

# Text Mining and Visualisation of Post-Covid-19 Metaverse Online News Related to Sports in South Korea

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## Abstract

The concept of the 'Metaverse' gained prominence following the COVID-19 pandemic, which coincided with the resurgence of the virtual world's economic ecosystem and advancements in IT technology. Recent studies have highlighted the significance of examining the establishment of societal perceptions and key social issues surrounding Metaverse in this rapidly advancing era. These studies have analysed popular content, the spread of sports awareness, and successful cases to shed light on this matter. The purpose of this study was to analyse online news data collected from the top three portal sites in South Korea using semantic network text mining technology. The study aimed to emphasise the significance of this data in promoting sports and physical activities. The study's findings indicate the need for collaboration among government ministries, departments, and agencies to facilitate the activation of metaverse-related startups, small and medium-sized enterprises, universities, and research institutes. Additionally, metaverse companies should prioritise the creation of high-quality content and recognise the significance of sports beyond online gaming. This should be accompanied by advancements in 5G-based hardware and software. This study aims to serve as a valuable reference for understanding and preparing for the upcoming metaverse era. It explores strategies for ensuring the sustainable growth of the metaverse across various aspects of life, including sports awareness and prevalence.

**Keywords:** Metaverse, Big Data, Text Mining, Sports Awareness, Social Network Analysis, Industrial Policy.

## Introduction

The rise of online culture has transformed leisure habits, as more people opt to stay home and participate in activities such as watching YouTube, playing digital games, and browsing the Internet, rather than engaging in physical pursuits like sports or outdoor activities. The research report on "COVID-19 and Content Use" provides valuable insights: According to a report titled "Changes and Prospects" published by the Korea Creative Content Agency, there was a noticeable increase in daily usage across various content genres such as digital games, movies, and VR before and after the Covid-19 outbreak. However, this surge in digital entertainment was accompanied by a decline in sports and healthy activities (Park & Kim, 2020; Rhee, 2021; Sung & Kim, 2023). As per a recent report by the Korean Bank Financial Group, the accelerated metaverse era is attributed to factors such as the revitalization of the economic ecosystem in the virtual world and advancements in IT technology. These factors, along with the impact of COVID-19, have contributed to the growth of the metaverse (Long, 2022). There has been a surge of interest in the Metaverse from the industrial sector.

In addition, several recent studies have been carried out to analyse popular content and successful cases within the Metaverse (Kim & Kim, 2023; Long, 2022). However, limited attention has been given to the social establishment of the issues surrounding Metaverse and the specific main issues that have arisen in a social context (Lee, 2021; Park & Kim, 2022). Additionally, there has been a lack of emphasis on promoting sports and healthy activities among individuals during the Covid-19 pandemic. Furthermore, Nike, a prominent sports brand, has made preliminary efforts to enter the metaverse. However, these endeavours are still in their early stages. Despite Nike's sports background and its foray into the metaverse (Demir, Argan, & Halime, 2023), there is currently no precise simulation of the adverse effects of excessive online screen time or any strategies to address this issue, such as engaging in sports. As previously mentioned, the Covid-19 pandemic has further exacerbated the decline in sports participation (Smith & Skinner, 2022).

Further, to the decline in sports, the metaverse has been described as a transformative force in social culture. It is argued that the metaverse is encompassing all aspects of society, but it will pose significant challenges to society and

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culture. These challenges come in the form of increased online interaction, a shift towards seeking entertainment on metaverse platforms, and a concerning decrease in physical activities and social interactions (Buana, 2023). This system serves as a two-way mechanism that presents challenges to the metaverse and examines the adverse impact of the metaverse on sports. In this complex scenario, it is crucial to establish a middle ground that addresses the intersection of sports, the metaverse, and social issues. To gain a practical understanding of the major social issues in the Metaverse, this study employed big data analysis techniques.

The aim was to examine the role of the metaverse in mitigating social and sports interactions and propose potential remediation strategies. Data was collected from three popular search engines in South Korea to identify Metaverse-related issues. The collection period spanned from January 1, 2020, to May 31, 2021, covering a total of 17 months during the COVID-19 outbreak. Through the analysis of collected data, a comprehensive set of 80 significant keywords was identified using text mining, frequency analysis, and TF-IDF analysis. Next, a semantic network analysis and visualisation were performed to identify the key issues related to the 80 important keywords that were classified. This study aimed to examine the current state of the Metaverse and explore the social issues associated with it using big data analysis and text mining techniques.

Additionally, it sought to emphasise the significance of promoting sports and other healthy activities through the Metaverse. The study aimed to explore the relationship between the metaverse and sports, highlighting the need for government, policymakers, industries, and the educational sector to recognise the potential drawbacks of the metaverse. It emphasised the importance of implementing measures to emphasise the value of sports

and social interaction within the online platform of the metaverse, utilising big data. The following study is structured into sections including a literature review, the methodology and tools used for data collection, the primary analysis conducted for compiling results, a discussion summarising key findings, and a conclusion that addresses the significance and limitations of the study.

