

Making a Prototype of Seoul Historical Sites Chatbot Using Langchain

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Submitted: 2024, Jan 09; Accepted: 2024, Feb 02; Published: 2024, Feb 22

Citation: Suh, J. Y., Kwak, M., Kim, S. Y., Cho, H. (2024). Making a Prototype of Seoul Historical Sites Chatbot Using Langchain. *J Electrical Electron Eng*, 3(1), 01-05.**Abstract**

In this paper, we are going to share a draft of the development of a conversational agent created to disseminate information about historical sites located in the Seoul. The primary objective of the agent is to increase awareness among visitors who are not familiar with Seoul, about the presence and precise locations of valuable cultural heritage sites. It aims to promote a basic understanding of Korea's rich and diverse cultural history. The agent is thoughtfully designed for accessibility in English and utilizes data generously provided by the Seoul Metropolitan Government. Despite the limited data volume, it consistently delivers reliable and accurate responses, seamlessly aligning with the available information. We have meticulously detailed the methodologies employed in creating this agent and provided a comprehensive overview of its underlying structure within the paper. Additionally, we delve into potential improvements to enhance this initial version of the system, with a primary emphasis on expanding the available data through our prompting. In conclusion, we provide an in-depth discussion of our expectations regarding the future impact of this agent in promoting and facilitating the sharing of historical sites.

Keywords: Conversational Agent, Historical Sites.**1. Introduction**

We've become captivated by how culture and technology blend together, leading us to create a chatbot focused on exploring Seoul's historic sites in Korea. Seoul is filled with cultural gems waiting to be explored, offering deep insights into Korean heritage. The city's top-notch public transport and convenience showcase the many aspects of Korea.

In this paper, we'll talk about how we built this chatbot. We used tools like Streamlit, Langchain, and the OpenAI API. Streamlit helped us make an interactive web app that's easy to use. Langchain was key in making the chatbot understand and respond more naturally.

Next, we'll share how we developed the chatbot, blending technology with information to create a reliable guide for cultural discovery. We'll explain how we gathered and organized information from public sources, made sure the chatbot's conversations flowed logically, and polished the user interface to keep users engaged without interruptions.

Then, we'll discuss the chatbot's benefits, focusing on how it can help people learn about Korean culture, especially those new to it. We'll also talk about the challenges we faced, like limitations due to the amount of available data, and our plans to add more information.

We'll wrap up by reflecting on what this project means, like how technology can help us connect with and appreciate different cultures. We'll also write about future improvements, hoping to create a more comprehensive and immersive experience that covers a wide range of cultural aspects.

Our goal with this paper is to shed light on the process of creating a chatbot enriched with culture and to spark discussions about using technology for wider and more inclusive cultural explorations.

2. Methods**2.1 Langchain**

At the heart of our heritage-focused conversational agent lies Langchain, the primary infrastructure for driving our natural language processing (NLP) functionalities. Langchain is a robust and efficient framework designed specifically for building conversational AI models. This enables the creation of the agent that are not only responsive but also highly skilled in comprehending and generating natural and fluent interactions.

In our endeavor, prowess of Langchain was unmistakably manifested as it gave life to the agent adept in navigating the cultural tapestry of Seoul's heritage sites. This framework conferred the agent with an acute sense of understanding, transforming user queries into coherent, context-rich dialogues.

Beyond mere response generation, Langchain's architecture delves deep into the intricacies of conversation, mastering user intent recognition, context management, and eloquent response formulation.

2.2 Streamlit

Streamlit is a prominent tool in web application development, particularly when integrating data science and machine learning. As an open-source library built on Python, Streamlit is distinguished by its straightforwardness, enabling swift and efficient creation and launch of web applications.

Our application utilized Streamlit to develop a visually appealing and interactive interface for the agent. Streamlit efficiently integrated the natural language processing capabilities provided by Langchain. As a result, the platform offers real-time conversations, easy-to-use input fields, and an engaging display. Essentially, Streamlit enhanced the interface of the system, making it user-friendly and improving the overall user experience.

The combination of Langchain's advanced conversational AI capabilities with Streamlit's web development and user-friendly.

