

The Transformation of the New Media Communication Paradigm in the Metaverse Era and Blockchain Based on the Topological Characteristics of Information Communication

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ABSTRACT

Keeping pace with the times, this paper analyzes and interprets the concept, characteristics of Metaverse, and its influence on new media communication. Based on this, under the topological characteristics of information communication, this paper discusses the transformation of new media communication paradigm in the metaverse era and models the prediction of new media information dissemination in metaverse. In this paper, the multi-agent modeling method is used to analyze and compare the evolution results of each agent attribute under different parameter values. At the same time, based on the ideal social media network, the improved integrated immune control strategy is applied to the dynamic model of epidemic (SEIR) with latent period, and the spreading and evolution process of rumors before and after immunization is simulated. This research has both theoretical value and practical application value, which can provide a useful reference for the follow-up research of new media communication.

KEYWORDS

Blockchain, Information Dissemination, Metaverse, New Media

INTRODUCTION

In the long process of human social development, the truly meaningful and valuable “message” is not the communication content of each era, but the communication tools used and the social changes it brings (Huang et al., 2015). With the further development of the internet, the next blue ocean of digital information technology revolution is coming out. Network refers to the dissemination of human information through computer networks (Gretry et al., 2017). Information in the network transmission is stored in digital form, spread at a high speed through the computer network, and read by computers or similar terminal devices. The interpersonal social network of information dissemination

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is a complex social network that is determined by the network topology structure and the connection relationship between nodes in a specific situation (Du & Dao, 2014). However, as a rising medium, the network is more deceptive than the traditional media because its information dissemination has no center or margin. With the increasing number of internet users, the social influence of the internet is constantly expanding. In the era of Web 2.0, every netizen holds the initiative of information, and every netizen is a small network medium. They will freely express their views and opinions on the affairs of enterprises or governments from their own perspectives (Yan et al., 2016). As the main body of information dissemination, netizens have the purpose, initiative, and enthusiasm. They are influenced by other subjects and environments, and their behavior also directly or indirectly affects other subjects and environments. On the whole, the emergence of the internet has made the prediction of the global village closer and closer to reality. We have seen the tremendous power of the internet media and its gradually mature development state. Through the network, people can freely carry out data transmission and information conversation. It has brought unprecedented changes to people's lives and brought great changes to all walks of life, including the communication industry.

Metaverse is different from the “virtual world” and video games. It originated from science fiction. Nowadays, the concept of metaverse is exploding, and some people call it the ultimate form of internet (Alsamhi et al., 2022). As the framework concept, the underlying logic and the technical reserve all have certain foundations; the metaverse, as a parallel world of the network, is not within reach, but it is not out of reach (Liu & Li, 2015). The metaverse discussed in this paper is not simply equal to digital games and virtual reality. Metaverse is a new internet application and social form that integrates virtual and real situations and is produced by integrating a variety of new technologies. It closely integrates the virtual world with the real world in social, economic, cultural, social, and identity aspects. It also allows users to produce content and edit the environment. Meta-concept is essentially a pioneering application of information value at a higher level, and the core value of media industry lies in information itself. In the new media era, users can be information receivers of online media, or disseminators who use online media to publish information. The traditional communicators have changed, and the source will also change (Hopp & Vargo, 2017). The emergence of new media tools has changed the way we spread information and has made a profound impact on our lives. Throughout the history of media development, with the birth of the internet and the development of new media, Marshall McLuhan's advanced theory is being realized one by one. Based on this development, this paper discusses the issue of new media communication in the metaverse era.

At present, we are in an era of mass communication. Books, radio, television, and other mass media transmit information to every corner of society. Especially after the emergence of new media, there are more and more forms of mass communication. The openness and freedom of the network make more people choose the form of online mass communication. Various forums and communities can allow people from all walks of life to express their opinions freely (Houston et al., 2015). With the development of push technology, “immersive experience” has been widely used in the new media field, especially when combined with mobile communication devices, making information more innovative in presentation and experience. The new media with digital technology as the carrier has broken and melted the boundary between media, region, and administration; it has also shown the characteristics of outstanding personalization, real-time information release, strong interactivity, diverse forms of expression, and more audience selectivity (Fusi & Zhang, 2020). The birth of metaverse will bring another industrial innovation to the development of new media. From the perspective of communication, metaverse is actually a kind of “meta-media”—its ambition to cover all media contains changes in communication mode, communication ecology, and communication philosophy. The technological change in the process of meta-ecological construction will definitely bring great influence on the deep integration of media, and it will promote the profound changes in the speed, intensity, and breadth of the evolution of new media. Under the topological characteristics of information communication, this paper discusses the transformation of the new media communication paradigm in the metaverse era. Its main work and innovations are as follows:

First, the paper proposes a theoretical framework that combines the metaverse with the transformation of media technology and then deeply analyzes the concept, characteristics, and impact of the metaverse on new media communication. This framework helps to understand the essence of the metaverse and its differences from traditional media.