## Literature Review

Researchers have varying definitions of the Metaverse, but the central idea is to establish a virtual reality resembling a world where different societies and cultural activities can take place (Buana, 2023; Rehm, Goel, & Crespi, 2015). Nevertheless, garnering global attention proved challenging due to the game's reliance on advanced technology and a high skill level, which hindered widespread accessibility. Additionally, individuals tend to engage in physical activities and sports during their leisure hours. Since 2008, the term Metaverse has lost public attention due to the rise of popular communication tools like Twitter, Facebook, and other mobile community applications, as well as the widespread use of mobile phones.

The resurgence of the Metaverse can be attributed to the establishment of IT environments through advancements in hardware and interface technologies (Ghani et al., 2019; Kim, Lee, & Ahn, 2021; Narin, 2021). ROBLOX and ZEPETO are prominent examples of Metaverse platforms, as depicted in Figure 1. As of August 18, 2022 (Sung & Park, 2014), Roblox has emerged as the highest-grossing mobile game on Google Play and AppStore in the U.S., according to a report by 'Mobileindex INSIGHT', a renowned global mobile game analysis site. Additionally, ZEPETO, available on Naver, has achieved an impressive milestone of 300 million cumulative global downloads (Agrawal & Prabakaran, 2020).



Figure 1. (Left): Second Life (Oh et al., 2023), (Middle): ZEPETO (Voinea et al., 2022), (Right): Roblox (Hennig-Thurau et al., 2023).

The exploration of the Metaverse originated with the introduction of Second Life, which served as the inaugural manifestation of this virtual reality concept. The metaverse, apart from its prominent presence in the gaming industry, is characterised by four significant developing themes, one of which is augmented reality (AR); second, the internet has expanded to include human-to-human interfaces,

enabling social interaction. Additionally, immersive mobile and portable technologies, such as smartphones, have had a significant impact.

Last but not least, blockchain technology and artificial intelligence have facilitated a transition from ubiquitous reality to the digital world (Wang et al., 2022). Rehm et al. conducted an analysis on the commercialization potential

of the virtual world and concluded that the Metaverse is poised to become an integrated platform for generating significant value soon (Rehm et al., 2015). Post-COVID-19, current research has expanded in scope compared to earlier studies (Kim et al., 2021), yet it continues to primarily concentrate on the technological applications and educational tools within the realms of computer science and engineering (Ghani et al., 2019; Narin, 2021). The rapid advancement of information and communication technology (ICT), along with the widespread use of smartphones and the Internet, has resulted in the constant production of large amounts of data in various fields, commonly known as 'Big Data'. It is widely used for policy-making in transportation, safety, and medical care sectors in technologically advanced countries like the United States, the United Kingdom, Japan, and South Korea (Ghani et al., 2019; Sung & Park, 2014).

Processing and analysing big data efficiently are crucial due to its immense size and diversity (Agrawal & Prabakaran, 2020). Text mining is a valuable technique used to extract meaningful information from unstructured text data. It can uncover new knowledge and insights that may not be immediately apparent from the data itself. With the growing abundance of text data in recent years, text mining has emerged as a prominent focus in the field of big data analysis technology (Hassani et al., 2020; Kim et al., 2019). The system extracts keywords from a range of textual information gathered from online news data, e-mail, and social networking sites. Text mining enables the analysis of social phenomena or trends through visualisation (Jun & Seo, 2013). The fundamental concepts discussed in this study have been explained as the primary basis and methodology.

Transitioning from the introductory information, numerous studies in the literature have explored the relationship between the metaverse, social interaction, social issues associated with the metaverse, and the decline in physical activity, particularly in sports. The metaverse has gained significant popularity among Generation Z, as evidenced by empirical research. This research has found that young people have made a notable transition to the metaverse, engaging in extensive social interactions on online platforms. Additionally, the supportive interactions on metaverse platforms play a crucial role in reducing social loneliness and enhancing social self-efficacy. However, this trend also highlights the concerning preference of the younger generation for virtual interactions over face-to-face encounters, posing a serious dilemma (Oh et al., 2023).

In addition, there has been considerable discussion surrounding the popularity of metaverse platforms that

utilise autonomous drivers. Users have shown a strong preference for social interaction through mixed reality scenario-based avatars (Voinea et al., 2022). A recent study highlighted the increasing viability of the metaverse and virtual worlds, emphasising their unique ability to facilitate real-time multisensory social interaction. This distinguishing feature sets them apart from traditional 2D internet platforms and contributes to the high quality of the metaverse's 3D environment and its interactive outcomes. However, it is worth noting that these high-quality benefits may have a detrimental impact on people's in-person social interaction (Hennig-Thurau et al., 2023). It is undeniable that the virtual world's high-quality service features and online social interactions have greatly accelerated human progress (Liang et al., 2023). However, the widespread use of this virtual system can also have negative effects on societal culture and physical interaction frequency. The concept of communication through digital mediums has expanded greatly, but it overlooks the fact that this digital transformation has significantly reduced in-person social gatherings and healthy movements among people (Riva, Wiederhold, & Mantovani, 2024). In addition, there are concerns about the impact of the metaverse on our ability to form meaningful relationships and develop our identities. Some argue that the negative consequences of the COVID pandemic have only exacerbated this issue, as social distancing measures have limited our in-person interactions. Virtual socialisation, while important for self-actualization, may not fully replicate the effects and efforts required for healthy relationship-building and identity development (de Castro, 2023).

