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COMPARISON OF AFFECTIVE PERCEPTION OF BITCOIN BETWEEN KOREA AND CHINA

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Abstract. *In this study, we compare and analyze Bitcoin's affect recognition in Korea and China, with respect to time lapse and gender, through visualization of the network analysis. Many studies on Bitcoin are currently underway. However, the comparative analyses of Bitcoin's affect recognition by country with respect to differences such as time lapse and gender are insufficient. Therefore, in this study, we collected people's usage patterns, experiences, reminders, and reasons for using Bitcoin. For comparison by country, in 2015, 34 Korean and 30 Chinese people were surveyed, and in 2018, 40 Koreans and 37 Chinese people were studied. Surveys were undertaken with the same contents and in the native language of each country. The collected vocabularies were then further refined using the semantic network analysis. Through this vocabulary, the study confirms and analyzes differences due to time lapse and gender. The results of this study are expected to be used as basic data for related research on Bitcoin, a virtual currency that is attracting attention for its future value.*
Keywords: Affect, Semantic network analysis, Bitcoin, Virtual currency, Gender differences, Time lapse

1. **Introduction.** Owing to the globally evolving IT industry, the impact of emerging and supporting technologies is enormous [1]. As a result, there is a steeply rising interest in new technologies related to the IT industry. At the center of this, the block chain technology is becoming a global trend. Block chain technology is a comprehensive and efficient information technology related to money [2] and is a highly influential technology that has the capability to transform the current digital economy for the better [3]. In other words, the impact and technical power of block chain technology are very high.

Currently, the 'Bitcoin' virtual currency, which uses block-chain as its core technology, is attracting huge attention for its future value. Bitcoin first appeared in 2008 [4] and its emergence as a new form of virtual money attracted worldwide media attention. Bitcoin gained massive usage and popularity not only from the media, but also from its users by providing them with a distributed, low-cost virtual currency system [5]. Baur et al. [6] explained that most of the participants who tested it, said "Bitcoin is well worth the future currency". Therefore, this study confirms and compares affect recognition of 'Bitcoin' that is attracting attention for its future value among various IT products and services.

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This study has the following composition. In Section 2, the contents of the related studies were examined in detail through the Literature Review. In Section 3, the process procedure of data and network analysis are described in detail. In Section 4, the data on the lapsed time by country and data between males and females were presented in detail. In Section 5, the difference analysis was detailed through the visualization data presented in Section 4. Section 6 concludes the paper.

2. **Literature Review.** The affect that users receive while using certain products and services has an enormous impact on the purchase of those products and services [7-10]. Relevant research on these affects began in the 1970s with affective engineering [11]. Affective engineering aims to develop more innovative and efficient products/services by applying emotions and demands that customers experience about certain products/services to market or further develop those products/services [12]. This range of affective engineering has recently become increasingly clear and expanded, and [13] described affect by classifying it into three categories, namely the primitive, descriptive, and evaluative affect. Primitive affect is a basic sensation that is experienced due to a relationship with a product/service and is an objectivity indicator. Description affect is a combination of user experience and personality, which functions as an added subjectivity. Finally, evaluative affect is the most subjective indicator of a user's evaluation of products and services. Evaluative affect is regarded to be linked to user value, and existing value sampling methods can be used for measurement of evaluative affect [14-17].

Semantic network analysis identifies meaningful connections between different vocabularies and semantics. [18] provides a general overview of semantic network analysis as a function that extracts vocabularies from text, conducts network analysis, and obtains results. [19] also introduces various visual analysis methods through semantic network analysis for the construction of knowledge and reasoning of analyses.

3. **Method.** This study was conducted once in 2015 and then in 2018, in the same manner. At first, 34 Korean and 30 Chinese participants participated in the experiment in 2015. The average age of Korean participants was 24.5 years (standard deviation ± 1.5), and the average age of Chinese participants was 29.6 years (standard deviation ± 7.02). Next, in 2018, 40 Korean and 37 Chinese participants participated in the experiment. The average age of Korean participants was 21.8 years (standard deviation ± 1.84), and the average age of Chinese participants was 21.9 years (standard deviation ± 2.71).