Next, the paper reveals a significant shift in the paradigm of new media communication in the era of the metaverse, emphasizing the profound impact of the metaverse on communication methods, purposes, and the relationship between subject and object. This focus provides a new research perspective for the field of media studies.

By using multi-agent modeling methods, I analyze the evolution results of various agent attributes under different parameter values. This method provides a powerful tool for understanding the interactions between multiple participants in the metaverse.

I apply an improved integrated immune control strategy to the Susceptible-Exposed-Infection-Recovered (SEIR) dynamic model, simulating the spread and evolution of rumors before and after immunization. This strategy is of great significance for rumor control in information dissemination and provides new methods for the field of information security. Through simulation experiments, I demonstrate the high prediction accuracy of the algorithm (95.208%), emphasizing the reliability and practical application potential of the model.

RELATED WORK

With the rapid development of network technology, the influence of the internet on social life is increasing. As the main body of information dissemination on the internet, netizens' behavior patterns have a direct impact on the process of information dissemination on the internet. Many scholars have discussed the related issues of new media communication. Mystakidis (2022) stated that the metaverse is not simply a new internet track, but rather, Web 3.0, a higher-dimensional digital new space on top of the PC internet and the mobile internet. This digital space is significantly different from traditional PC internet and mobile internet. This viewpoint highlights the new dimension of the metaverse as a new digital space (Mystakidis, 2022). Dhiman (2023) posited that a distinctive feature of existing internet media that is different from traditional media is that it has interactive social attributes, and "interactive social interaction" is also the first attribute of the internet. This belief reveals the importance of new media in social interaction (Dhiman, 2023). The higher-dimensional metaverse is bound to achieve new-dimensional interaction and social interaction through new technologies, new concepts, and new procedures. According to Yuan et al., an important reason why digital media has become so common is the emergence of the World Wide Web (Yuan, et al., 2023). The World Wide Web became the petri dish for the explosive growth of "digital survival." It means we don't have to worry about which server we're on, or which directory we can access. We can just do the linking and think about the structure later. This point emphasizes the importance of the popularization of digital media for information dissemination. Farid (2023) pointed out that the metaverse is not a video game. Video games generally escape reality, set up addiction mechanisms, and passive consumption, whereas the metaverse is connected with reality, advocates free exploration of the open world, and encourages users to produce content by themselves (Alsamhi et al., 2022). On the internet platform, traditional media will re-create the value of content creation in a new situation. Creedon et al. combined the technology of big data in the field of computer with the practice in the field of news communication, truly realized the theoretical analysis and practical research of news media under information technology, and explored the reform of media production mode and communication mechanism in the new era (Li & Liu, 2023). Farid (2023) posited that the door of the current scene era has been opened. In the future, every person, every industry, and every form of existence in society will be profoundly affected and changed by the scene era—a social connection with scene services and scene sharing. The basic paradigm can realize the person's incarnation to participate in "arbitrary" real practice in the way of "presence" (Farid, 2023). This is the highest form of media as "human relational connection" in the real world. On the

basis of network topology modeling, Lenze established a reasonable interpersonal communication model of mobile internet crisis information (Bulovsky, 2019). Koohang (2023) pointed out that the metaverse not only provides a tool for visualizing information in a social, collaborative environment but also empowers participants to construct and modify virtual spaces. Mayer et al. (2023) stated that immersive media has become a new direction for the development of the new media industry. This new industry will generate innovative reporting scenarios, reporting modes and methods, and new dimensions of interactive social networking, thus providing audiences with an unprecedented immersive experience (Mayer et al., 2023).

The traditional communication theory and its simplified model can hardly describe the current social media network. Under the topological characteristics of information communication, I discuss the transformation of a new media communication paradigm in the metaverse era and model the information dissemination prediction of metaverse new media. For this paper, I used the multi-agent modeling method to analyze and compare the evolution results of each agent attribute under different parameter values. I also simulated the evolution process of rumor spreading before and after immunization.

METHODOLOGY

The Evolution of New Media Communication From the Perspective of Metaverse and Blockchain

In the blockchain, metaverse is a new social form that is produced by integrating a variety of new technologies; it emphasizes the integration of reality and reality. Its concept can be simply understood as a collective, lasting and parallel “virtual world” (Dyner & Chovanec, 2021). In the metaverse, we can interact with people, places, and events in real time in the form of virtual avatars, and we complete behaviors such as work, consumption, social interaction, and entertainment. From the perspective of communication, the metaverse is actually a kind of “meta-media”—in its ambition to cover all media, it contains changes in communication mode, communication ecology, and communication philosophy. It provides immersive experience based on augmented reality technology, generating a mirror image of the real world based on digital twin technology. It builds an economic system based on blockchain technology, and it closely integrates the virtual world with the real world in an economic system, social system, and identity system. It also allows each user to produce content and edit the world. The metaverse has brought a comprehensive interweaving of a virtual environment and reality. It includes the following contents:

- The metaverse will profoundly change the organization and operation of the existing society through the integration of virtual and real.
- The metaverse will not replace real life with virtual life, but will form a new lifestyle of virtual and real two-dimensional.
- The metaverse will not replace real social relations with virtual social relations, but will give birth to a new type of online and offline social relations.