2.3 OpenAI API

The OpenAI API, an essential tool in today's AI development, was crucial in enhancing capabilities of the agent. With the help of advanced language models like GPT-4 from this API, created answers are much more natural and fluent. As a result, the agent doesn't just give basic information, but it offers detailed and thoughtful responses.

We made significant use of the API, taking full advantage of its advanced language understanding. If users wrote their question to the chatbot, the API carefully analyzed and used this information to create a tailored answer. Additionally, the ability of the API let the agent to understand and communicate in multiple languages which it can cater various input available, making them feel welcomed and understood.

By integrating the OpenAI API into our project, we've developed a digital cultural chatbot that can understand different languages and provide tailored experiences for users.

3. Structure

In this section, we will explain how we built the conversational agent. Its main purpose is to provide accurate information about historical sites in Seoul, especially their names and brief location details. This information is sourced from a specially prepared data file that lists Seoul's heritage in English (Choe Dohui (2016)). The functioning of the agent can be visualized in the image that follows.

The image illustrates how the agent works.

When users ask questions, the system uses both Langchain and the OpenAI API to understand and process these inquiries. It then matches the questions with the relevant information from the given data file and creates a clear answer. This answer is then shown to the user through an interface created with Streamlit. This setup allows the agent to provide immediate and relevant answers, ensuring a smooth and informative conversation with users.

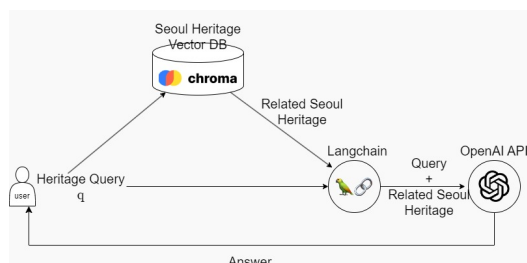


Figure 1: The Overall Structure of the Conversational Agent

Let's break down the components, starting with the data. The data file has details about heritage sites in Seoul, all written in English. The given data is main source of knowledge, providing names and locations of the heritage sites. This information is then converted into a vector form and is saved in a Chroma database.

We utilize the GPT-4 model from OpenAI API and set it up using a template from Langchain, giving it a guideline on how it should interact. By combining advanced language model of OpenAI with Langchain, agent can better understand and produce accurate responses. This results in conversations where the agent clearly understands what users are saying and replies in a relevant and meaningful way.

We've used Streamlit to launch the agent, which gives users a simple and interactive way to communicate with it. Streamlit combines the chat features we built with Langchain and the

OpenAI API to create a single platform where users can interact smoothly with the conversational agent.

We've woven together Streamlit, Langchain, and the OpenAI API to create the foundation of the dialogue system. This combination allows users to easily obtain information about Seoul's heritage sites. Below is a glimpse of what interacting with the agent looks like.

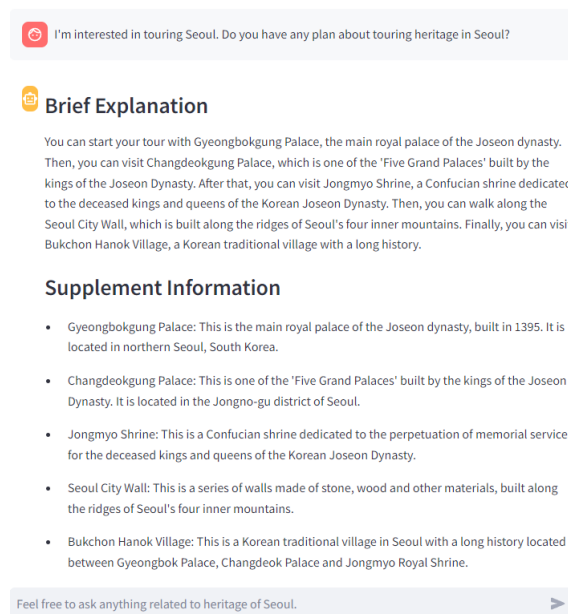
4. Discussion

Our exploration into the chatbot designed to share knowledge about Seoul's historical sites reveals both the strengths of modern technology and the constraints of its data sources. This chatbot creates an engaging experience, making it easier and more approachable for people unfamiliar with Seoul's history to learn about it.