The information of men and women in Korea and China in 2015 and 2018 is as follows. At first, in Korea, 11 female participants and 23 male participants participated in the experiment in 2015. The average age of women was 23.1 (standard deviation ± 1), and the average age of men was 25.2 (standard deviation ± 1.2). Next, in China, 20 female participants and 10 male participants participated in the experiment in 2015. The average age of women was 29 (standard deviation ± 5.8), and the average age of men was 31.8 (standard deviation ± 7.5). Next, in Korea, 15 female participants and 25 male participants participated in the experiment in 2018. The average age of women was 21.3 (standard deviation ± 1.3), and the average age of men was 22.1 (standard deviation ± 2). Finally, in China, 21 female participants and 16 male participants participated in the experiment in 2018. The average age of women was 21.9 (standard deviation ± 2.7), and the average age of men was 21.6 (standard deviation ± 2.4).

In 2015, all the Korean participants answered that they heard about the currency called Bitcoin for the first time. In China, only 6.1% of the participants answered that they knew about Bitcoin. However, in the case of Korean participants in the 2018 study, 100% of them knew about Bitcoin, but only 67.6% Chinese participants answered that they knew about Bitcoin.

We conducted various surveys, such as basic awareness survey, collecting related vocabularies (composition of verbs, adjectives, and nouns), and correlation descriptive phrase for the people of Korea and China. The content of each survey was the same and they were conducted in the native language of each country. During data analysis the collected vocabularies were converted into English, and specially modified vocabulary was used for colloquial terms (For example, life smash was translated as ruin). In addition to this, similar vocabularies were integrated to minimize information loss. The complete vocabulary is used to construct the co-occurrence matrix for network analysis.

The network scales used in this study are degree and eigenvector centrality, as in the previous study [20]. Degree centrality indicates the degree of the connected node and the value of the node becomes large with an increase in the number of people who respond. The top 20 nodes are extracted based on degree centrality. Eigenvector centrality is a measure of the degree of mutual influence between the nodes. The higher the degree of centrality and eigenvector centrality values is, the larger the node size is and the thicker the edges appear. Note that even if the degree centrality value of the two nodes is the same, the size of the node will be different if the eigenvector centrality value is different.

4. **Result.** Figure 1 represents the semantic network of 2015 and 2018 based on survey data from Korea and China. First, the size of the 'Hacking' node was the largest in the 2015 Korea data. Vocabularies with high correlation can be identified by the thickness of the edge between two words, also called the correlation. For example, you can see 'Hacking' and 'Currency'. It is a service that is directly connected to money and safety and vocabularies such as 'Hacking', 'Safety', and 'Security' appeared. In addition to this, vocabularies related to familiarity, such as 'Useless', 'Inconvenient', and 'Unfamiliar' also appeared. Finally, money-related vocabularies such as 'Electronic money', 'Coin', 'Market price', and 'Money' were also common. In the China data from 2015, the nodes of 'Virtuality' and 'Valuable' showed the largest size. A major example of the correlation between the two words is 'Valuable' and 'Mining'. Similar to Korea, safety related vocabularies such as 'Safety', 'Cheat', and 'Unsafety' and money related words such as 'Currency' and 'Investment' were prevalent. Next, in the case of Korea data of 2018, the size of the 'Stock' node was the largest. A major example of the correlation between the two words is 'Stock' and 'Gambling'. Overall, many gambling-related vocabularies, such as 'gambling', 'lotto', 'jackpot', 'upstart', and 'big win' were recurrent. Compared to the Korean data of 2015, the frequencies of vocabularies related to safety and money were relatively small. In the case of China's data of 2018, the 'Exchange rate' and 'Internet' nodes showed the largest size. A major example of the correlation between the two words is 'Internet' and 'Mining'. Overall, the nodes are made up of vocabularies that describe the technical characteristics of Bitcoin.