Metaverse, as a “new invention” embedded in the digital revolution and the development sequence of internet technology, like almost all meta-media, serves as an integrated media to reduce the former mainstream media, which used to occupy the dominant position in human society, to secondary media and subordinate media. Under the logic of metaverse, the scene applications created by new technologies, such as augmented reality/virtual reality (AR/VR), artificial intelligence (AI), and fifth generation wireless network technology (5G), will bring more possibilities for media transformation. The medium of the future will no longer exist as a fixed “entity,” but rather, a complex system constructed by data, algorithms, and computing power. We can understand the algorithm as a kind

of media that has an important enlightenment to grasp the construction path of mainstream media in the future communication.

In the blockchain, the commonness between metaverse and new media clearly shows that the future development of media industry is closely related to the development of metaverse. In fact, a newer medium that doesn't even exist at present may be nested in an older medium. The most obvious ones are those science fiction movies, virtual reality environments, transmission devices, or brain implants that predict breakthroughs in imaging and communication technologies (Wang, 2022). In today's Web 2.0 era, every netizen holds the initiative of information. Every netizen is a small network media, and these netizens will freely express their views and opinions on the affairs of enterprises or governments from their own perspectives. As the mainstream new media, its fundamental task lies in mastering the discourse power of the mainstream ideology in the new era, spreading the mainstream values and expanding the mainstream public opinion position. With the rapid development of new mobile internet technology, the era of universal interconnection has arrived. The audience is not only the information receiver but also the content producer who can release information at any time. The influence of the universe on the new media in the future is mainly manifested in the modes, voices, forms, and ideas of communication. Among them, the change of communication mode will be embodied in the stage from the most basic digital twinning to the higher stage of virtual and real integration, and the communication activities will also transition from the actual information transmission between entities to the "surreal" information transmission between entities. The meta-concept of the universe is shown in Figure 1.

From the blockchain, technological innovation—that is, new means and forms of communication—constantly appear, constantly challenging the survival of traditional media. With the integration of traditional media and network, the transformed traditional media continues to occupy an important place in the media structure (Cheng, 2022). Traditional media have started online editions, providing new comment space and hyperlinks to achieve cross-site and multi-point reporting. The

Figure 1. Blockchain-based metaverse concept



biggest feature of the current digital media platform is that all previous media and their modes of transmission can coexist in digital form. The new media platform gathers media contents, such as text, images, sounds, and videos; inherits almost all the original interactive ways of mass media and face-to-face communication, including narration, debate, and games; and integrates different modes of communication and communication. A major feature of metaverse is “immersion experience” (Majeed et al., 2021). The so-called immersion experience can be understood as the participation, inclusion, and interaction with the digital environment, and the feeling of experiencing the alternative reality objectively provided by virtual reality technology. Based on this understanding, with the help of metaverse technology and brain-computer interface, we can open up a brand-new reporting mode—real feeling reporting. With the help of metaverse technology and brain-computer interface, real feeling reporting will subvert all existing reporting modes, for example, food reporting, so that the audience can get real tongue-tip experience. Metaverse, relying on its unique genre, framework, and mechanism, has constructed a set of communication modes that are different from those in the previous mass media era and Web era. As a kind of “meta-media,” it not only absorbs different media contents and mechanisms but also makes some adjustments or returns to the bias of the old media in the past, and at the same time brings some new directions for future communication.

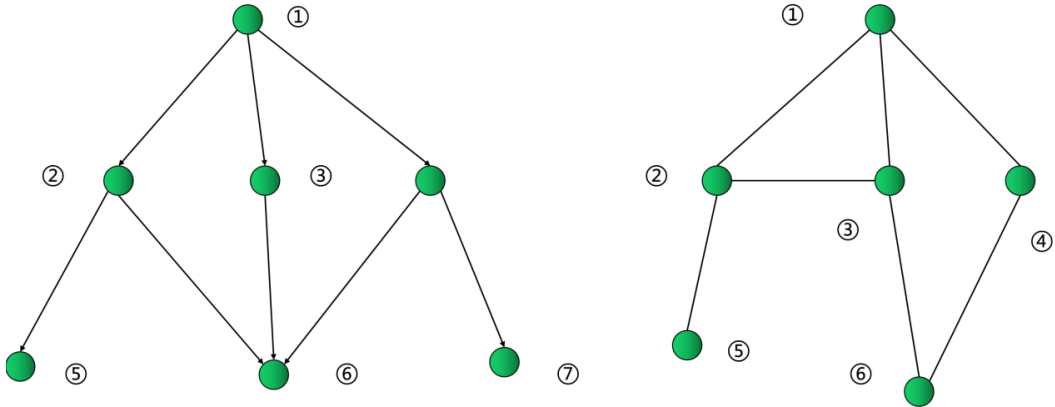
Prediction Modeling of New Media Information Dissemination

This study includes the following assumptions: the new media communication paradigm of the metaverse will play a key role in the future; multi-agent modeling and immune control strategies can be used to predict the evolution of information dissemination and rumor dissemination; and immersive media will provide unprecedented experiences and interactions.

