

A Study on the Analysis of Museum Gamification Keywords Using Social Media Big Data

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Abstract

The purpose of this paper is to identify keywords related to museums, gamification, and visitors, and provide basic data that the museum market can be expanded by using gamification. That used to collect data for blogs, news, cafes, intellectuals, academic information by Naver and Daum which is Web documents in Korea, and Google Web, news, Facebook, Baidu, YouTube, and Twitter for analysis. For the data analysis period, a total of one year of data was selected from April 16, 2020 to April 16, 2021, after Corona. For data collection and analysis, the frequency and matrix of keywords were extracted through Textom, a social matrix site, and the relationship and connection centrality between keywords were analysed and visualized using the Netdraw function in the UCINET6 program. In addition, We performed CONCOR analysis to derive clusters for similar keywords. As a result, a total of 25,761 cases that analysing the keywords of museum, gamification and visitors were derived. This shows that the museum, gamification, and spectators are related to each other. Furthermore, if a system using gamification is developed for museums, the museum market can be developed.

Keywords: Museum, Gamification, Big data, Textom, Semantic network analysis

1. Introduction

When looking at the application of gamification in museum education, among the various elements of the game, related contents such as fun, immersion, and satisfaction, which are the results of the process, are the main ones [1, 2]. Based on this, museums need to plan programs and devices that enable fun experiences and various activities in the form of inducing interest and encouraging viewing, cultivating imagination and creativity while inducing interest and fun. The purpose of this study is to provide basic data for the introduction of a museum system using gamification in the future by grasping the relationship between museums and gamification keywords. Social network service (SNS) information data of each keyword is collected using

Textom which is a tool specializing in text analysis. This study analyses the keywords related to museums, gamification, and visitors in the past year from 2020 to 2021 through Textom and the museum trends that are changing due to Corona. Based on this, the influence between the museum, gamification, and the visitors and the strategic direction of the museum using gamification are derived. It also aims to present basic data so that the museum market can be expanded by using gamification and to develop it into a museum gamification system. The next study, it is necessary to create a museum service using gamification. Section 2 consists of research subjects, data collection methods, research tools and procedures, and describes the research methods. Section 3 describes the research results of social network visualization of data collected through Textom. Section 4 is described as a conclusion.

2. Research Methods

2.1 Research Targets and Data Collection Methods

The collection channels of this paper are web documents, blogs, news, cafes, intellectuals (tips), academic information and news provided by Google, Google Facebook, web documents, Baidu, YouTube, and Twitter were analysed. As keywords for data collection, 'museum, gamification, and visitors' were used. The collection period used for data analysis was selected as one year from April 16, 2020 to April 16, 2021, after Corona. The analysis tools used to analyse the data are UCINET6, a social network analysis program, and Netdraw, which represents data visualization. Also, when there are too many nodes in the network structure analysis, there is a limit to the visualization expression. So, in order to simplify the network with only nodes that play an important role in the entire network, we focused on the top 50 keywords.

2.2 Investigation Tools and Procedures

This paper intends to analyse the semantic connection between words extracted through big data analysis of words collected using text mining techniques.

1) Text Mining

Text mining is a method of extracting large amounts of unstructured data into relational data, and decomposes words from text. And it is a technique to investigate the relationship between words by grasping the frequency of occurrence of specific words [3]. Text mining was conducted through Textom to create a matrix for co-occurrence word frequency calculation and social network analysis. In this study, words not related to museums were deleted and refined from the collected data. In addition, it was determined that analysis was unnecessary for words that did not form words such as thing, year, month, etc., so they were deleted and selected as the top 50 words.

2) Semantic Network Analysis

It is an analysis method that derives the content of the message contained in the form of the relationship by analysing the structural relationship of whether the words forming the message are used and placed in the text, and analysing the pattern and meaning of the structure [4, 5]. The degree of relationship was quantified by identifying the connection structure between words using Ucinet6 and analysing the centrality of the degree of connection [6]. For visualization, NetDraw of Ucinet6 was used, and the relationship between words was clearly expressed to visualize the network between words related to the museum. In addition, CONCOR analysis was performed to derive clusters formed by words with similarities.

2.3 Data Processing Method

This paper utilized Textom programs for unstructured text appearing on blogs, news, cafes, web documents, and knowledge IN on portal sites. The collected keywords are extracted, and the importance was grasped through the frequency of the keywords. Text mining analysis was used to find detailed keywords of museums, gamification, and visitors. Next, network analysis, visualization, and CONCOR analysis were performed via the NetDraw function of Ucinet6 program in order to see the frequency of use of words related to museums, gamification, and visitors, and the network of words. In this study, data on SNS including the words "museum,

gamification, visitors” were collected and refined from Daum, Naver, Google, Baidu, YouTube and Twitter. Based on the words derived via this process, key keywords will be derived through symmetric 1-mode matrix data with the same rows and columns, and the relationship between them was examined.