We've made the chatbot more user-friendly by incorporating advanced technologies like Streamlit and Langchain. These tools do more than just make the chatbot look good; they ensure

interactions are smooth and easy for everyone. At the heart of this chatbot is a complex natural language

Tour plan of Seoul Heritage



I'm interested in touring Seoul. Do you have any plan about touring heritage in Seoul?

Brief Explanation

You can start your tour with Gyeongbokgung Palace, the main royal palace of the Joseon dynasty. Then, you can visit Changdeokgung Palace, which is one of the 'Five Grand Palaces' built by the kings of the Joseon Dynasty. After that, you can visit Jongmyo Shrine, a Confucian shrine dedicated to the deceased kings and queens of the Korean Joseon Dynasty. Then, you can walk along the Seoul City Wall, which is built along the ridges of Seoul's four inner mountains. Finally, you can visit Bukchon Hanok Village, a Korean traditional village with a long history.

Supplement Information

- Gyeongbokgung Palace: This is the main royal palace of the Joseon dynasty, built in 1395. It is located in northern Seoul, South Korea.
- Changdeokgung Palace: This is one of the 'Five Grand Palaces' built by the kings of the Joseon Dynasty. It is located in the Jongno-gu district of Seoul.
- Jongmyo Shrine: This is a Confucian shrine dedicated to the perpetuation of memorial services for the deceased kings and queens of the Korean Joseon Dynasty.
- Seoul City Wall: This is a series of walls made of stone, wood and other materials, built along the ridges of Seoul's four inner mountains.
- Bukchon Hanok Village: This is a Korean traditional village in Seoul with a long history located between Gyeongbok Palace, Changdeok Palace and Jongmyo Royal Shrine.

Feel free to ask anything related to heritage of Seoul. >

Figure 2: A Sample Result of the Conversation between the User and the Agent

Understanding system that facilitates conversations that are not only informative but also engaging. However, there's a catch: the chatbot depends on publicly available data, which has its limits. This reliance means it can only share as much as the data it has access to, which might not cover all of Seoul's historical sites comprehensively. Important places could be missed, or the stories told could be less detailed, affecting the chatbot's effectiveness.

Accuracy is another hurdle. The chatbot's ability to process and respond in natural language can sometimes be hampered by incomplete data, leading to responses that might be too general or incorrect. It's important for users to double-check the information provided by the chatbot, especially if they're looking for detailed and specific insights.

Delving deeper into discussions about particular historical

sites presents additional challenges. Our data mainly lists the names and locations of sites. To make conversations flow better with this limited information, we use techniques like crafting prompts that encourage the chatbot to engage with the data in a conversational manner. For example, we might use a prompt like "Make conversation with the dataset," where "dataset" refers to a file containing key information like site names and locations in English, helping to bridge the gap between the data we have and the rich conversations we aim to facilitate.

To generate smoother conversations from this limited data, we employ prompts such as "Make conversation with the dataset" as shown below, where "dataset" denotes a file with keys like "main_key", "h_eng_dong", "h_eng_gu", "name_eng", and "h_eng_city". Below is an example about the explanation wrote above?

Sure, let's have a conversation using the dataset you provided about various places in Seoul. Here's a conversation:

User: Hi, I'd like to learn more about some places in Seoul. Can you tell me about a place in Jongno-gu?

AI: Of course! There are several places in Jongno-gu, Seoul. One notable place is "Gajeongdang" located in Jongno12.3.4ga-dong. It's a historic site with an interesting name. Would you like to know more about it?

User: Yes, please tell me more about Gajeongdang.

AI: Gajeongdang is a cultural site in Seoul, specifically in Jongno-gu. It's known for its historical significance and unique architecture. It's a great place to explore if you're interested in Korean history. Is there anything else you'd like to know about Seoul?

User: Sure, tell me about another place, maybe in Gangnam-gu.