Social networks are a network structure consisting of a series of nodes and connections between nodes. This theory originated from sociology and later evolved into a quantifiable research method that can be formalized by combining it with disciplines such as graph theory and econometrics. Social network analysis refers to a quantitative research model that represents actors with nodes and specific relationships between them with lines. It conducts structural analysis on the set of these nodes and lines. The research object can be expanded to any similar thing with structural connections, and social network models can analyze the status and importance of individual nodes in the network, as well as reflect the overall structural characteristics of the network. In the field of social network research, any social unit or social entity can be regarded as a point, or when there is a relationship between two actors, the relationship is regarded as the connection between the two points. This connection represents the concrete content of the relationship or the substantial relationship that actually occurs. Among them, the difference between directed network and undirected network lies in whether edges are directional or not. There are differences in access to nodes in the network. The degree of entry of node 1 refers to the number of all nodes that regard node 1 as their friends. The degree of 1 point refers to the total number of friends owned by node 1. In the graph of undirected social network, it means that node 1 and node 2 are friends with each other. There is no discrepancy, as shown in Figure 2.

The definition of a connected subgraph of a network is that if a subgraph of a network has a connected path between any two vertices, then the subgraph is called a connected subgraph of the network. The size of a connected subgraph indicates the number of vertices contained in the connected subgraph. The main method used to generate time series is data aggregation. Data aggregation refers to arranging the selected data according to the time sequence, counting the number of samples in different time intervals, and taking the number of samples as the value of time series to generate time series. The degree is a statistical indicator of the connection between two nodes. Usually, the degree k_i of a node is interpreted as the number of other nodes directly connected to the node, which is recorded as $\langle k \rangle$. In a sense, the degree of a node also indicates the influence of this node in the network.

Figure 2. Directed topology and undirected topology



Cumulative degree distribution function $p(k) : p(k)$ represents the probability distribution of nodes whose degree is greater than or equal to k . In practical applications, the cumulative degree distribution function is often used, and it is easy to find network distribution characteristics, as shown in equation (1):

$$p_k = \sum_{K-k}^{\infty} p(k) \quad (1)$$

In a network, the minimum number of edges through which two nodes pass is the path length. The average path of the network is the average distance of all node pairs. The mathematical expression is shown in equation (2):

$$L = \frac{2}{N(N+1)} \sum_{i \geq j} d_{ij} \quad (2)$$

Among them, d_{ij} is defined as the distance between the i and j nodes, and N is the total number of nodes in the network. It is found that scale-free network has small average path length, large clustering coefficient, and small world effect. When the average degree of nodes is fixed, the increase of average path length is proportional to the logarithm of network scale. Compared with the node with low degree, the newly added edge is more likely to be connected to the node with high degree; that is, the rule of selecting the other end is that the probability of a point being selected is proportional to the degree of this end. Network density is the ratio of the actual number of edges in the network to the maximum number of possible edges in the network. If the number of vertices existing in the network G is N , and the actual number of edges is K , then the density of the network is as shown in equation (3):

$$Desity(G) = \frac{K}{N(N+1)} \quad (3)$$

The clustering coefficient of the network represents the aggregation degree of nodes in the network, which is defined in equation (4):

$$C = \frac{\text{Number of closed triplets}}{\text{Number of connected triplets of vertices}} \quad (4)$$

Among them, connected triplets is defined as a connected subgraph consisting of three vertices and two edges; closed triplets refers to a triangular connected subgraph that can form a closed loop.

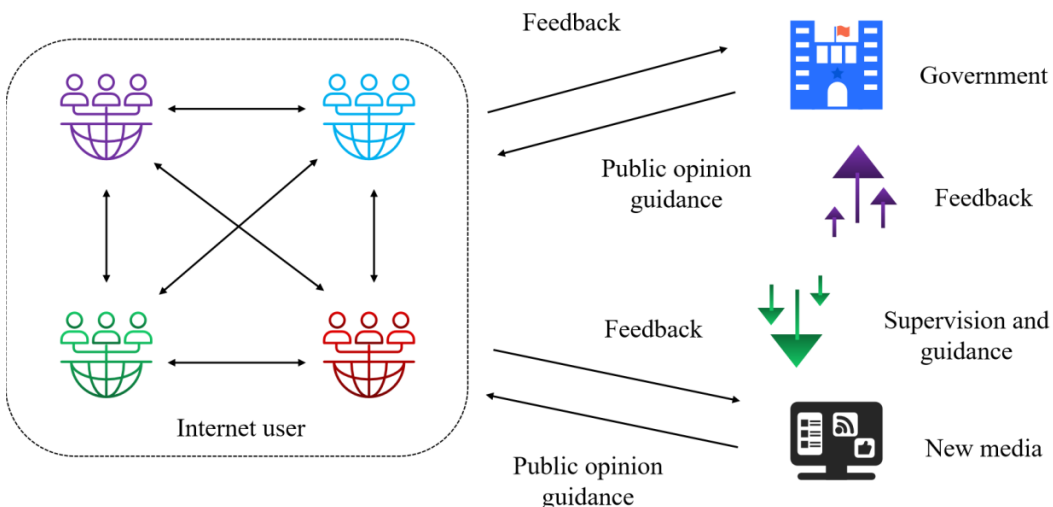
There are three main types of subjects that influence the spread of network information: government, network media, and netizens. In the network environment, netizens are not only receivers of information but also disseminators of information, and there are great differences among individuals. However, when public emergencies with high uncertainty occur, people gathered at high density on the internet will show unconscious and conditioned imitation behavior, and the minority will obey the majority in decision-making. Figure 3 shows the interaction among the government, online media, and netizens.