In the realm of identity and personality development, maintaining a consistent routine and engaging in regular physical activity through sports holds immense importance (Anarbayev, 2021). However, the use of high advanced technologies such as the metaverse can have detrimental effects on human health. These negative consequences include damage to mental health, physical social isolation, and a tendency towards laziness and lack of engagement in healthy activities (Dwivedi et al., 2023). In a recent investigation, there has been a discussion about the metaverse and its impact on the human body. It has been noted that the metaverse can greatly influence various aspects of life. However, it is important to acknowledge that using online platforms can have negative effects on physical and mental health due to the lack of physical activities.

Nevertheless, this drawback can be turned into a strength by utilising 3D virtual metaverse technologies to engage in activities such as boxing matches with AI players, playing basketball in a virtual environment, and other options that

effectively combine sports with the metaverse (Bale et al., 2022). In addition, a study conducted by Yu (2022) provides more insight into how physical sports can be integrated into the metaverse. The study highlights that the metaverse is still in its early stages and suggests that it can be utilised as a medium for promoting sports education. However, this can only be achieved when universities embrace various physical sports technologies within the metaverse, particularly those related to physical sports.

### Research Methodology

Semantic network analysis utilises the power of big data and social network analysis (Figure 2). The study of social network analysis involves the visualisation of a network's structure using dots and lines to represent connections between different elements. Every point and line in the network reveal their interconnectedness, enabling us to grasp the overall characteristics (An, 2018).

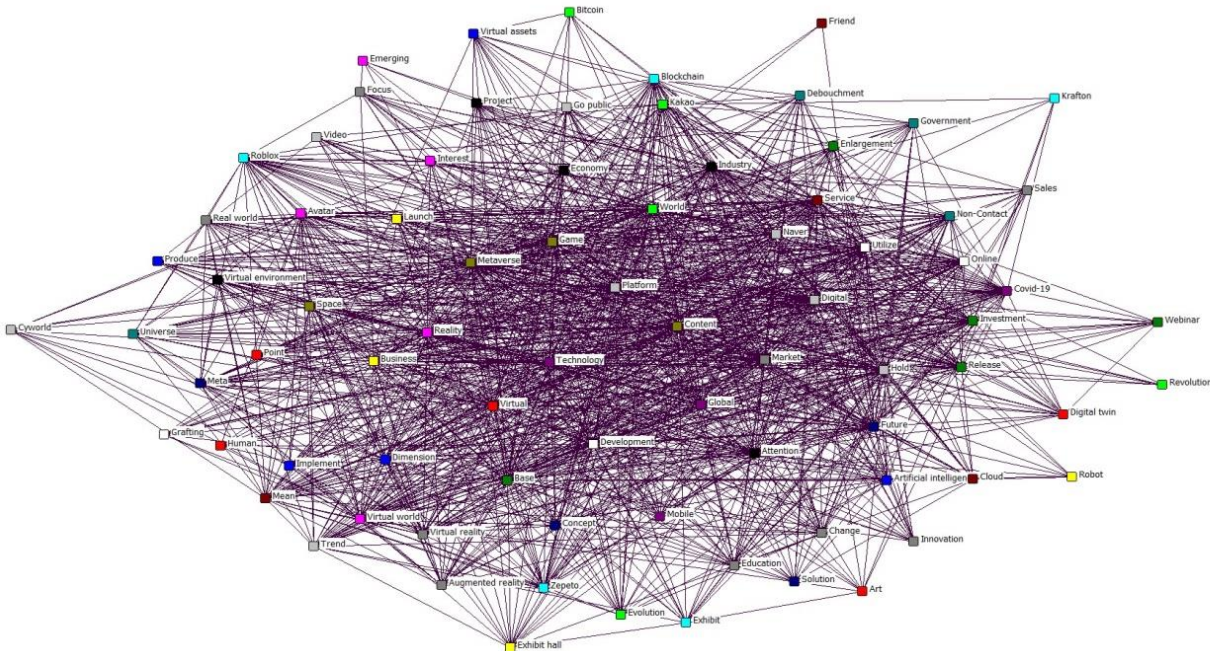


Figure 2. Full Network of Keywords Related to Metaverse.

