

A Study on the Use of Chatbot Model in Knowledge Service Consulting

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Abstract

Background/Objectives: In this study, a model study was conducted to introduce Chatbot, which is being introduced by governments and companies through the use of artificial intelligence, into the knowledge consulting industry.

Methods/Statistical analysis: In this research analysis, we analyze how Chatbot, which is being utilized in various fields, thinks about its utilization through portal and social SNS text mining and sentiment analysis when utilized for knowledge consensus. The analysis software used the Python Ver3.8 and Textom Ver.4.5 programs, which were analyzed by scrolling through portal text for three months at Google, Naver, and Daum.

Findings: Chatbot is divided into Q&A chatbot and AI-based counseling chatbot.

Technical factors include pattern recognition, natural language processing, semantic web, text mining, and situation recognition computing. These two conditions were identified and the study was conducted.

The construction process of the Chatbot consists of user scenario definition - pre-registration - pattern registration - exception processing - query registration.

Six indicators for evaluating the performance of the Chatbot were collected by scrolling through three months of data based on Comprehensive Capabilities, User engagement, Speed,

Functionality, Interoperability, and Scalability.

In order to introduce knowledge services to Chatbot, the core of chatbot accuracy can be seen as driving various algorithm tasks countless times to increase accuracy by 90%. The purpose of the service, such as which knowledge consulting tasks the chatbot will replace, was also set at the consulting stage and a knowledge consulting chatbot model was derived.

Improvements/Applications:

The most important thing in building knowledge consulting chatbots is response rate and accuracy. It should be designed according to the purpose of the service through text mining, etc.

Keywords: Chatbot, AI, IOT, Consulting, Knowledge, recognition technology.

1. Introduction

The international community, including Korea, became interested in various IT technologies as non-face-to-face activities due to Corona 19 increased, and attracted attention to big data and artificial intelligence technologies. There have been times when artificial intelligence technology has attracted great attention twice in the past, but it did not cause industrial, social, technological, and ripple effects. However, in the current panthermic situation caused by corona, these technologies are necessary and the related industries.

It is evaluated that many of the underlying technologies and elements necessary for growth have been developed.

All aspects of artificial intelligence technology can be fostered because the technological environment is rapidly developing. Just as humans need learning materials in various fields to develop intelligence, artificial intelligence.

This is because a large amount of data is required to develop, and Internet of Things (IoT) technology is an important foundation for the formation of artificial intelligence-related industries. Internet of Things (IoT) technology, which connects people to things and between things and things based on data, provides an environment in which data required to develop artificial intelligence can be collected smoothly.

Also, due to the development of computer hardware, the advancement of server and CPU technology that can process a large amount of data is also evaluated as an important factor driving artificial intelligence technology. This is because the universalization of high-performance computer technology capable of high-speed parallel processing is also an important factor in order to learn a large amount of data.

In addition, cloud computing technology that can process information using other people's computers through the Internet provides an environment that can process large amounts of data beyond the limitations of individual computers.

5G technology, a giga-class wireless Internet technology that is at least 20 times faster than 4G LTE, has opened the possibility to receive large amounts of data smoothly in real time. Related industries As the foundation element that can be formed, related artificial intelligence in earnest as the front and rear technologies and industries related to artificial intelligence are matured. The industry is expected to grow significantly.

Chatbots are software agents that use interactive interfaces to interact with users.[1]

One of the keys to the non-face-to-face trend is digital transformation. In many cases, existing built-in systems are moved to the cloud or AI is introduced to increase work efficiency. Among these, chatbots, which are representative of AI, are also not irrelevant to this non-face-to-face trend.

2. Materials and Methods

2.1. Related Works

Chatbot refers to 'artificial intelligence-based communication software' that provides answers to questions or related information through text conversations with people.[2]

Chatbot-related businesses are introduced by many institutions and companies using artificial intelligence.

Chatbots, systems that can use natural language to interact with humans in a more appropriate way, are becoming more and more important. This is because the availability of computational means for natural language interactions between computers and humans is getting closer only to interactions between humans. As a result, more and more chatbots are helping humans organize tasks or make decisions. [3]

Digital technical services such as chatbots are also combined with human service staff to satisfy digital users[4]

On the medical side, when a patient is exposed to COV-19, it recommends immediate action and designs sophisticated artificial intelligence (AI) chatbots for diagnostic evaluation purposes.[5]

According to a report by Grandview Research, a domestic chatbot market research firm surveyed by Conan Technology[6], the global chatbot market, which stood at \$190 million in 2016, is

expected to grow 24.3% annually to form \$1.23 billion in 2025.[7] According to Conan Technology's own survey, the domestic market is expected to expand to 34 billion won this year, growing 51% annually by next year.

