

Suggested social media big data consulting chatbot service for restaurant start-ups

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Abstract

The food industry has been hit hard since the first outbreak of COVID-19 in 2019. However, as of April 2022, social distancing has been resolved and the restaurant industry has gradually recovered, interest in restaurant start-ups is increasing. Therefore, in this paper, 'restaurant start-up' was cited as a key keyword through social media big data analysis using TextTom, and word frequency and cone analysis were conducted for big data analysis. The keyword collection period was selected from May 1, 2022, when social distancing due to COVID-19 was lifted, to May 23, 2023, and based on this, a plan to develop chatbot services for restaurant start-ups was proposed. This paper was prepared in consideration of what to consider when starting a restaurant and a chatbot service that allows prospective restaurant founders to receive information more conveniently. Based on these analysis results, we expected to contribute to the process of developing chatbots for prospective restaurant founders in the future

Keywords: *Chatbot, natural language processing, big data analysis*

1. Introduction

COVID-19, a respiratory disease caused by the new virus that first broke out in December 2019, has taken a heavy toll on the restaurant industry. Due to the influence of social distancing caused by COVID-19, business hours of restaurants were limited, and the number of private gatherings was also limited. Therefore, strong social distancing policies to prevent infection damage and prevent quarantine have also hit the real economy, which is very closely connected [1]. In terms of the social and economic damage of COVID-19, the restaurant

Manuscript Received: July. 5, 2023 / Revised: July. 10, 2023 / Accepted: July. 14, 2023

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industry is much larger than other industries [2]. In the case of the restaurant industry, it is an industry centered on face-to-face services, and in addition, the implementation of social distancing policies such as telecommuting, school closures, and collective prohibition has led to a decrease in people's external activities. However, as COVID-19 calms down, the government has been phasing out its social distancing policy, and as of April 15, 2022, social distancing measures due to COVID-19 have been lifted in about two years and a month [3]. As the social distancing policy was lifted, people's interest in the restaurant industry increased. According to a column by Lee Ho, a columnist for the Women's Consumer Newspaper, preference for the restaurant industry soared to 60.7%, the pre-COVID-19 level, at the start-up fair held in March 2022 [4]. As social distancing due to COVID-19 is lifted, consumers' interest in restaurant start-ups is expected to continue to increase.

Due to the recent development of artificial intelligence technology, Chatbot, an interactive artificial intelligence, is attracting attention. Among them, "Chat GPT" developed by OpenAI is leading the development of chatbot technology with huge attention in the artificial paper field [5]. Chatbot is an agent service that automatically answers simple requests or questions from chatbot users in a messenger-based environment, and was initially a simple form of providing only static answers. However, due to the development of AI technology, the optimal answer is automatically provided by analyzing users' questions [6]. Users can simply receive the necessary information in the form of question-and-answer without having to sell their own items and search for information on the Internet or include unnecessary processes such as phone calls. Microsoft, Facebook, Google, and Kakao, the world's leading ICT companies, already use messenger-based chatbot platforms and operate chatbot services that can be applied in real life. Therefore, this study aims to analyze expected questions when users use chatbot services by conducting big data analysis focusing on the frequency of searches of Naver, Google, and Daum, Korea's representative social networks. By designating "restaurant start-ups" as a representative keyword and analyzing the frequency of social network searches from May 1, 2022 to May 1, 2023, the goal is to propose a chatbot service that provides information and help to restaurant start-ups.

2. Theory

2.1 Chatbot

The concept of chatbots began in 1990 when the Internet first spread[6]. The chatbot used at that time was not a chatbot service for the purpose of providing information, but a simple conversation that provides simple fun and interest to users. At that time, chatbots were established as a service that failed to attract users' attention immediately as the limitation of storing answers to expected questions in the system and printing simple correct answers when expected questions occur was revealed. After Google developed AlphaGo in 2016, Volkswagen began to pay attention to the AI field, and as this field was recognized as a general-purpose technology, it tried to incorporate AI technology into existing services. As the AI market expands, deep running technology for AI development is applied to chatbot systems, and chatbots, which used to be simple conversations, learn a lot of data through online services and interpret desired information to provide appropriate answers based on information. Currently, chatbot service refers to artificial intelligence-based software [7] that not only provides necessary information quickly and accurately through chat with humans but also responds appropriately. With the development of artificial intelligence technology, deep learning and natural language processing technologies provide positive responses to chatbot users by interpreting strings. In addition, chatbot technology collects and learns data by accumulating time to operate it, and based on this, increases the accuracy of information [8].

2.2 Natural language processing

Natural Language Processing (NLP) is an area of artificial intelligence (AI) that allows computers to understand and process human language. Natural language processing can be divided into two categories: Natural Language Understanding (NLU) and Natural Language Generation (NLG)[9]. Understanding natural language is a technique to grasp the structure and meaning of text or speech. Through this, computers can understand people's words and sentences and perform various tasks based on their meanings. For example, search engines use natural language comprehension techniques to understand users' search terms and provide relevant information[10]. In addition, the chatbot uses natural language comprehension technology to understand users' questions and provide appropriate answers. Natural language generation is the technology of computer-generated human language. This allows the computer to write various forms of text. Machine translation, for example, uses natural language generation techniques to translate text from one language into another. In addition, the abstract machine adopts natural language generation technology to reduce long text to short text.