### CONCOR Analysis

A widely utilised analysis method for structural equivalence is CONCOR (Kim & Jun, 2014). This method clusters significant terms based on their mutual similarity and reorganises the semantic network. Using CONCOR

analysis, one can easily elucidate the correlation between keywords and their overall structure. As depicted in Figure 3, within a network with equivalence from (A) to (I), there are two groups that exhibit structural equivalence. The first group consists of B, C, and D, while the second group comprises E, F, H, and I. E and F can be substituted.

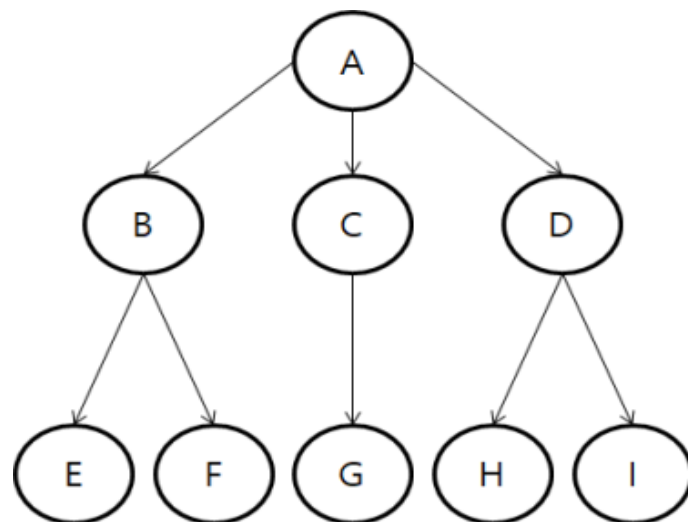


Figure 3. Equivalence-Satellite Network.

### Analysis Tools

In this study, the researchers utilised TEXTOM and UCINET6 solution tools to gather data, conduct keyword

analysis, determine frequency, and extract matrix data. Matrix data is a co-occurrence frequency matrix, as illustrated in Figure 4, that represents the frequency of simultaneous occurrences of A and B keywords (textom, 2023).

	Metaverse	Game	Naver	Reality	Virtual	Kakao	Platform	Technology	Hold	World	Content	Market	Future	Digital	Industry
Metaverse	0	2148	3337	3505	2493	2899	2074	1619	1790	1952	1477	1710	2215	1336	2918
Game	2148	0	57	266	378	30	362	214	107	236	314	226	222	155	196
Naver	3337	57	0	51	48	2520	187	61	37	96	98	110	35	38	42
Reality	3505	266	51	0	1300	58	184	234	91	611	137	104	881	198	106
Virtual	2493	378	48	1300	0	59	256	245	102	851	151	103	133	188	139
Kakao	2899	30	2520	58	59	0	65	69	29	29	32	63	15	65	35
Platform	2074	362	187	184	256	65	0	216	109	198	288	142	78	270	109
Technology	1619	214	61	234	245	69	216	0	170	214	186	172	167	244	106
Hold	1790	107	37	91	102	29	109	170	0	100	85	102	131	117	117
World	1952	236	96	611	851	29	198	214	100	0	108	134	116	191	66
Content	1477	314	98	137	151	32	288	186	85	108	0	148	85	311	217
Market	1710	226	110	104	103	63	142	172	102	134	148	0	68	96	81
Future	2215	222	35	881	133	15	78	167	131	116	85	68	0	109	130
Digital	1336	155	38	198	188	65	270	244	117	191	311	96	109	0	83
Industry	2918	196	42	106	139	35	109	106	117	66	217	81	130	83	0

Figure 4. Co-Occurrence Matrix.

This study utilised UCINET 6, a software package capable of analysing diverse social networks and offering the degree of centrality and CONCOR analysis through the NetDraw network visualisation tool (Borgatti, Everett, & Freeman, 2002).

### Data Collection and Preprocessing

Data from online news sources was gathered using three search engines: Google, Naver, and Daum. The search

term used was 'Metaverse'. The data collection period spanned from January 1, 2020, to May 31, 2021, coinciding with the global outbreak of COVID-19. From the extracted keywords, we removed unnecessary ones like specific names, regions, countries, and occupations to focus on the analysis. From the online news data, we selected the top 80 most frequently shown keywords out of the 35,005 extracted. The research procedure and its overall details are depicted in Figure 5.