In the social network model $G = (V, E)$, if the degree of node i is equal to k_i , it can be understood that node i has k_i connected nodes. Then there are two cases of k_i between adjacent nodes: Theoretically, the number of edges is $k_i(k_i - 1) / 2$, and in fact the number of edges is E_i . Therefore, the clustering coefficient of node i can be expressed as shown in equation (5):

$$C_i = 2E_i / (k_i(k_i - 1)) \quad (5)$$

Average the sum of the clustering coefficients of all nodes in the network to obtain the clustering coefficient of the network, as shown in equation (6):

Figure 3. Interaction among three kinds of subjects



$$C = \frac{1}{N} \sum_{i=1}^N C_i \quad (6)$$

The distribution function $P(c)$ of the clustering coefficient represents the probability that the clustering coefficient of a random node v is just around c ; namely, it is the formula shown in equation (7):

$$P(c) = \frac{|V(c)|}{V} \frac{\left| \left\{ v \in V \mid C - \frac{1}{2m} \leq C(v) \leq C + \frac{1}{2m} \right\} \right|}{N} \quad (7)$$

In this formula, $| \cdot |$ represents the size of the set, V_c represents the node set whose clustering coefficient is in the interval near c , C is a discrete value, and m is a natural number. $P(c)$ can be used to understand the distribution of clustering coefficients in the network. In general, the obvious characteristic of regular network is that the clustering coefficient is large. The obvious characteristic of the network is that the clustering coefficient is small. A small world network has a large clustering coefficient and a small average distance.

The input requirements of the model are stationary random sequences, but for many time series, they are not stationary, so these sequences need to be processed in advance. The most commonly used method is the difference process of time series. According to the characteristics of time series, the first-order forward difference process is shown in the formula in equation (8):

$$\Delta y_t = y_{t+1} - y_t = (1 - L)y_t \quad (8)$$

The forward difference process for d order difference is shown in the formula in equation (9):

$$\Delta^d y_t = \Delta^{d-1} y_{t+1} - \Delta^{d-1} y_t = (1 - L)^d y_t \quad (9)$$

The prediction process can be expressed as shown in equation (10):

$$\left(1 - \sum_{i=1}^p \phi_i L^i \right) (1 - L)^d y_t = \left(1 + \sum_{i=1}^q \theta_i L^i \right) \varepsilon_t \quad (10)$$

The change of netizens' attitudes is influenced by the attitudes of other netizens, online media, and the government, but the degree of influence on netizens' attitudes may be different, which is expressed by weight. More and more studies show that there are often associations in users' social networks; that is, users will form some small groups called associations according to some reasons, such as hobbies or geographical location. In this paper, the social network formed by early users who liked news is introduced, and some topological characteristics of the social network are calculated as new features to improve the effect of the algorithm. In addition, the model in this paper considers not only the dependence of time series but also the interference of randomly fluctuating time series, and it has a good prediction effect for short-term time series prediction.

RESULT ANALYSIS AND DISCUSSION

In this paper, I describe the method and frame flow of the new media information dissemination prediction algorithm based on the topological characteristics of information dissemination. I briefly explain the data used and the corresponding experimental steps. I then apply the algorithm proposed in this article to the dataset for experiments, verifying the effectiveness of the new media information dissemination prediction algorithm based on information dissemination topology features.

First, I constructed an ideal social network model and then simulated and analyzed the important statistical characteristics of the network. To observe the topology diagram of the network and the degree of each node, I constructed a BA scale-free network with 50 nodes as an example (Sharma et al., 2021). According to the propagation mechanism of SIR model, all nodes in social media networks are divided into three categories: S (uninfected nodes), I (propagation nodes), and R (immune nodes). I collected the data of a public event as the initial data and ran the program based on the Repast platform. The output results are shown in Figure 4.

In the evolution interface, Curve 1 represents the number of netizens whose subject supports false information, Curve 2 indicates the number of netizens who have a neutral attitude toward false information, and Curve 3 indicates the number of netizens who object to false information. The time graph reflects the evolution process and trend of different attitudes of netizens from the initial moment to the current moment.

After stabilized the algorithm, the evolution process and trend of netizens, attitudes are shown in Figure 5. The abscissa is the time axis, and the ordinate indicates the number of netizens.

Note that before the real information is published, false information is brewing and spreading. Once the factual information is published, the attitude of netizens to information will change fundamentally, which is shown in the graph that the potential of Curve3 rising and the potential of Curve1 decreasing.