The fact that chatbot construction cases are coming out one after another from the public and the private sector supports Conan Technology's outlook. Recently, Incheon International Airport Corporation established three types of AI chatbots, and the Military Manpower Administration opened the AI chatbot "Ara" for real-time civil service counseling.[8]

Chatbot construction is actively taking place not only in public institutions but also in private companies. Kakao Enterprise has established a non-face-to-face consultation chatbot in Kyobo Life Insurance, and Korea Southern Power has established a messenger-based interactive chatbot system to provide services to executives and employees. In addition, Microsoft has unveiled its "healthcare bot," a chatbot that can get information about Corona 19. Chatbots are also being used to support social crimes. Korea Communications Standards Commission established 'Digital Sex Crime Information Reporting and Counseling Talk', which is an AI chatbot counseling service.

Shinhan Bank has combined RPA technology with its AI chatbot 'Molly' to automate the entry of financial statements. When an employee at a branch enters the company's business number and financial statement issuance number in the chatbot AI Molly, the RPA automatically enters data by inquiring the information of the National Tax Service. When the input is completed, a notification message is sent to the applicant so that they can start their follow-up work.

The automation process not only saves time for employees to input data themselves, but also eliminates work errors that can be caused by incorrect numbers. It is said that the burden on employees of stores, which are concentrated on Covid-19 financial support and corporate credit rating, has been greatly reduced.

Like this, chatbot service has been developed into a hybrid form that uses scenario format and machine learning format. In line with this, public institutions are building chatbots that combine text, images, voice or new technologies. Chatbot is no longer just a "bot" but an "emotional secretary" and is also evolving to serve as a "friend" who can even touch user emotions.

2.2. Proposed Method

Chatbots are mostly used in counseling services and are generally divided into Q&A chatbots without artificial intelligence and counseling chatbots based on artificial intelligence.

Table 1: Chatbot Type Table

division	Q&A chatbot	AI counseling chatbot
Conversati on	(One-way information delivery) It can only answer user questions, Additional supplementation is difficult	(Interactive information exchange) The conversation agent takes the initiative . Repeat the question-and-answer process to compensate for insufficient information
Provide in formation	(Providing comprehensive information) Because it provides only general informati on You need to judge whether the information is right for you	(Provide customized information) User's situation information through conv ersation Recognize and provide appropriate infor mation to users
Informatio n acquisiti on	(Users lead their own questions) Users want to get information that is right f or them. Repeat the process of creating questions an d finding answers	(Expert help through conversation) Even users without knowledge Quick and easy access to the information you want with a guide

Text-based chatbot services are mainly used for pattern recognition, natural language processing, semantic web, text mining, context-aware computing technologies, and recently improved computing power and artificial intelligence, big data. [9]

The development of processing technology has made it easier to use technology.[10] In particular, natural language processing technology, which is the core technology of chatbot, is carried out in stages with basic language processing, deep language processing, keyword and related word extraction.

Table 2: Technical Elements of Chatbot

Core Technology	Details
Pattern recognition	Identifying shapes, letters, voices, etc. by machine.

Natural language processing	Includes information retrieval, Q&A, system automatic translation, interpretation, etc.
Semantic Web	Next-generation intelligent web where computers can understand the meaning of information resources and even make logical reasoning.
Text Mining	The process or technique of finding new and useful information from unstructured textual data
Context-aware computing	Providing intelligent user-centered services by informing the reality of the situation in virtual space

Referring to chatbots used by governments, companies, educational institutions, etc., we would like to build a service conceptual chart for use in knowledge consulting and create a model through text mining analysis.

The construction process of the Chebot consists of user scenario definition - pre-registration - pattern registration - exception processing - query registration.

Six indicators for evaluating the performance of a Chabot.[11]

1. Compensation capabilities (chatbot understanding) :Chatbot autocorrects if a user has spelling errors or errors about a sentence.
2. User engagement: Must be able to interact to share information with users.
3. Speed: Quickly respond to information by integrating with databases when building chatbots.
4. Functionality: Provide users with navigation tools and have them interested in a variety of features.
5. Interoperability: Chatbots should be distributed across a variety of channels, allowing users to get a lot of results on a variety of channels.
6. Scalability: The chatbot must be designed to be scalable, including multiple user usage and additional modules.

