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Research Paper

Tourism trend and network analysis utilizing big data on social media

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Abstract

Background/Objectives: With evolving trends, tourism is also experiencing more diverse policies and methods of promotion. In particular, with the development and increasing popularity of social media platforms, a new trend is setting in. In line with such changes, the current study sets out to utilize big data on social media platforms to analyze trends in tourism, ways in which tourism elements mutually interact, and analyze patterns, in order to propose tourism promotion strategies and provide related basic data.
Methods/Statistical analysis: Analysis on social media platforms were conducted to visually express relationship among nodes and analyze the structure and status of link in quantitative terms. NodeXL is an add-in program to Microsoft Excel; it allows the user to directly collect data from social media platforms to execute matrics, statistics, and visualization. The data was collected from Korea Tourism Organization (KTO)'s Twitter and Facebook accounts. Hashtags (#) on 3,200 posts on the Twitter account were analyzed to compute the tourism trend, and the inter-node interactions and links on the Facebook fan pages were analyzed in terms of network density and centrality to calculate the form and characteristics of social media networks.
Findings: By analyzing social media pages that represent promotional efforts for Korean tourism, we were able to find the following results: On the KTO Twitter account, the higher hashtag terms were "eating tour," and "exciting travel," which follow the recent tourism trends. However, because of platform restrictions, the Twitter account, rather than engaging in mutual interactions with its users, only tended to deliver information, and was unable to reflect more diverse tourism trends. On Facebook, 348 nodes were actively linked 14.99 times on average, indicating a healthy level of activity. Average degrees of connection was 2.214, which is smaller than average connection distance of small societies, indicating efficient mutual interaction. There were three core user groups, with eleven individuals serving as media nodes, and six users with Eigenvector centrality.
Improvements/Applications: Tourism promotion must be executed in line with diverse and latest trends in the field. Because Facebook has a higher level of mutual interaction than Twitter, the account holder can maximize the promotional effects by utilizing individuals that serve as the centrality node. That is to say that promotional strategies that take into account the characteristics of individual social media platform are required.

Keywords: *Social Network; Tourism; Trend; Nodexl; Big Data*

1. Introduction

Trend is an important social phenomenon that allows researchers of societal changes to identify the current status and predict the future. In the transformation of social environments, consumer trend is also displaying changes. From prosumers (producer + consumer) who began the trend of do-it-yourself (DIY) products, new prosumers who actively participate in product marketing were born. In addition, other types of consumers such as socialsumers (social + consumers) who seek the benefit of the entire society, rather than the individual, as well as curasumers (curator + consumer) who use and demand products to fit their own consumption style, indicate the changing landscape of the consumption market. As such, businesses are searching for new ways to market their products by inviting consumers as expert developers, promotion agents, and product development idea providers. In order to execute marketing based on consumption intent and actual behavior, big data is crucial. Despite such a requirement, IBM's survey on 1,700 CMO of nineteen industries from sixty-four countries selected big data (71%) as an area that is forecasted to bring the greatest impact but is not sufficient prepared[1].

Changes in consumer trend are also heavily influencing tourism trends, which is an area closely related to the transformation of social environment. As aging, population decline, prolonged economic recessions, and multicultural societies become the norm, tourism trend is also undergoing rapid changes.Key elements of global tourism trend in 2030 will be wellness and medical tourism catering to the aged population, inexpensive and objective-driven tourism for small families, green tourism, shopping tourism, food tourism, festival tourism, and safe tourism[2]. Studies on Korean tourism have focused on ten major trends including tourism that brings down barriers, new 3S (safe, sustainable, social) travel, new tourism ecology led by mobile platforms, happy inconvenience through outdoor recreation (OR), tourism culture for relaxation and happiness, slow travel, and independent decision-making in travel[3].

In particular, consumption pattern in the contemporary society shows that while consumers prefer products with the lowest price when it comes to essential items (needs), their resistance to price is significantly lower for items that they desire (wants), indicating a phenomenon of double-sidedness. This indicates that while

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consumer trends are being reflected in the market, the form of desires is becoming more individual. With the development of information technology and increased information accessibility, physical and mental barriers are coming down, and more people wish to fill the gap created by rapid social changes. Such series of phenomena are being expressed and shared via social media platforms, which can be an easy source of big data, which, if analyzed, can assist with identifying new trends.

The term big data was first used officially used in a report by World Economic Forum 2012, about ten future technologies[4]. With the increase in the volume of information, popularization of smartphones, and development of IoT, more people are using social media platforms such as Twitter, Facebook, and YouTube, which in turn increases the volume of big data[5]. Google Trend Analysis shows that interest in big data has been constantly increasing for the past five years, and Korea is a country with an especially high level of interest in big data (https://trends.google.com/trends/explore?q=big-data), the level of interest only next to India. Big data is a large-scale data set coming in various forms, and is a next-generation architecture that can create new values by allowing users to collect, process, and treat data with lost costs [6].