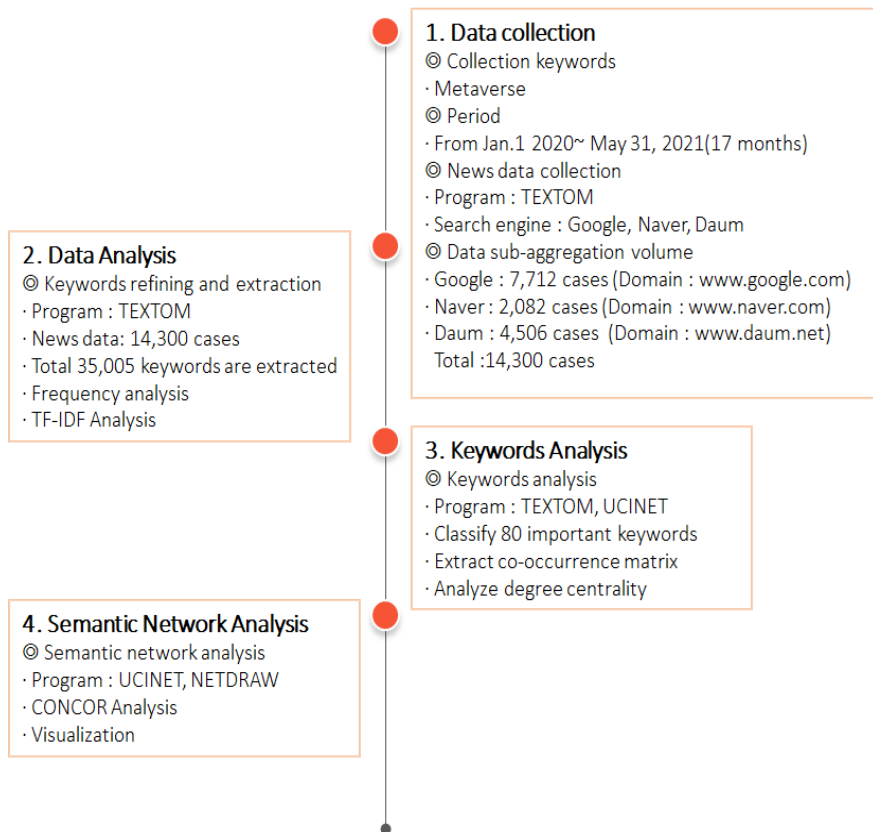


Figure 5. Stepwise Descriptions for Keyword Extraction.



16	Development	1171	Development	3202.665	Market	0.022
17	Global	1084	Zepeto	2964.448	Service	0.021
18	Zepeto	1033	Global	2927.972	Base	0.02
19	Service	990	Service	2891.123	Virtual world	0.02
20	Roblox	958	Business	2850.606	Mean	0.02
21	Business	952	Roblox	2817.762	Global	0.019
22	Base	911	Base	2616.588	Zepeto	0.019
23	Virtual World	898	Investment	2607.838	Utilize	0.018
24	Utilize	895	Virtual world	2589.295	Roblox	0.017
25	Investment	857	Utilize	2571.740	Dimension	0.017
26	Covid-19	749	Covid-19	2437.595	Business	0.015
27	Mean	727	Mean	2373.942	Investment	0.015
28	Virtual Reality	705	Blockchain	2274.437	Virtual reality	0.015
29	Blockchain	693	Virtual reality	2201.217	Blockchain	0.015
30	Attention	667	Release	2172.707	Covid-19	0.013
31	Release	665	Revolution	2139.728	Attention	0.013
32	Dimension	653	Online	2137.806	Revolution	0.013
33	Online	651	Attention	2136.577	Avatar	0.012
34	Art	586	Dimension	2045.107	Meta	0.012
35	Launch	551	Change	1992.591	Release	0.011
36	Revolution	545	Launch	1932.113	Online	0.011
37	Avatar	536	Art	1909.244	Non-Contact	0.011
38	Change	535	Avatar	1859.888	Digital twin	0.011
39	Focus	531	Non-Contact	1847.621	Concept	0.011
40	Non-Contact	529	Focus	1770.143	Launch	0.01
41	Digital Twin	497	Space	1711.032	Change	0.01
42	Concept	489	Exhibit hall	1704.614	Space	0.01
43	Space	486	Digital twin	1692.135	Krafton	0.009
44	Krafton	466	Government	1681.633	Exhibit hall	0.009
45	Emerging	466	Concept	1656.731	Webinar	0.009
46	Government	455	Education	1623.060	Trend	0.009
47	Go Public	429	Krafton	1603.573	Universe	0.009
48	Meta	428	Go public	1602.800	Focus	0.008
49	Education	416	Emerging	1599.521	Education	0.008
50	Exhibit Hall	411	Meta	1517.074	Augmented reality	0.008
51	Webinar	401	Trend	1479.969	Emerging	0.007
52	Artificial Intelligence	389	Artificial intelligence	1462.590	Government	0.007
53	Trend	381	Webinar	1438.226	Go public	0.007
54	Enlargement	363	Project	1429.053	Artificial intelligence	0.007
55	Interest	361	Enlargement	1407.588	Enlargement	0.007
56	Project	360	Interest	1355.152	Interest	0.007
57	Debouchment	347	Debouchment	1342.047	Project	0.007
58	Produce	345	Cloud	1326.249	Debouchment	0.007
59	Cloud	330	Produce	1319.629	Economy	0.007
60	Economy	328	Economy	1306.922	Virtual environment	0.007
61	Point	320	Cyworld	1299.894	Real world	0.007
62	Augmented Reality	317	Point	1251.847	Produce	0.006
63	Bitcoin	313	Bitcoin	1248.333	Cloud	0.006
64	Virtual Environment	311	Robot	1231.002	Point	0.006
65	Universe	304	Virtual environment	1221.019	Exhibit	0.006
66	Exhibit	288	Exhibit	1216.996	Implement	0.006
67	Robot	277	Augmented reality	1216.619	Evolution	0.006
68	Implement	275	Universe	1174.726	Virtual assets	0.005
69	Virtual Assets	270	Virtual assets	1138.362	Innovation	0.005
70	Cyworld	270	Implement	1103.076	Grafting	0.005
71	Friend	263	Video	1093.210	Mobile	0.005
72	Video	253	Friend	1065.297	Solution	0.005
73	Evolution	248	Mobile	1037.802	Art	0.004
74	Real World	248	Solution	1034.269	Bitcoin	0.004
75	Innovation	240	Sales	1032.088	Robot	0.004
76	Grafting	239	Innovation	1032.037	Friend	0.004
77	Mobile	239	Human	1030.914	Video	0.004
78	Human	238	Evolution	1023.148	Human	0.004
79	Solution	237	Real world	1016.788	Sales	0.004
80	Sales	235	Grafting	990.192	Cyworld	0.003