2.3 Big Data Analysis

The information society is rapidly changing from an institutional center of the past to a human center. This strengthens the power of social networks and uses them socially [11]. Among them, Big Data Analysis played a role in preparing for tomorrow's society. It becomes a key engine that creates opportunities. Big Data is a huge amount of atypical data that works efficiently in modern society, as the generation, collection, analysis and representation of big data develops. This enables the administration and analysis of personal information and non-integrated analyses that have not been possible so far. By analyzing large amounts of data, the focus has been on analyzing large amounts of data to capture consumers' opinions in real time and implement them in the chatbot service, so that consumers can quickly get accurate information.

3. Experiments

3.1 Analysis Method

The analysis of the study is as follows. First of all, based on the information collected using the big data analysis tool Textron, the keyword "restaurant startup" and frequency information related to the data preprocessing process are searched. Textom searches and collects data from portal sites and related keyword rankings to provide matrix information on the frequency of search keywords. Second, in order to increase the sustainability of the study, contents unrelated to "restaurant start-up" were grouped into the same keywords related to the study. In addition to 8,912 keywords, the 30 keywords most relevant and exposed to the study were connected to the portal site through set data and search frequency analysis. Finally, after visualizing the data using Ucinet6 and NetDraw, Concor analyzes the results of identifying the network from node to node and between connections. The analysis process is shown as a demonstration in [Figure 1]

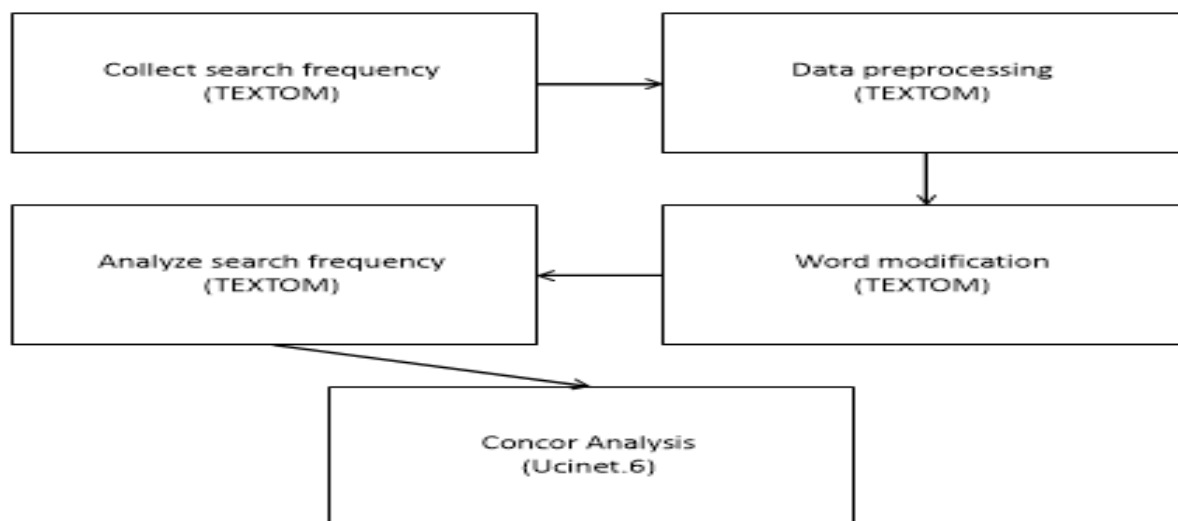


Figure 1. Analysis method

3.2 Word Frequency Analysis

Through text mining, the search frequency of the key keyword "restaurant startup" was collected from May 1, 2022 to May 1, 2023, after COVID-19, and a total of 8,912 keywords were derived except duplicate words and synonyms, and the results of 30 keywords are shown in Table 1. As a result of checking the word frequency table, the most frequently searched word was startup (11530), followed by keywords such as restaurant (7564), youth (1947), education (1689), and franchise (1388). As a result of word frequency analysis, the keywords that prospective startups consider or pay attention to when starting a business are "education," "franchise," "recruitment," and "brand," which are highly related to franchises, or franchises. After COVID-19, prospective restaurant founders are interested in franchise start-ups with relatively low safety and risk compared to individual start-ups. In addition, the most important areas to consider when opening a restaurant are fried chicken (743), delivery (528), and cafes (500), and they are more interested in fried chicken, delivery restaurants, and cafes than meat, Korean food, and Chinese restaurants.