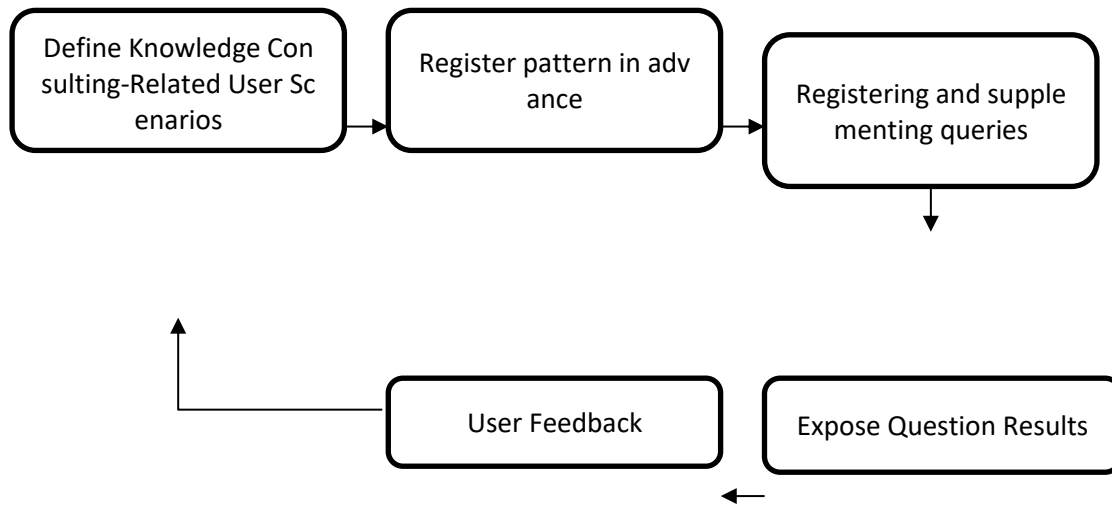


Figure 1. Knowledge Consulting Chatbot Model

3. Results and Discussion

In this research analysis, we analyze how Chatbot, which is being utilized in various fields, thinks about its utilization through portal and social SNS text mining and sentiment analysis when utilized for knowledge consensus. The analysis software used the Python Ver3.8 and Textom Ver.4.5 programs, which were analyzed by scrolling through portal text for three months at Google, Naver, and Daum.

Table 3 : Word frequency

Channel	Sections	Collection(Word)	measure of capacity
Naver	Web documents	1,000	596 KB
	Blog	85	28 KB
	News	136	58 KB
	Cafe	30	9 KB
	intellectual	1	5 KB
Daum	Web documents	52	20 KB
	Blog	53	17 KB

	News	34	11 KB
	Cafe	4	1 KB
Google	Web documents	1,000	621 KB
	Blog	95	46 KB
	Facebook	115	43 B

The number of pages in which the words for knowledge consulting and Chebot are mentioned on portals and SNS, in the order of web documents and news. There has been a lot of mention. Consulting and Chabot were the fifth most frequently mentioned pages, with analysis of the frequency with which two words were linked.

Table 4 : N-gram box

Word 1	Word 2	frequency
Fit	consulting	380
consulting	A. I	289
A. I	Chatbot	220
A. I	relation	198
consulting	Chatbot	196

We analyze the correlation coefficients between words after extracting them through text mining.

Table 5 : Correlation coefficient table

(1-mode)	Cons	Chatb	Knowl	Artificia	Profes	Consul	job	Servic	manag	Justif	Exper	Smar
Correlati	ulting	ot	edge	l	sional	tant		e	ement	y	t	t
on				intellige								
coefficie				nce								
nt												
Consulti	-	0.01	0.16	0.06	0.02	0.28	0.11	0.14	0.22	0.23	0.29	0.11

ng												
Chatbot	0.01	-	0.02	0.35	0.30	0.06	0.10	0.25	0.05	0.04	0.40	0.23
Knowledge	0.16	0.02	-	0.09	0.11	0.18	0.17	0.09	0.17	0.18	0.15	0.47
Artificial intelligence	0.06	0.35	0.09	-	0.16	0.03	0.31	0.00	0.04	0.02	0.36	0.09
Professional	0.02	0.30	0.11	0.16	-	0.42	0.06	0.29	0.02	0.02	0.29	0.61
Consultant	0.28	0.06	0.18	0.03	0.42	-	0.11	0.18	0.50	0.62	0.16	0.06
job	0.11	0.10	0.17	0.31	0.06	0.11	-	0.19	0.20	0.42	0.19	0.02
Service	0.14	0.25	0.09	0.00	0.29	0.18	0.19	-	0.38	0.15	0.18	0.21
management	0.22	0.05	0.17	0.04	0.02	0.50	0.20	0.38	-	0.44	0.15	0.21
Justify	0.23	0.04	0.18	0.02	0.02	0.62	0.42	0.15	0.44	-	0.18	0.24
Expert	0.29	0.40	0.15	0.36	0.29	0.16	0.19	0.18	0.15	0.18	-	0.19
Smart	0.11	0.23	0.47	0.09	0.61	0.06	0.02	0.21	0.21	0.24	0.19	-

Chebot and experts had the highest correlation of 0.40.