Figure 2 shows the semantic network of Korean and Chinese men. The data were analyzed by combining the data extracted in 2015 and 2018. First, in the case of Korean male data, the size of 'Stock' node was the largest. A major example of the correlation between the two words is 'Stock' and 'Gambling'. Gambling-related vocabularies, such as 'Stock', 'Gambling', and 'Speculation', buzzwords and related words such as 'Let us go' and 'Endure', and safety related vocabularies such as 'Risky' and 'Hacking' are said to be smaller than the other nodes. In the case of men's data in China, degree centrality was about half as low as Korean male data. As a result, the overall size of the nodes was smaller than that of the Korean male data. The size of nodes was seen to be the largest in 'Mining'. A major example of the correlation between the two words is 'Internet' and 'Mining'. Overall, the nodes are made up of vocabularies that describe the technical characteristics of Bitcoin. There was no language related to safety and vocabulary such as 'Exchange rate' appeared unrelated to Bitcoin.

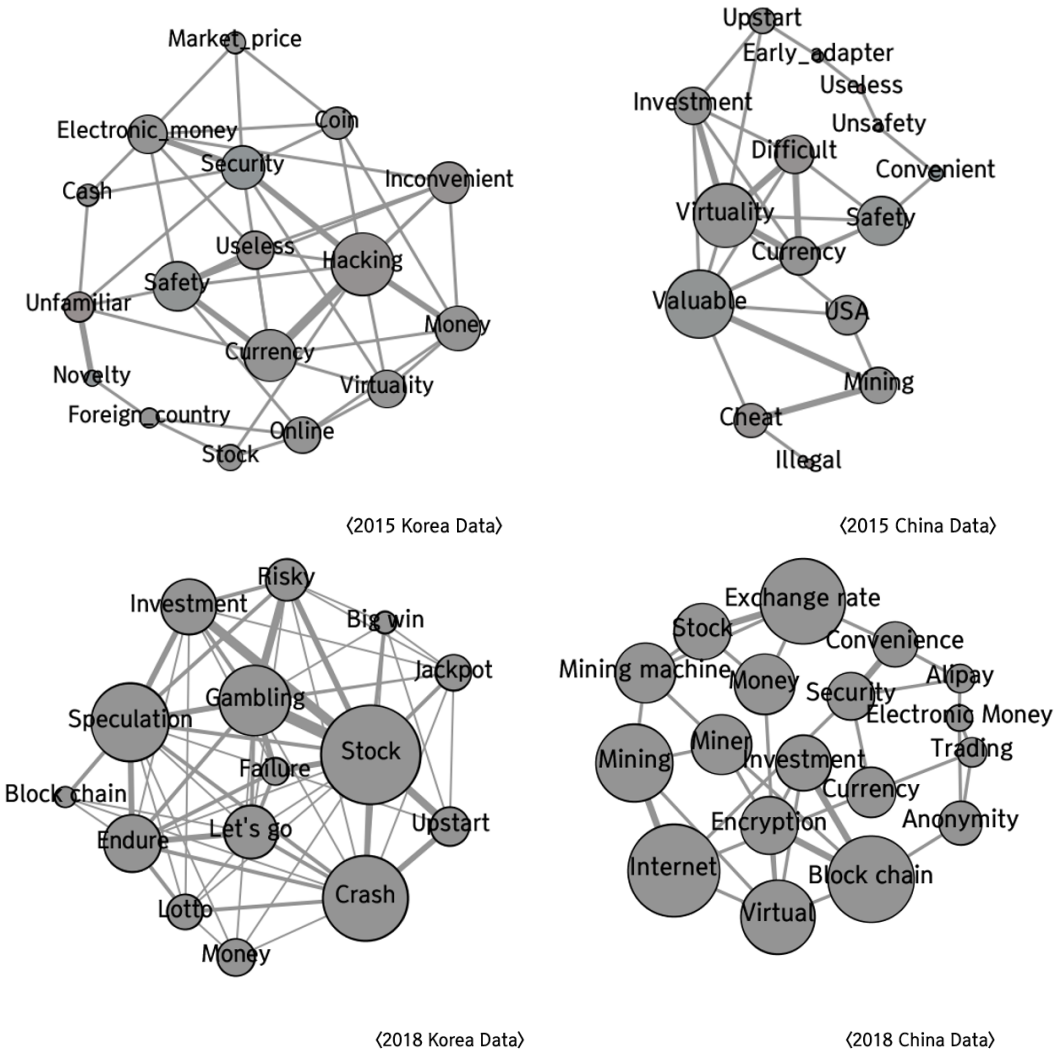

FIGURE 1. Semantic network of representative nodes for Korean and Chinese data

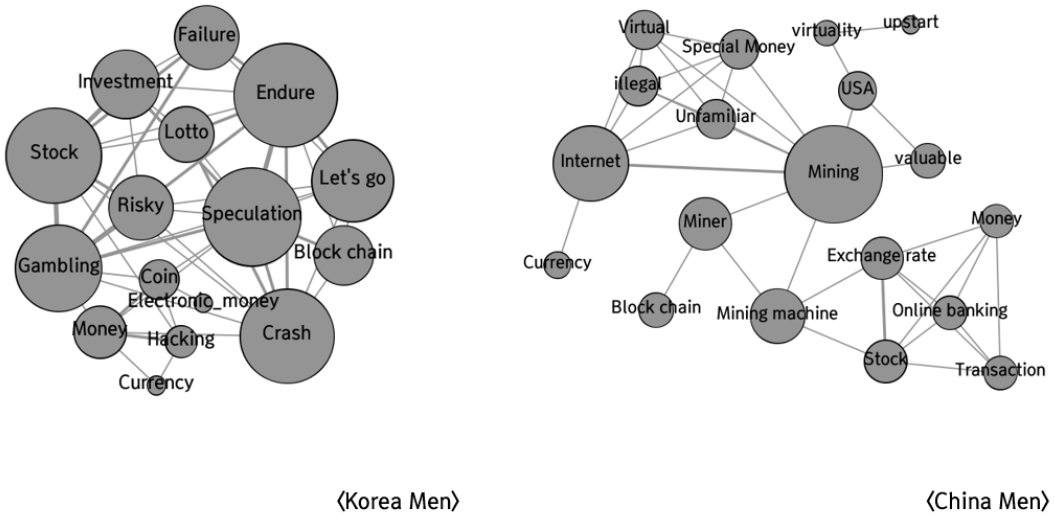

FIGURE 2. Semantic network of Korean and Chinese men

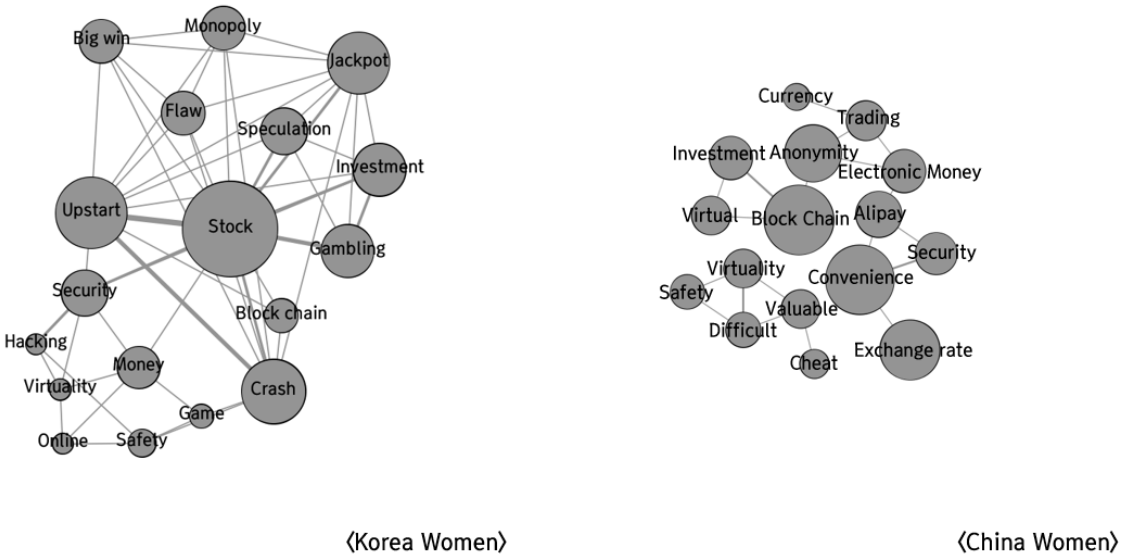

FIGURE 3. Semantic network of Korean and Chinese women

Figure 3 shows the semantic network of Korean and Chinese women analyzed in the same way as Figure 2. First, in the case of Korean female data, the size of the 'Stock' node was the largest. A major example of the correlation between the two words is 'Stock' and 'Gambling'. Words related to gambling, namely 'Stock', 'Gambling', 'Speculation', 'Upstart', and 'Jackpot' were placed on top nodes. Safety-related vocabularies such as 'Safety' and 'Hacking' also appeared, though they were smaller than other nodes. Next, for women's data in China, degree centrality was about half as low as for Korean female data and the size of the nodes, overall, was smaller than that of the Korean female data. The largest node was the 'Block chain'. A major example of correlation between the two words is 'Investment' and 'Block chain'. Overall, the nodes are made up of vocabularies that describe the technical characteristics of Bitcoin. Safety related vocabularies such as 'Safety' and 'Security' and user related vocabularies such as 'Convenience' also appeared.