According to the characteristics of social media networks, when the network scale reaches a certain number, the network characteristics tend to be basically stable. Therefore, I constructed a scale-free

Figure 4. Model evolution interface

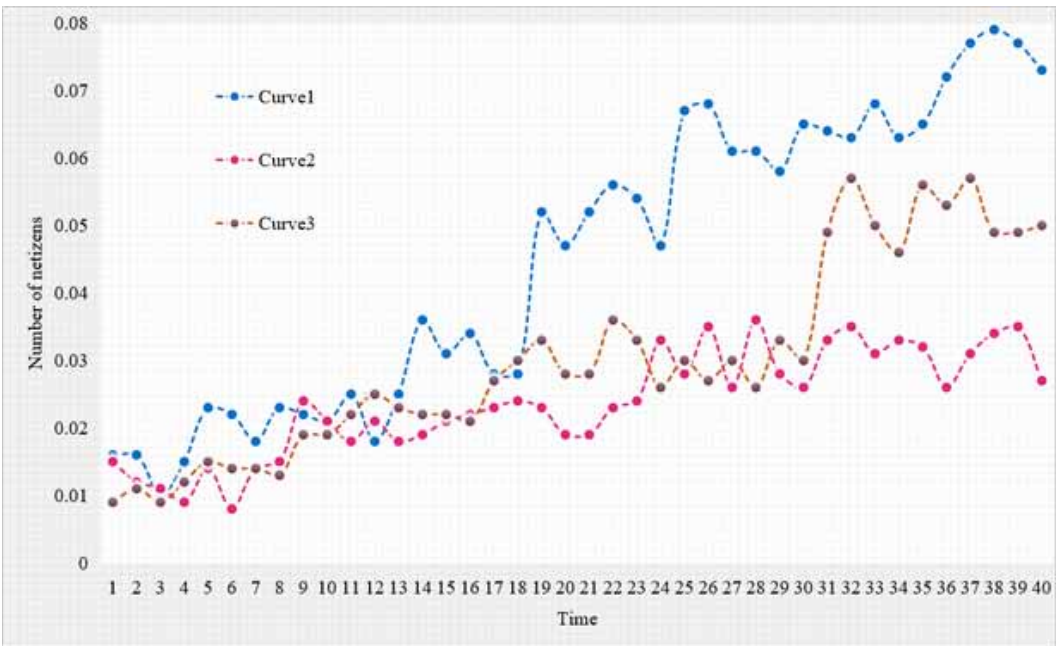
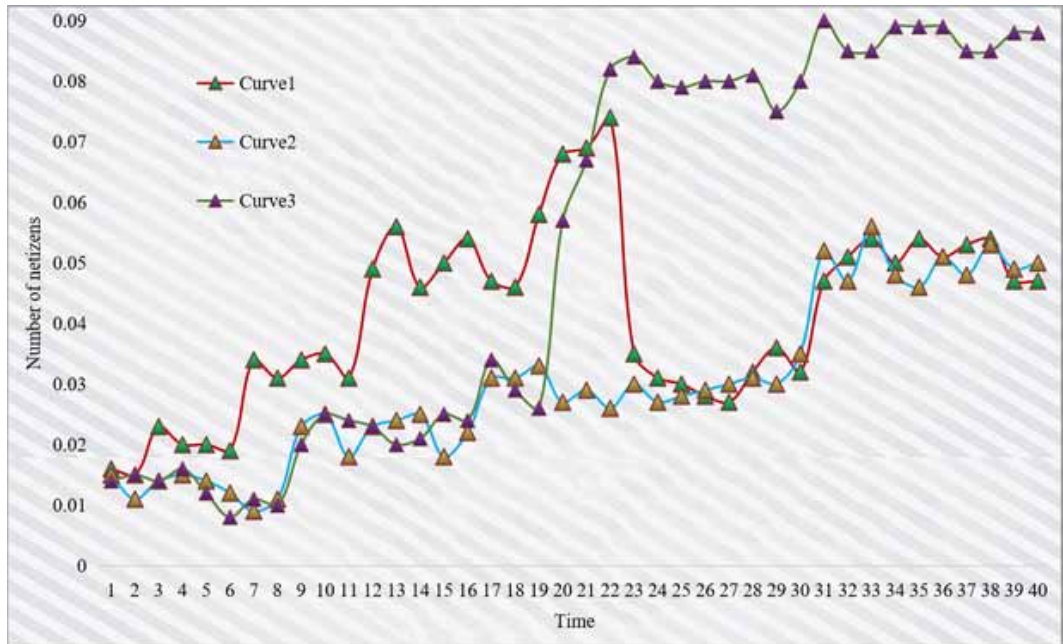


Figure 5. Evolution process and trend chart of different attitudes of netizens



network with 2,000 network nodes as the basis of social media network communication. The total number of nodes in this network is 2,000, the clustering coefficient is 0.037012, the average degree is 5.849, the maximum degree is 85, and its degree obeys the power law distribution. The degree distribution of each node is shown in Table 1. The power law distribution of scale-free network is shown in Figure 6.