AI: How about "Tomb of Prince Gwangpyeong" in Irwonbon-dong, Gangnam-gu? It's a place with a rich history. Would you like to know more about it?

User: Yes, please tell me about the Tomb of Prince Gwangpyeong.

AI: The Tomb of Prince Gwangpyeong is a significant historical site in Seoul, located in Irwonbon-dong, Gangnam-gu. It's associated with Prince Gwangpyeong, and it provides insights into Korean royal history. If you're interested in royal tombs and history, it's definitely worth a visit. Is there anything else you'd like to explore?

Figure 3: A Result of Conversation Generation with "Make Conversation with the Dataset" Prompt

The subsequent interactions, as delineated below, guide users on prompts that elicit more comprehensive discussions. For instance, after an introductory inquiry about Seoul's heritage, the agent can suggest related prompts to enrich the dialogue. So, the user can save time with prompts when continuing the conversation. Still, there remains a risk of truncated or

unsatisfying exchanges. To mitigate this, we gave prompts like "Suggest further questions on Seoul's heritage". The results, as showed below, propose relevant questions rooted in the dataset, assisting particularly novice users unsure of the dialogue's progression.

suggest further questions on Seoul's heritage.

Certainly! Here are some further questions related to Seoul's heritage that you can explore:

1. What are the most significant historical events associated with Seoul, and how have they influenced the city's heritage?
2. Are there any endangered or at-risk heritage sites in Seoul, and what measures are being taken to preserve them?
3. Can you provide insights into the architectural styles that have shaped Seoul's heritage over the years?
4. How has Seoul's cultural heritage evolved and adapted to modern times while preserving its historical essence?
5. Are there any specific cultural practices or traditions that are closely tied to Seoul's heritage?
6. What role does Seoul's heritage play in attracting tourists and fostering cultural exchange?
7. Can you highlight any recent restoration or conservation projects related to Seoul's heritage sites?

Figure 4: A Sample Response with "Suggest Further Questions on Seoul's Heritage." Prompt

5. Conclusion

In conclusion, we've developed a prototype of a chatbot designed specifically for those unfamiliar with Seoul's historical landmarks. Utilizing the OpenAI API, integrated with the Langchain framework and Streamlit's interactive development capabilities, we've crafted an agent that not only delivers pertinent information but does so through an intuitive and user-friendly interface [1-6].

The synergy of these cutting-edge technologies ensures that the chatbot is both informative and adaptable. The OpenAI API provides a solid foundation for understanding and addressing user inquiries, Langchain helps overcome language barriers, and Streamlit offers a responsive interface that meets the varied needs of its users. While the fusion of these technologies represents a notable accomplishment, we recognize the potential for ongoing enhancements and optimizations.

Reflecting on our journey and the creation of the prototype, we are filled with optimism for its future prospects. Our hope is for this agent to transcend its role as a technological innovation, becoming a symbol of hospitality. We imagine it as a continuously evolving tool, mirroring the vibrant and ever-unfolding story of Seoul's cultural legacy.

References

1. Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., & Amodei, D. (2020). Language models are few-shot learners. *Advances in neural information processing systems*, 33, 1877-1901.
2. Harrison Chase. (2022). Langchain.
3. Lombardi, M., Pascale, F., & Santaniello, D. (2019). An application for Cultural Heritage using a Chatbot. In *2019 2nd International Conference on Computer Applications & Information Security (ICCAIS)* (pp. 1-5). IEEE.

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4. OpenAI, R. (2023). Gpt-4 technical report. arxiv 2303.08774. *View in Article*, 2, 13.
 5. Sperli, G. (2021). A cultural heritage framework using a deep learning based chatbot for supporting tourist journey. *Expert Systems with Applications*, 183, 115277.
 6. Wang, Y., Kordi, Y., Mishra, S., Liu, A., Smith, N. A., Khashabi, D., & Hajishirzi, H. (2022). Self-instruct: *Aligning language model with self generated instructions.*

Language Resource References

Choe Dohui. 2016. *Current status of historical sites in Seoul (English)*. Seoul Tourism & Sports Bureau Tourism Industry Division.

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