5. **Discussion.** There are some differences between the 2015 and 2018 data. Through nodes such as 'Currency', 'Electronic Money', and 'Money' among the data nodes present in the 2015 data of Korea and China, we confirmed that there is a clear perception of Bitcoin as a currency. However, through vocabulary such as 'Useless', 'Inconvenient', and 'Unfamiliar' we can confirm that the recognition was not high. Conversely, in the case of 2018 data, the overall degree centrality value of the nodes increased by a factor of two and the configuration of the nodes became more specific, so it is easy to decipher that the perception of Bitcoin improved with time. The comparisons done according to the change in configuration of the nodes are described in detail as follows. In Korea, in 2015, people simply recognized Bitcoin as a 'dangerous currency for hacking'. In 2018, there was a concrete perception change to 'gambling-like money', 'investment-like form of stock', 'Gambling', 'Jackpot', and 'Big Win'. References to safety vocabulary appeared in a similar fashion to 2015. In addition, buzzword-related vocabulary associated with the emergence of Bitcoin appeared in the upper nodes. As a result, it can be confirmed that it is important to provide users with a sense of familiarity with the service, such as buzzwords [21]. In addition, this can be extended to the 'brand' aspect to monitor how 'brand' affects users [22]. Next, in China, degree centrality did not increase significantly compared to Korea, but it was approximately 1.5 times larger. As a result, it was easy to see that the perception of Bitcoin rose similar to that in Korea. The comparison according to the change in the configuration of the nodes is described in detail as follows.

In 2015, Bitcoin was simply a 'virtual currency'; however, in 2018 there appeared concrete perceptions such as 'the method of mining through the Internet' and 'Investments using a block chain and the type of stock'. Similar to Korea, a rising reference to safety vocabulary was also apparent. The rise in Korea's Bitcoin recognition over time is significantly larger than that of China's.