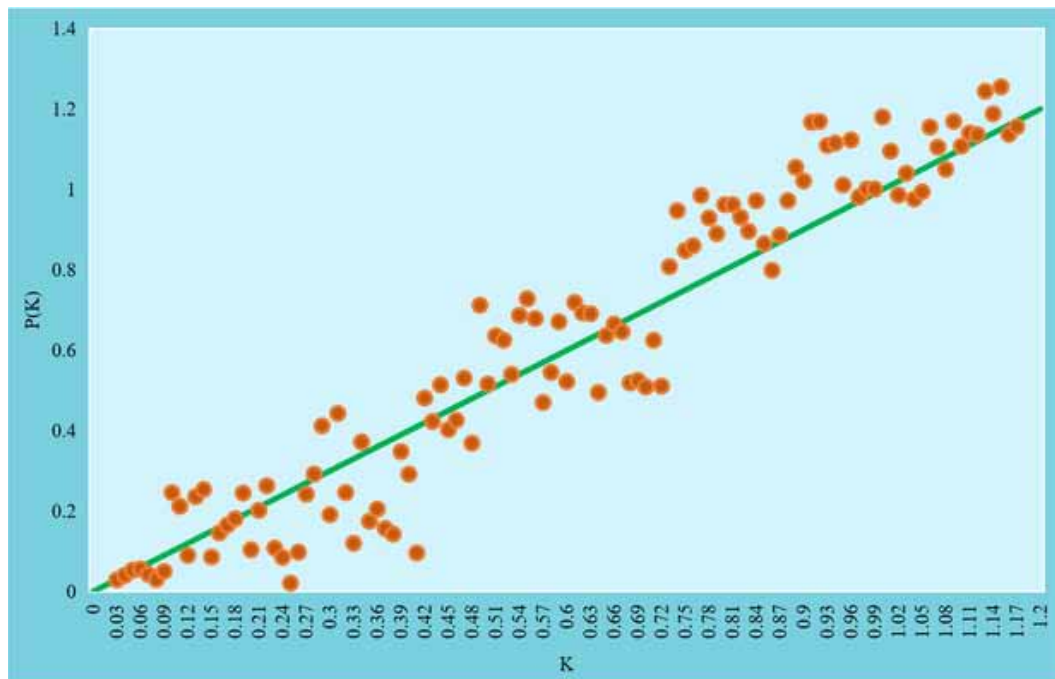
For the network topology features, I extracted the following features: the size of the largest connected subgraph, the number of connected subgraphs, the density of the network, and the clustering coefficient of the network.

On the social media network, each user is regarded as a node, and the friend relationship between individual users is regarded as the edge between nodes. The information in the network spreads along the edge between nodes. In the social media network, the information published by a certain node will be seen by its neighbors, and the information will be broadcast and shared with a certain

Table 1. Degree value distribution of each node

Node Number	The Degree Value K of Each Node	Node Number	The Degree Value K of Each Node
1	14	9	12
2	14	10	5
3	9	11	7
4	6	12	8
5	9	13	6
6	7	14	7
7	8	15	8
8	6	16	4

Figure 6. Degree value distribution of each node power law distribution of scale-free networks



probability. If the connected neighbor node is not interested in the content of the message at all and does not spread the message, the neighbor node is regarded as an “immune person.” Figure 7 shows the node density curve of each state of SIR.

The attenuation speed of S-state node density in the graph is also affected by the degree of propagation source node. The greater the degree of the source, the faster the attenuation of the S-state node density curve, indicating the faster the speed of information dissemination. It shows that the constructed network is basically consistent with the information dissemination characteristics of social media networks in reality.

By dividing the training set and the test set, I was able to train the model on the training set. When faced with new data, I could use the trained model to make predictions. The trained model was used to predict 50 groups of untrained samples. The prediction error is shown in Table 2.

The simulation results in this section show that the prediction accuracy of this algorithm can reach 95.208%. The results have certain reliability, and they can truly reflect the actual situation of a mobile internet information dissemination network.

Of course, this study may be subject to the following limitations: For example, the metaverse field is relatively novel, and relevant literature may be limited, which may limit a comprehensive understanding of the development of this field. The application of multi-agent modeling and immune control strategies may be limited by the complexity of the model and the availability of data. There may be differences in viewpoints among different scholars regarding the definition and future development assumptions of the metaverse, which may affect the consistency of research conclusions.