Data from social media is at the center of big data. Vitalization of social network services (SNS), in which users create and share contents, the era of Web 2.0 has come to dominate the internet use, which in turn enhanced the creation and use of consumer-generated media (CGM) [7]. Social network services are media platforms based on online services, in which the users can share and participate in thoughts, opinions, experiences, and information[8]. Depending on the objective of use, SNS is rapidly evolving in all directions depending on the purpose, including information sharing, relationship building, collaboration, and entertainment[9]. Lee Ju-yeong (2013) categorized social media functions into fifteen items including social networking, posting, photo sharing, micro-blogging, gaming, and interpersonal relationship[10]. Under this categorization, Facebook provides social networking services, Blogger.com provides posting services, Instagram focuses on photo sharing, YouTube allows users to share videos, Twitter offers micro-blogging services, and Skype is for interpersonal relationships. Other than these categories, previous studies have categorized social networking services in terms of purpose, relationship of interactions, access methods, information types, and information dissemination methods.

While social media platforms can be categorized in terms of purpose, use method, and functions, because of rapid evolution of contents and functional expansion of platforms, it is nearly meaningless to distinguish services by their functions: Facebook began offering live video service, games, and shopping services to go beyond its original function of building relationships to allow users to produce, share, and consumer information. Twitter is becoming more like a portal website by embracing news, game, lifestyle, and technology functions. Kakao Talk is going beyond its intended chatting services, offering blog, shopping, and interactive services through an embedded service called Kakao Story.

Recently, smart tourism, which grafts smart technologies to social network big data to provide tourism services, is becoming more popular[11]. This trend is becoming a key to international tourism, and with more information on various tourist attractions being shared on social media platforms, more travelers are taking interest in previously less known locations[11]. Analysis of tourism trend in social media can also serve as a foundation for the expansion of smart tourism.

The current study intends to analyze social network, utilizing one of social mining technologies based on big data such as opinions and information left on the social media platforms. To achieve this end, the current study analyzed Korea Tourism Organization's Twitter and Facebook accounts to understand tourism promotion trends and social network interaction. Through this, the study seeks new promotional strategy for tourism and providesrelated basic information.

2. Materials and methods

2.1. Data collection

Two steps were taken in order to collect data for analysis. Twitter account for Korea Tourism Organization (@ Kor_Visitkorea) and its Facebook account (9suk9suklike) were used for the effort. On February 2017, the Twitter account had approximately 30,000 tweets, 133,000 following pages, and 371,000 followers. The Facebook page had 398,088 followers and 402.318 likes, indicating a wide range of user interaction. Tourism trend from the Twitter account will be analyzed by collecting interactive hashtags (#) on 3,200 posts and finding words that are frequently mentioned. As for the Facebook page, inter-user interaction data, in which one to three posts are shared for an original post, are collected to understand the form and characteristics of social network services.

2.2. Tools and methods of analysis

Analysis of social networks visually express relationship among nodes to quantitatively measure link structure and status, in order to understand the people, groups, and organizations linked through information-sharing mutual interactions and social relationships. Social network analysis, which was developed based on network theory, utilizes nodes and links to explain characteristic and structural patterns of network forms based on interdependent relationship among each user[12]. Software packages for analyzing social network include AllegroGraph, EgoNet, Graph-tool, NetMiner, NodeXL, and scores more (Wikipedia).

NodeXL (Network Overview Discovery Exploration for Excel) is a program added into Microsoft Excel. The application and source code can be downloaded from the developer's website (https://NodeXL.codeplex.com) for use. NodeXL was developed by a project executed by the Social Media Research Foundation, and is a network system joint-cooperative network system operated by Stanford University, Cornell University, University of Maryland, and a Microsoft research institution.

NodeXL extracts e-mail data or social media platform information to analyze their data. Network expression method in edge lists method is taken as the basic, matrices, CSV, Pajek, graphML, and UCINET, and many other network data could be analyzed. The program has data importer that can directly collect data from social network services such as Twitter, Flicker, YouTube, Facebook, Wikipedia, and WWW hyperlinks, with functions to calculate social network analysis matrics and statistics. Majors functions include network graph visualization and dynamic filtering of node and link feature value, as well as structure character analysis for network. NodeXL-independent algorithm can cluster, component, and sub-network search and analysis. The program is becoming increasingly popular, with 276,824 downloads in December 2016.

Key analysis includes the following: Network density refers to the degree of connection among nodes. More inter-node connection increases the density, with links being made organically without certain links not being skewed to one side [14]. Inclusiveness refers to the ratio of nodes with connected links, and centrality expresses the degree in which certain nodes are located at the center of the network, allowing the user to identify nodes that play important roles. Degree centrality, closeness centrality, and betweenness centrality are sub-indices [13], [14]. Users with high centrality are trend setters who lead the opinions by receiving and disseminating information with high efficiency[15].

3. Results and discussion

An analysis of Korea Tourism Organization Twitter account showed that #TravelNewsFarandWide (860), #Seoul (156), #FlavorTravel (154), #ExcitingTravel (153), #TravelRecommendation (112), #Jeju (90), #Busan (73), #Daegu (71), and #Incheon (59) were frequently used hashtags in approximately 3,200 tweets. #TravelNewsFarandWide is a tourism information promotion

hashtag, and 449 hashtags were related to certain areas in Korea. For terms, “flavor” and “exciting travel” were major promotional trends. This Twitter account showed no interactive activity such as retweet between the users, indicating that it is used mainly for one-sided dissemination of tourism information.