3. Research Results

3.1 Analyze Keyword Associations Frequency

Table 1 presents keywords related to museums, gamification, and visitors for one year from April 2020 to April 2021. From April 2020 to April 2021, related documents were searched for museum, gamification, and visitors keywords over the past year, and a total of 25,761 related documents were derived. This study is to see if museum and gamification are related to each other. Table 1 shows the frequency and centrality of the extracted keywords as a result of conducting text mining and UCINET6 program for analysis of museum keywords focusing on the top 50 keywords due to limitations in network visualization expression. The keywords with the highest TF value were museums, visitor, games, Gyeongju National Museum, and gamification ranked in the top 5. The keywords with the highest TF-IDF value appeared in the order of museum, game, visitor, exhibition, and gamification.

Table 1. Key related keyword frequency and degree of association centrality

TF						TF-IDF					
ranking	word	TF	ranking	word	TF	ranking	word	TF-IDF	ranking	word	TF-IDF
1	Museum	6319	26	Trip	527	1	Museum	12270.62	26	Trip	2175.685
2	visitor	3877	27	experience	507	2	game	8319.878	27	service	2057.18
3	game	3185	28	non-face-to-face	506	3	visitor	8033.849	28	non-face-to-face	2054.325
4	Gyeongju National Museum	2940	29	service	498	4	exhibition	6545.168	29	experience	2049.208
5	gamification	2626	30	method	496	5	gamification	6430.203	30	method	2005.862
6	exhibition	2520	31	exhibition	474	6	Gyeongju National Museum	6367.74	31	exhibition	1995.495
7	education	2142	32	subject	473	7	education	5982.433	32	Child	1904.943
8	conjugation	1462	33	Child	447	8	conjugation	4367.776	33	History Museum	1904.598
9	view	1101	34	Audience	412	9	Art gallery	3902.422	34	subject	1900.262
10	Art gallery	1097	35	visit	408	10	view	3645.715	35	Audience	1762.75
11	history	1056	36	fun	406	11	history	3612.285	36	student	1757.051
12	contents	970	37	student	404	12	contents	3355.025	37	visit	1727.499
13	space	899	38	History Museum	403	13	space	3190.646	38	fun	1693.381
14	kid	807	39	Attention	370	14	National Museum of Korea	3056.803	39	event	1681.399
15	culture	792	40	feelings	368	15	kid	3011.704	40	special exhibition	1652.571
16	National Museum of Korea	765	41	event	367	16	culture	2899.174	41	feelings	1599.362
17	Participation	760	42	special exhibition	364	17	play	2752.979	42	Attention	1574.737
18	play	747	43	role	351	18	Participation	2741.251	43	role	1556.699

19	apply	739	44	platform	320	19	offer	2660.372	44	National Museum	1485.823
20	offer	731	45	Marketing	317	20	apply	2655.915	45	Seoul Museum of History	1472.677
21	digital	678	46	National Museum	312	21	digital	2619.54	46	Marketing	1469.871
22	story	587	47	education program	308	22	learning	2306.041	47	education program	1455.623
23	learning	568	48	Seoul Museum of History	291	23	story	2289.257	48	platform	1430.025
24	corona	562	49	strategy	283	24	relics	2257.56	49	strategy	1299.84
25	relics	528	50	plan	279	25	corona	2220.931	50	plan	1285.844

Figure 1 is a visualization method that visually and prominently expresses key words so that you can easily understand the keywords of a document. The importance of words was indicated by letter color, size, and font. In addition, words with high frequency are emphasized through size and expressed differently in colors at the same time, making it easy to understand key words. Based on Table 1, the results of visualizing the major keywords with high frequency in the word cloud are shown in Figure 1.