Therefore, considering that the metaverse is an emerging field, future research can seek more practical data to support and validate the accuracy of the model. This can include information dissemination data or user behavior data on different platforms. In addition, multi-agent modeling methods and immune control strategies can continue to be improved to better capture the complexity of the metaverse information dissemination network. At the same time, the research results can be applied

Figure 7. SIR density curve of each state node

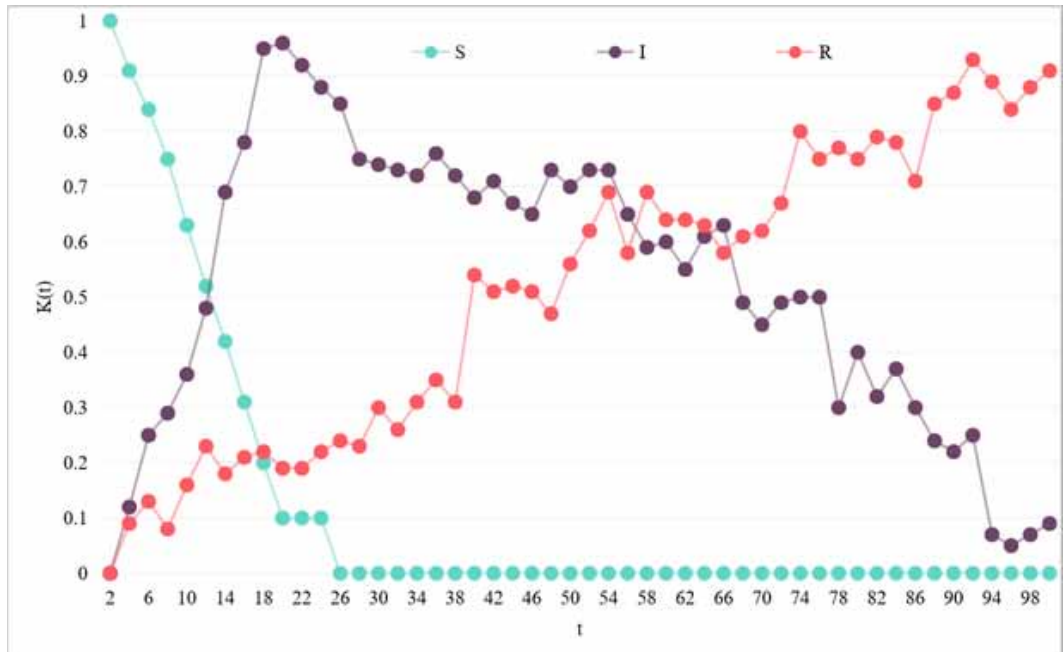


Table 2. Prediction error

Sample	Error
10	0.154
20	0.098
30	0.106
40	0.982
50	0.879

to practical scenarios, such as information dissemination management and security enhancement of the metaverse platform, to provide policymakers with suggestions on the development of the metaverse and to promote its sustainable development.

CONCLUSION

The immersion experience, free creation, social network, economic system, and civilized form endowed by the universe are catering to the positive cycle of media technology change, with the connotation of continuous development and evolution. It aims to expand the dimension of human existence and senses to achieve penetration, parallelism, and balance, and then give human beings greater freedom. When the metaverse has changed the existing way of traditional media and the relationship between media, it inevitably means that the metaverse has reshaped the traditional mode of communication, the purpose of communication, and the relationship between subject and object. This paper closely follows the pace of the times, and analyzes and interprets the concept, characteristics, and influence of the metaverse on new media communication. Under the topological characteristics of information

communication, this paper discusses the transformation of the new media communication paradigm in the metaverse era. At the same time, this paper models the prediction of new media information dissemination in metaverse. In this paper, I used the multi-agent modeling method to analyze and compare the evolution results of each agent attribute under different parameter values. At the same time, basing my focus on the ideal social media network, I applied the improved integrated immune control strategy to the SEIR dynamic model to simulate the spread and evolution of rumors before and after immunization. The simulation results show that the prediction accuracy of this algorithm can reach 95.208%. The results have certain reliability, and they can truly reflect the actual situation of a mobile internet information dissemination network. The metaverse provides a richer and immersive means of communication for new media, improving user engagement and experience quality. The metaverse has expanded the scope of media dissemination, allowing users to no longer just be recipients of information, but creators and participants. This interactivity and creativity are crucial for the development of new media. The metaverse has opened up new business opportunities, including virtual goods, digital asset trading, virtual real estate, and virtual advertising. These opportunities in turn have brought new profit models and business ecosystems to the internet technology and new media industry, promoting innovation and economic growth. However, currently, the metaverse industry is still in its early stages of development. In this initial stage, the metaverse industry faces a series of challenges, such as the need to provide effective privacy protection and security measures for user data and virtual assets of the metaverse. There are currently potential threats, such as privacy infringement and virtual asset theft. In addition, the development of the metaverse requires a large amount of computing resources, which may have an impact on energy and the environment. How to achieve sustainable development of the metaverse and reduce resource waste is an urgent issue. By reading this article, researchers can gain a more comprehensive understanding of how the metaverse changes communication methods and media ecosystems. In addition, the transformation of communication paradigms provides a new research perspective for the field of media science. The multi-agent modeling method adopted in this article provides a powerful tool for understanding the interactions between multiple participants in the metaverse. From the definition and expectations of the metaverse from all walks of life, the many characteristics proposed by the metaverse are worth looking forward to for breakthroughs and innovations in internet technology, and they will also bring more beneficial thinking and development possibilities for the development of new media.

DATA AVAILABILITY

The figures and tables used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

I declare that I have no conflicts of interest.

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