Social network of Korea Tourism Organization’s Facebook fan page is as shown in Table 1. There were 348 nodes and 14,993 links, with 9,042 unique links, displaying connections among various nodes. Network density was also 0.0965, which indicates active information exchange among users. 0.057 was the ratio in which nodes were connected in the semantic network. Networks are composed of single component, showing smooth flow of information re-production. Users were four degrees apart from each other, with an average distance of 2.214, which is a short and efficient level of interaction.

Table 1: Korea Tourism Organization Facebook Fan Page Social Network Analysis Values

Index	Value	Index	Value
Nodes	348	Components	1
Unique Links	9042	Maximum Node in a Component	348
Links	14993	Maximum Links in a Component	14993
Network Density	0.096	Diameter	4
Reciprocated Node Pair Ratio	0.057	Average Geodesic Distance	2.214

Social network graphic is as shown in figure 1. There are a total of three groups, which are composed of users who replied to the same post, and the Korea Tourism Organization social media page was in Group 2. Figure 2 is the graph that shows betweenness centrality, with eleven high-tier (1382.000 – 26625.267) users. There were six users with high Eigenvector centrality (0.007 – 0.010), with weights on the centrality of other nodes.

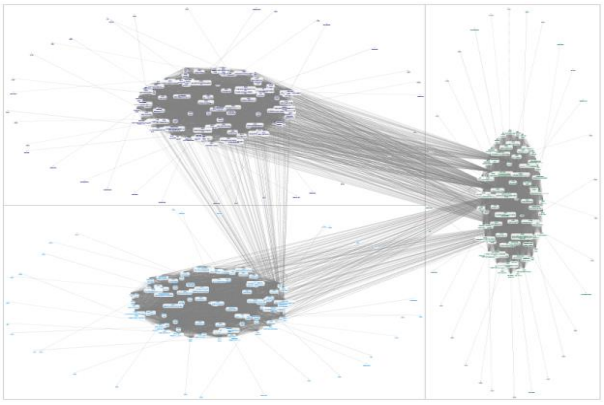


Fig. 1: Korea Tourism Organization Facebook Fan Page Social Network Graphic.

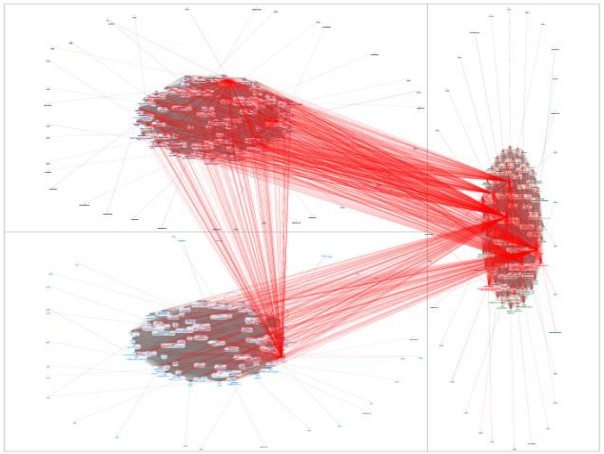


Fig. 2: Korea Tourism Organization Facebook Fan Page Betweenness Centrality Graphic.

4. Conclusion

The current study investigated tourism promotion trends and social network forms via social network analysis, one of the social mining techniques based on social media big data. Korea Tourism Organization’s Twitter and Facebook pages are the representative social media accounts that promote Korean tourism and provide related information.

Analysis of 3,200 tweets on the Twitter accounts showed that “Flavor Travel” and “Exciting Travel” were higher-tier hashtags that did not include names of certain areas in Korea, indicating that the trends used by Korea Tourism Organization accounts follow trends provided in previous studies. However, tourism information and promotion were being made in one direction, without retweets among users or other interactions. Such phenomenon is caused by the features of Twitter, which is operated in terms of information delivery, rather than mutual communication.

Facebook fan page analysis showed 348 nodes, 14,993 links, 9,042 unique links, and 0.0965 network density, displaying rapid interaction among users. In particular, average geodesic distance, which indicates distance between users, was 2.214, which is lower than the average link in a small society of “six degrees of separation,” showing short and efficient tourism information interaction. There were a total of three user groups, with eleven individuals playing medium-centric roles, and six users well-connected with others with high centrality, playing even bigger role as a medium among users.

According to these results, the following proposals can be made: First, promotion in terms of more diverse trends in addition to “Flavor Travel” and “Exciting Travel,” such as “Solo Travel,” “Relaxing Travel,” and “Slow Travel” are required. Second, in order to vitalize social network in tourism promotion, there needs to be more central users. Lastly, tourism promotion strategy that considers individual characteristics of Twitter, Facebook, and other social media platforms are needed. Information delivery function may be strengthened for the Twitter page, and the Facebook page may be operated to post and share users’ experienced tourism information.

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