Through sentiment analysis, 63.37% responded positively to knowledge consulting and chatbots.

Table 6. Sentiment analysis

Analysis

Division	Frequency (case)	Emotional strength ratio (%)	Frequency ratio (%)
Positive	609 / 961	62.72 / 100.0	63.37 / 100.0
Denial	352 / 961	37.28 / 100.0	36.63 / 100.0

In detail, 34.31% of the respondents liked it, while 33.66%, which was highly rejected.

On the bright side, the keywords "Innovative, Growing, and Grateful" were high.

Table 7. Emotional

Detail Emotional	Detail Emotional Frequency	Detail Emotional Ratio (%)
Interest	172	18.62
Likeable	336	34.31
Joy	101	9.8
Rejection	325	33.66
Sadness	21	3.34
Fear	6	0.28

Look forward to it. It's a lot of mystery.

On the negative side, there was a sense of loss, difficulty, and caution.

4. Conclusion

The technical conversation process of the chatbot before building the chatbot is divided into three categories: "Interaction," which is a user interface, "Integration," an application that converts the answers asked to the machine to understand, and "intelligence," which understands questions, manages conversations, and so on.

In the process, "interaction" and "intelligence" that face contact points with users are also important, but "interference" that increases the accuracy of chatbots by selecting quality data and teaching them. This is because repeated learning can increase the accuracy of answers to user questions.

In order to introduce knowledge services to Chebot, the core of chatbot accuracy can be seen as driving various algorithm tasks countless times to increase accuracy by 90%. Therefore, consulting is also the most important thing in the chatbot construction process. The purpose of the service, such as what tasks the chatbot will replace, will also be set at the consulting stage.

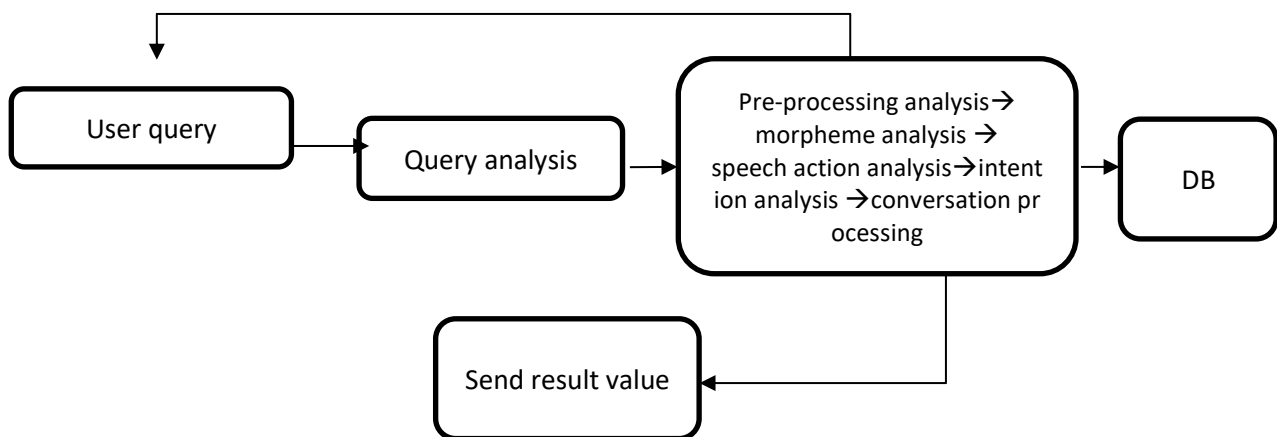


Figure 2. Knowledge Consulting Chatbot Expected Configuration Diagram

Integration is very important for Chatbot to improve the accuracy of chatbot by selecting high-quality data and providing guidance. This is because repetitive learning can increase the accuracy of the answers to user questions.

In order to introduce it to Chatbot in knowledge service consulting, the key to chatbot accuracy is to increase accuracy by driving various algorithm work countless times. Therefore, the most important thing in building a chatbot in knowledge service consulting is also the response rate and accuracy of Chatbot. Through the analysis of positive and negative reactions through text mining, emotional analysis, and topping analysis, the chatbot should be designed according to the purpose of the service, such as what tasks it will replace.

Further research projects will also require correlation and further analysis of response rules and accuracy when making knowledge service consulting a chat suit.

5. Acknowledgment

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