In Korea, the composition of male and female data was more or less similar. The only difference is that the male data refers to buzzwords such as 'Let us go' and 'Endure'. In Korea, despite the fact that both men and women were equally affected by buzzwords, we can confirm that the men were much more affected. Other than that, there was no difference in the composition of Korean male and female vocabulary. Next, in China, the composition of male and female data was similar as it consisted of vocabulary representing the technical characteristics of the service. The difference is that safety-related vocabulary appeared only in the case of female data and the vocabulary "Convenience" that indicates the use experience is referred to as the top node. Through this, it can be seen that Chinese men are not significantly affected by the safety of services. In addition, it can be seen that the use of a product by Chinese women is influenced more by the usability of products.

6. **Conclusion.** Through this study, we confirmed the affect recognition in Korea and China of 'Bitcoin', a virtual currency with potential for future development. As time elapsed, we confirmed how the affect recognition degree formed and we also confirmed the necessity of 'steady research with constant cycle' of products/services. In addition, through the difference in collected data between men and women, we confirmed that Korean men are more sensitive to buzzwords than Korean women and that Chinese women are more sensitive to safety and more interested in usability than Chinese men. Safety and risks can adversely affect service recognition and can also have a profound impact on people's judgment of products/services [23]. The limitations of this study are that the number of samples is as low as 30-40 resulting in low reliability, and the age group is limited to 20-30 years. Therefore, further research requires a study of other age groups, a larger number of samples, and various countries to provide more robust information and reliability of data.

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