### CONCOR Analysis

To understand the meanings of the 80 significant terms, it is essential to group them into similar categories. In this study, the CONCOR analysis was conducted as a clustering method, and the number of clusters that emerged was determined through a dendrogram (Lee & Song, 2020). The hierarchical clustering dendrogram displays a vertical column of nodes that represent the original data, while the other nodes represent the clusters that the data is grouped into. The arrows indicate the distance between the clusters. This study utilised four classification criteria, as depicted in

Figure 7. When the classification criterion was set to five, the clusters exhibited a complex and intricate structure. When the classification criterion was set to three, it became evident that the cluster of keywords was distinct. However, it was observed that there was a tendency for excessive concentration within a specific cluster. Therefore, the presence of three classifications posed a challenge when it came to examining and analysing from different perspectives. Using the UCINET6 programme, the CONCOR analysis was conducted based on the dendrogram with four classification criteria. The visualisation results can be seen in Figure 7 and Table 2.

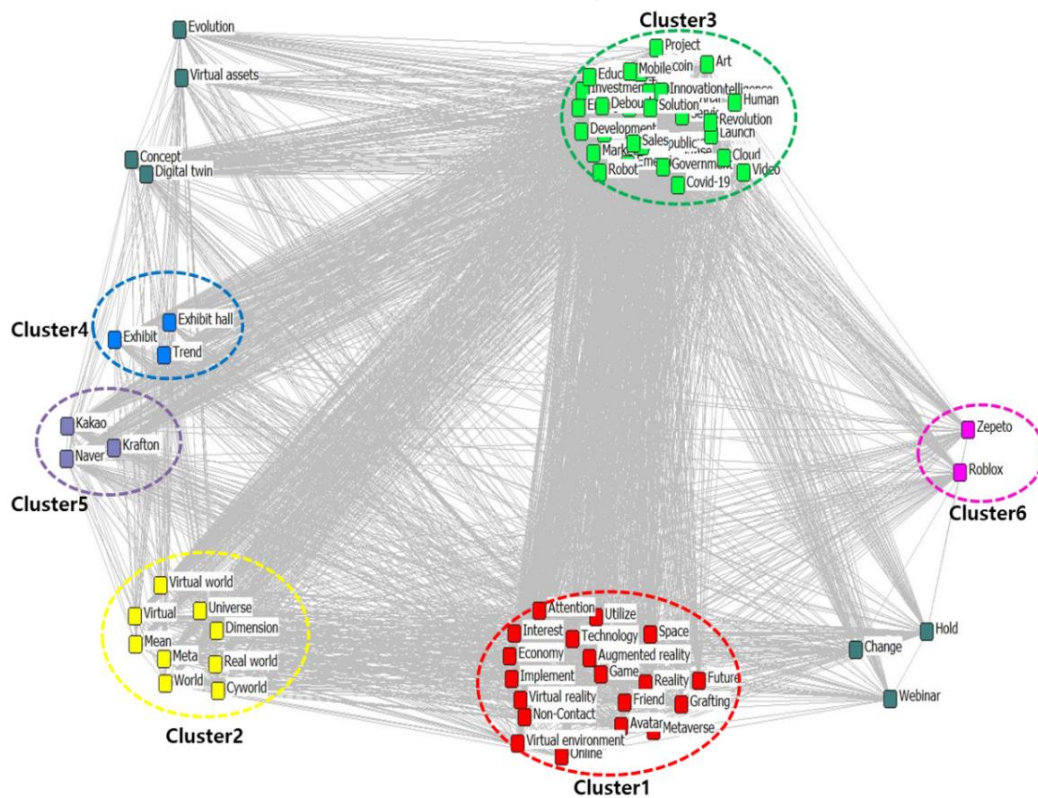


Figure 7. CONCOR Analysis of Metaverse keywords.