Figure 1. Top 50 most frequent words Word Cloud

3.2 Network Visualization Analysis Results for Keywords

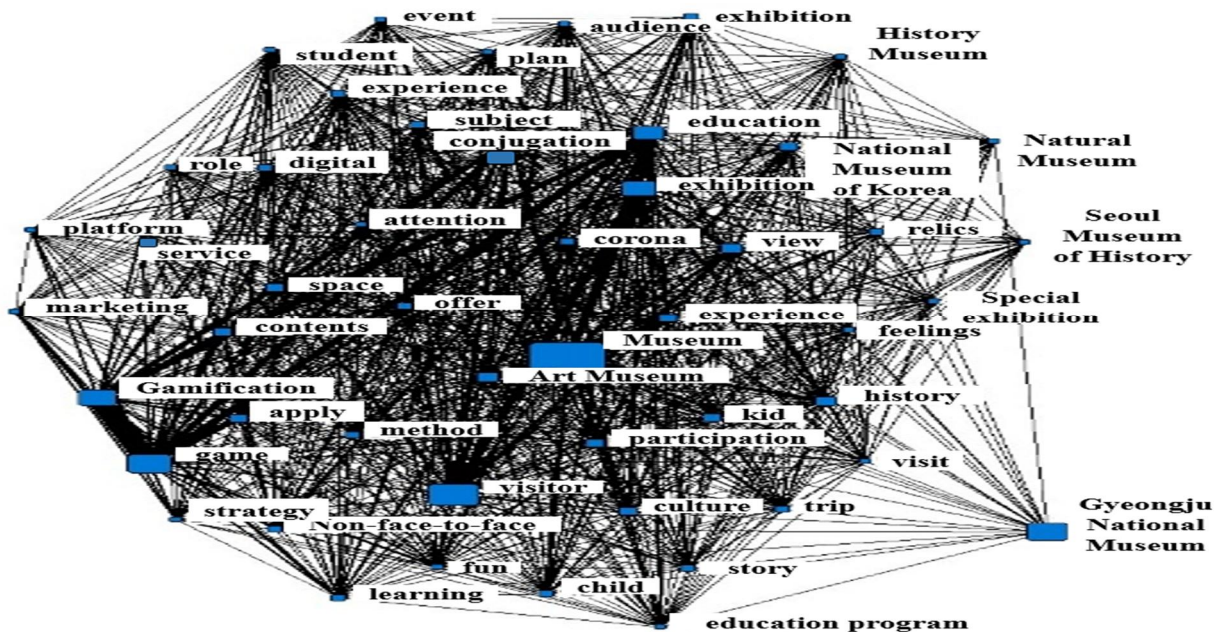


Figure 2 Keyword network visualization

Figure 2 shows the analysis result of visualizing the network based on the centrality of the degree of connection in order to derive the relationship between the pattern and the degree of connection within the network. When the original data include museums, gamifications, and education keyword is checked, that mean is gamification is one of the important technologies to experience and will play an important role in the museum experience. However, figure and all study can be development stage by original data and also it can be seen that it is still insufficiently applied to domestic museum education. As a result, it can be seen that gamification is closely related to museum education.

