception in Smart Tourism Destinations with Rough Sets," 2017 3rd IEEE International Conference on Cybernetics (CYBCONF), Exeter, UK, pp.1-6, 2017. doi: 10.1109/CYBConf.2017.7985765.
- [3] A. B. Osmond, S. H. Supangkat and F. Hidayat, "Design and Implementation of Smart Trip Planner," 2019 International Conference on ICT for Smart Society (ICISS), Bandung, Indonesia, pp.1-4, 2019. doi: 10.1109/ICISS48059.2019.8969814.

- [4] KiBeom Kang, JeongWoo Jwa, SangDon Earl Park, "Smart Audio Tour Guide System using TTS", *International Journal of Applied Engineering Research*, pp.9846-9852, 2017. https://www.ripublication.com/ijaer17/ijaerv12n20_81.pdf
- [5] JeongWoo Jwa, "Development of personalized travel products for smart tour guidance services", *International Journal of Engineering and Technology*, vol. 7, no. 3, pp.58-61, 2018. doi: 10.14419/ijet.v7i3.33.18524
- [6] Hyun-Ji Cho, Jin-Yi Lee, Tae-Rang Park, Jeong Woo Jwa, "React Native and Android Mobile Apps for Smart Tourism Information Service to FITs", *The International Journal of Internet, Broadcasting and Communication*, vol.14, no.2, pp.63-69, 2022. <https://doi.org/10.7236/IJIBC.2022.14.2.63>
- [7] Dong-Hyun Kim, Hyeon-Su Im, Jong-Heon Hyeon, Jeong-Woo Jwa, "Development of the Rule-based Smart Tourism Chatbot using Neo4J graph database", *International Journal of Internet, Broadcasting and Communication*, Vol.13, No.2, pp179-186, 2021. <https://doi.org/10.7236/IJIBC.2021.13.2.179>
- [8] Myeong-Cheol Jwa, Jeong Woo Jwa, "Development of Tourism Information Named Entity Recognition Datasets for the Fine-tune KoBERT-CRF Model", *International Journal of Internet, Broadcasting and Communication*, Vol.14, No.2, pp55-62, 2022. <https://doi.org/10.7236/IJIBC.2022.14.2.63>
- [9] Myeong-Cheol Jwa, Tae-Seung Ko, Byeong-Joo Kim, Jeong-Woo Jwa, "Tourism Information Multi-domain Dialogue State Tracking Datasets for Smart Tourism Chatbot", *International Journal of Intelligent Systems and Applications in Engineering*, vol.10, no.1S, pp.192-196, 2022. <https://ijisae.org/index.php/IJISAE/article/view/2256/839>
- [10] Ko, Tae-Seung, Jwa, Myeong-Cheol, Jwa, Jeong-Woo, "Tourism Information QA Datasets for Smart Tourism Chatbot", *International Journal of Membrane Science and Technology*, vol. 10, pp.243-2481, 2023. doi: 10.15379/ijmst.v10i1.1451
- [11] H. -C. Kang, K. -B. Kang, D. -H. Kim, M. -C. Jwa, T. -S. Ko and J. -W. Jwa, "Smart tourism chatbot system using Multi-domain Tourism Information DST," 2023 Fourteenth International Conference on Ubiquitous and Future Networks (ICUFN), Paris, France, pp.608-612, 2023. doi: 10.1109/ICUFN57995.2023.10200288.
- [12] Hoon-chul Kang, Myeong-Cheol Jwa, Jeong-Woo Jwa, "The task-oriented Smart Tourism Chatbot Service", *International Journal of Membrane Science and Technology*, Vol. 10, No. 4, pp235-243, 2023. <https://cosmoscholars.com/phms/index.php/ijmst/article/view/1888/1221>