Table 1. Word frequency analysis

WORD	FREQUENCY	WORD	FREQUENCY
Startsup	11530	Cook	720
Restaurant	7564	Food	621
Youth	1947	Success	609
Education	1689	Market	556
Franchise	1388	Item	544
Recruitment	1230	Delivery	528
Cooking	1077	Professional	528
Brand	1019	Consulting	522
Restaurant industry	1017	Preliminary	515

Founder	905	Cafe	500
Menu	869	Marketing	439
Kitchen	867	Development	431
Meal	832	Famous Restaurant	382
Dining Room	807	Open	346
Chicken	743	Cost	336

3.3 Concor Analysis

Consistency analysis is a form of cluster analysis in which nodes, or keywords, are classified into one group throughout the network structure. In this study, the key keyword of "restaurant start-up" is set to analyze the considerations of prospective restaurant start-ups through portal site search frequency, and based on this, we predict the problems that founders raised when providing chatbot services. The results of the Concor analysis are shown in Figure 2. According to [Figure 2], keywords are divided into a total of three clusters, and the first cluster has 14 keywords such as "startup," "join," "recruitment," and "brand" as startup-related keywords. In the second cluster, a total of 12 keywords such as "restaurant," "cooking," and "restaurant" were found to be highly related, while in the last cluster, keywords such as "youth," "education", "major", and "development" were highly related.

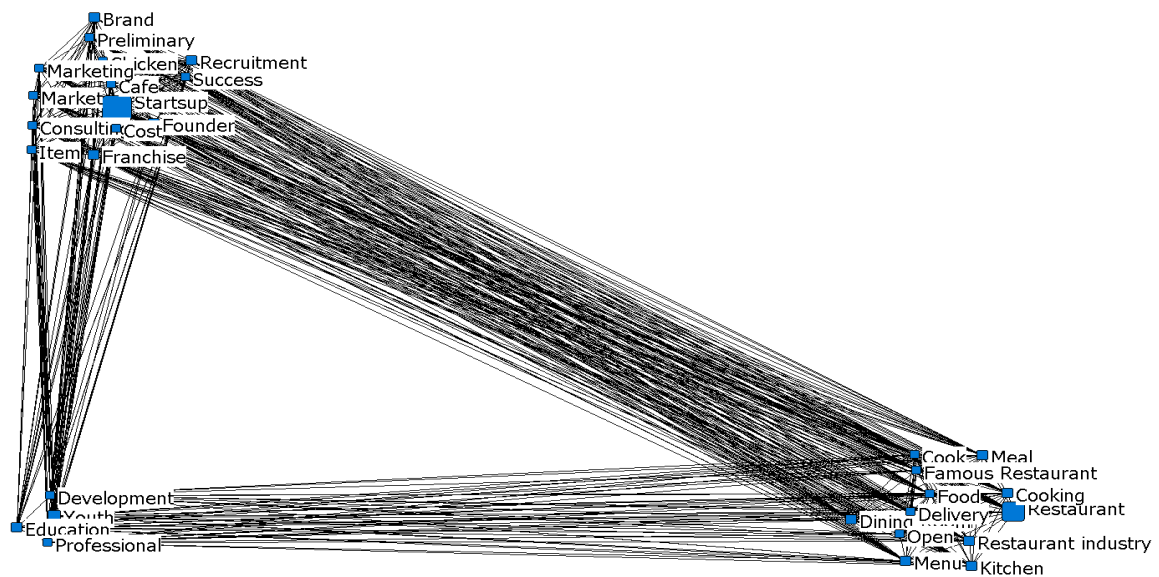


Figure 2. Concor analysis

4. Conclusion

As social distancing has eased due to the novel coronavirus infection disease and interest in restaurant startups

has increased, it is necessary to introduce a chatbot service that provides simple and accurate food startup counseling to consumers without complicated processes. As artificial intelligence grows rapidly, restaurant companies should also change according to the rapidly changing modern society. Therefore, this study proposes a restaurant startup counseling chatbot that helps restaurant start-ups.

4.1. Expected speech and entity

An utterance refers to an input sentence or part of a sentence delivered by a user to a chatbot, and an entity refers to an object name, that is, specific type information of the utterance sentence. For example, when a user sends a message saying, "I want to open a chicken restaurant," the chatbot recognizes it and acquires information with the keyword "chicken restaurant" and provides it to the user. The speech includes messages and requests that users communicate through conversations with chatbots. In other words, it can appear in many ways, such as asking questions or issuing commands. Voice consists of natural languages, and chatbots understand and generate responses using natural language processing technology. Understanding spoken sentences plays an important role in maintaining the flow of conversations between chatbots and users and meeting user needs. Therefore, processing and response programs should be prepared considering various types of voice, and in order to do so, sufficient training data should be used to learn chatbots.

5. Discussion

This study proposes a chatbot service that helps restaurant founders more conveniently challenge startups after lifting social distancing due to COVID-19. Based on big data analysis using Textom, it also designed an expected scenario for implementation based on expected voice by setting up pending voice and offline. This study shows that there is enough space to utilize big data analysis technology when designing chatbot systems through big data analysis. In addition, this study provides information that can be applied more conveniently and easily to start-ups by applying the considerations of prospective start-ups when starting a restaurant to the chatbot system through big data analysis. In this regard, the results of this study are instructive for future research on the development of a chatbot system for restaurant founders.

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