Cluster 1 (red squares) was labelled as 'immersive content and technology' based on the CONCOR analysis. This cluster was formed by keywords such as Metaverse, Game, Virtual reality, Augmented reality, and technology. Cluster 2 (yellow squares) was labelled as 'definition' as it comprises the explanatory terms for Metaverse, including Virtual, Universe, Virtual world, and Cyworld. Cluster 3 (green squares) was labelled as 'New Industry' due to its composition of Platform, Content, Digital, Blockchain, and Bitcoin. Cluster 4 (blue squares) was given the name 'Exhibition' due to its inclusion of the exhibition hall and a trend. Cluster 5 (violet squares) was designated as a 'Content Company' due to its inclusion of the two largest digital content companies in Korea, namely Naver and Kakao.

Cluster 6 (purple squares) was labelled as 'Content' due to the presence of keywords such as ZEPETO and Roblox. Clusters 7 and 8 were not included in the analysis due to their complex interpretation and lack of significant connections. Further elaboration on the clusters can be provided by referring to Figure 7 and Table 2: The cluster focused on the growth of digital content industries, highlighting how they were expanding due to the rise of non-face-to-face culture. In addition, the rapid expansion of immersive content technology like VR, AR, and MR has led to significant growth in the content industries. This has captured the attention of the public, who are increasingly interested in these advancements. The keywords associated with this trend include Game, Virtual reality, Augmented reality, Technology, Future, Utilise, Online, and Economy.



**Table 2***Six Clusters and the Keywords.*

Cluster Group	Cluster Name	Keyword
Cluster1 Red (19)	Immersive content and technology	Metaverse, Game, Reality, Technology, Future, Utilize, Virtual reality, Attention, Online, Avatar, Noncontact, Space, Interest, Economy, Augmented reality, Virtual environment, Implement, Friend, Grafting
Cluster2 Yellow (9)	Definition	Virtual, World, Virtual world, Mean, Dimension, Meta, Universe, Cyworld, Real world
Cluster3 Green (37)	New industry	Platform, Content, Market, Digital, Industry, Development, Global, Service, Business, Base, Investment, Covid-19, Blockchain, Release, Art, Launch, Revolution, Focus, emerging, government, Go public, Education, Artificial intelligence, Enlargement, Project, Debouchment, Produce, Cloud, Point, Bitcoin, Robot, Video, Innovation, Mobile, Human, Solution, Sales
Cluster4 blue (3)	Exhibition	Exhibit hall, Trend, Exhibit
Cluster5 Violet (3)	Content company	Naver, Kakao, Krafton
Cluster6 Purple (2)	Content	Zepeto, Roblox

Within the realm of 'definition', the key concepts of the Metaverse are elucidated by terms like Virtual, Dimension, Meta, and Universe. It demonstrated that the Metaverse has progressed beyond its initial stage of emerging into the public consciousness. The 'New Industry' cluster comprised of Cloud, Artificial intelligence, and Robot, which are widely recognised as promising industries for the future. This suggests that the government and investors are actively making strategic moves towards the Metaverse. The 'Exhibition' cluster consisted of elements such as the Exhibit Hall and Trend, which reflected the transition from traditional offline exhibitions to online-oriented Metaverse exhibitions. The 'Content Company' and 'Content' clusters comprised a compilation of company names that we anticipated would play a significant role in shaping the Metaverse ecosystem in the coming years.

In summary, the extended COVID-19 pandemic has greatly boosted the expansion of digital content industries. The collaboration between the government and business sectors is anticipated to foster sustainable growth for the Metaverse. Digital games and immersive technologies garnered significant attention due to their crucial role in introducing users to the concept of Metaverse and building the necessary platforms.

## Discussion and Conclusion

### Discussion of the Empirical Findings

The study has focused on exploring the social issues associated with the metaverse platform using big data. It aims to emphasise the connection between the gathered

information and the decline in sports participation, highlighting the importance of achieving a balance between the metaverse and real-life social interaction. The key findings revealed that the cluster focused on "immersive content and technology" demonstrated a significant growth in the digital content industries because of the shift towards non-face-to-face interactions. On the other hand, the "definition" cluster provided an explanation of the core concepts of the Metaverse. However, it is worth noting that this cultural shift has had a negative impact on sports and social activities. Furthermore, within the 'New Industry' cluster, several industries with great potential for the future emerged. However, this cluster did not paint a positive picture for sports activities, as the prevalence of the virtual world metaverse seemed to overshadow them.