3.3 CONCOR Analysis Results for Museum Gamification

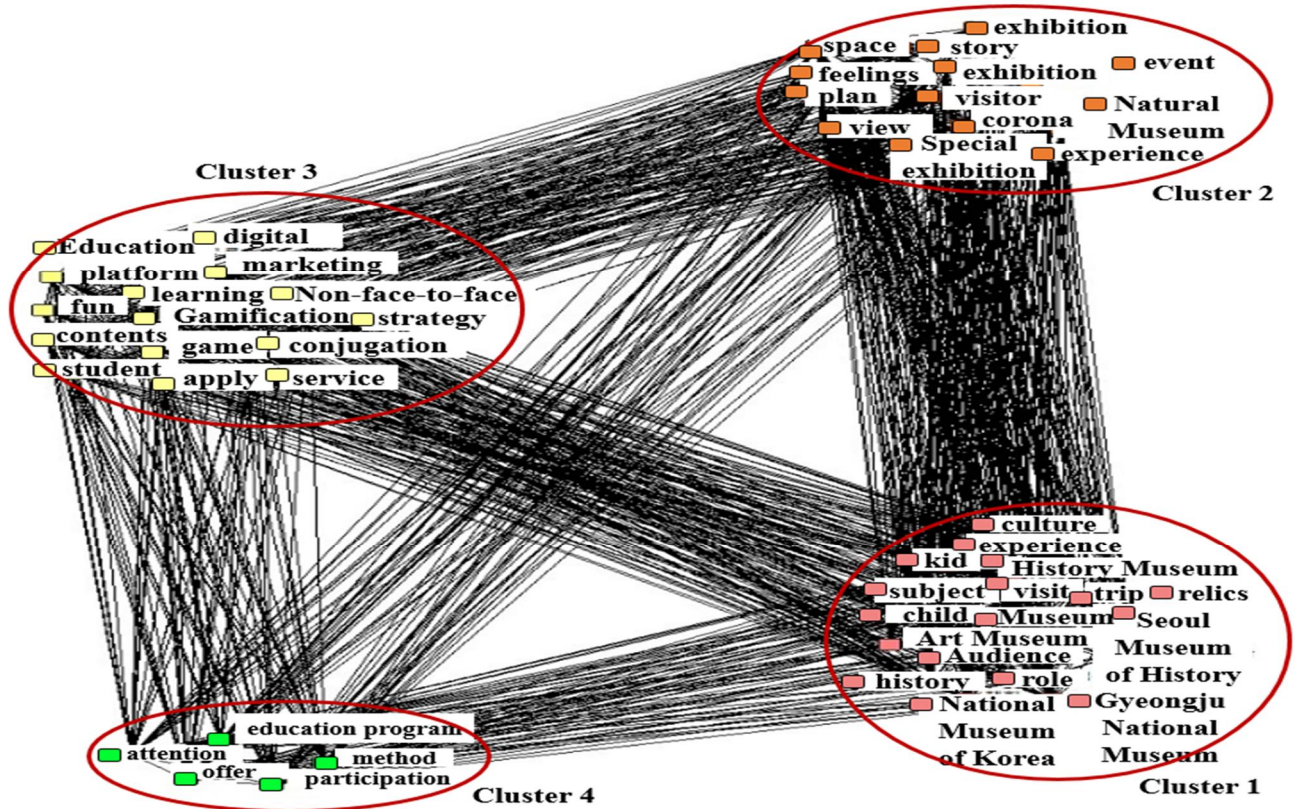


Figure 3 Museum Gamification CONCOR analysis

CONCOR analysis is a method of repeatedly performing correlation analysis to find groups with an appropriate level of similarity [7]. As a result of CONCOR analysis on museum gamification, a total of four groups were formed: 'museum', 'gamification', 'visiting', and 'education', as shown in Figure 3. Cluster 1, museum, culture, trip, role, child, National Museum of Korea, art museum, subject, kid, audience, history, experience, relics, history museum, visit, Seoul Museum of History, Gyeongju National Museum As it was extracted, it was named 'museum'. Cluster 2, visitor, exhibition, event, National Museum, corona, exhibition, experience, view, space, story, special exhibition, plan were named as 'viewing properties' as words related to museum viewing were extracted. Cluster 3, game, apply, gamification, learning, marketing, digital, non-face-to-face, strategy, conjugation, service, education, platform, fun, contents, student were named as 'gamification properties' as words related to gamification viewing were extracted. Cluster 4, educational program, method, attention, offer, participation as it was extracted, it was named 'education attribute'.

In Cluster 1, it was found through keywords that visitors visit the museum to experience historical relics and cultures and experience them in the museum had a positive effect on visitors. In Cluster 2, it was confirmed that putting a story in the exhibition space reflecting the visitor's participation experience induces visitors to communicate in two directions. In Cluster 3, it was found that if the game elements were actively applied to education, they could learn proactively and feel the fun and interest of watching. Game elements should also

be applied to museum education to provide interesting content to visitors so that they can enjoy watching. In Cluster 4, the importance of museum educational functions is increasing. Recently, in addition to the original educational function of museum exhibits, educational programs are provided to provide more clear and reliable educational effects so that they can be performed in the museum [8, 9]. It is necessary to study educational content appropriate to participate with the active attitude and interest of visitors. As a result of a comprehensive analysis, visitors prefer activities that can be experienced directly at the museum. If game elements are applied to museum education programs so that the experience can be further expanded, it can be confirmed that it can help visitors feel the fun and interest of viewing.

4. Conclusion

In this study, data were collected using Textom to confirm that using gamification in museums allows visitors to feel fun and interested. As a result of the analysis, a total of 25,761 cases were derived as a result of identifying keywords for one year from April 2020 to April 2021. When analyzing the frequency analysis table, museums, gamification, and visitors showed high TF and TF-IDF values in the top five. Through this, We found that museums, gamifications, and visitors were related to each other. Based on the analyzed original text data, it was found that visitors prefer to experience and experience in museums. In addition, it can be seen that applying game elements helps visitors to experience more diverse experiences. These findings suggest that the museum and gamification are highly related, providing useful information for applying gamification to the museum. It was concluded that the introduction of museum education using gamification, which can lead to changes in museums, was effective in terms of visitor immersion. In future research, it is necessary to proceed with a museum system that utilizes gamification for museum education [10].

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