Additionally, the 'Exhibition' cluster suggested a shift from traditional offline exhibitions to online-oriented Metaverse exhibitions. At last, the clusters related to specific content companies that are leading the way in the future Metaverse market. However, these final clusters did not identify any potential room for sports. The analysis results indicate that for the sustainable growth of Metaverse in the post-COVID era and the achievement of a balanced metaverse with sports activities, collaboration is needed between relevant government ministries, departments, agencies, and the metaverse and sports sectors. This collaboration will activate Metaverse-related startups, small and medium enterprises, universities, and research institutes. It will also maximise social interaction and utilise the metaverse to promote physical sports

activities, ensuring the sustainability of society and the well-being of individuals.

This will provide opportunities for global companies, sports federations, complexes, and other metaverse startups to work together and thrive. Additionally, it is crucial for Metaverse companies to prioritise the creation of captivating content and raise awareness about the significance of physical sports for a sustainable lifestyle. This can be achieved through the advancement of 5G-based hardware and software, which will encourage its usage and promote a healthy and active lifestyle by integrating sports. This is a matter of establishing a strong presence in the Metaverse industry and integrating physical sports activities into the lives of metaverse users.

### **Conclusion**

The growing trend of relying on online platforms for everyday tasks has sparked a renewed interest in the Metaverse as a means of communication that can serve as an alternative to physical spaces. During a period when the Metaverse is capturing significant interest from both the government and the public, this study aimed to uncover the primary social concerns linked to the Metaverse and its potential consequences through the utilisation of big data analysis methods. To fulfil this objective, a total of 14,300 online news articles pertaining to the Metaverse were gathered from prominent search engines such as Google, Naver, and Daum. After analysing the data, we were able to extract 80 significant keywords using text mining techniques.

Subsequently, we conducted a CONCOR analysis to identify six distinct clusters of keywords. These clusters include topics such as immersive content and technology, definition, new industry, exhibition, content company, and content. The key clusters that were identified all pointed towards the sustainable growth of the metaverse. However, they also brought attention to the concerning decline of face-to-face culture and the absence of physical sports activities. Thus, the study has determined that the metaverse world and the related sports organisations must prioritise giving considerable importance to utilising the mentioned online world to highlight the importance of physical sports for a healthy lifestyle.

### **Implied Significance of the Study**

The study has made several unique contributions and implications that can be utilised by a wide range of scholars and researchers from the empirical side. It also provides suggestions for the government and other associated bodies to work towards more efficient operations in the metaverse dimension. This study has revealed a notable

rise in the usage of the metaverse following its introduction. It has also shown that the metaverse is being increasingly embraced in various industries. As a result, it is crucial for researchers to comprehend its widespread impact on society. In addition, researchers have explored the relationship between the metaverse and online sports, revealing a potential negative impact on physical sports and social interaction. Thus, within the growing metaverse phenomenon, this study sheds light on the various industries and content creators that play a crucial role. The findings of this study provide substantial evidence to support this notion.

From a practical standpoint, the study has emphasised the importance of incorporating the metaverse world to promote physical sports. The compiled results have revealed a significant transition from face-to-face interactions to online virtual experiences through the metaverse. To prevent any potential drawbacks of widespread adoption of metaverse and online platforms, the government, industries, and content companies are emphasising the significance of physical sports and social interaction within the metaverse. This multi-dimensional approach aims to ensure the prosperity of the virtual world while also considering the needs and preferences of its users.

### **Observed Limitations of the study**

This paper has certain limitations as the data collection period was relatively brief and primarily centred around the post-COVID-19 outbreak period. Consequently, it becomes challenging to derive a comprehensive conclusion. Furthermore, the study conducted an analysis using news articles from portal sites, excluding individuals who are actively engaged in the virtual space of the Metaverse. Furthermore, this study has not utilised any empirical model to illustrate a significant correlation between physical sports and the metaverse. In addition, the study has placed a strong focus on the use of metaverse and big data to promote social interaction and sports. However, it has not addressed any key strategies that could effectively enhance sports activities in people's daily lives through the metaverse. Finally, it is worth noting that this study was conducted on a relatively small sample size, which may impact the overall findings and conclusions.

### **Future Research Directions and Suggestions**

The study has emphasised the need for additional research due to the limited data sample. It is recommended to conduct further research with a larger and more diverse

data collection. Additionally, gathering user feedback through surveys or focus group interviews would provide valuable insights into their reviews and opinions. In addition, it is crucial for future researchers to emphasise the connection between the metaverse and sports. They should also focus on promoting physical sports and increasing awareness through live social interactions in their studies, utilising the metaverse as a tool.

A well-designed empirical model can be applied in future studies to assess the effectiveness of strategies implemented by metaverse companies and online virtual world platforms in promoting the significance of sports to users. The study proposed various methods of communication, such as indirect messages and advertisements, to emphasise the

significance of sports. It also recommended integrating physical sports into metaverse gaming and leveraging virtual world influencers to promote awareness. These strategies were found to be effective for further exploration.

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