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Research on Optimization Methods of Marxist Ideology Dissemination Network on Social Platform Based on Big Data Technology

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Abstract With the development and popularization of information technology, social platforms have become an important platform and channel for the dissemination of Marxist ideology. Social platforms cope with the influence of various non-mainstream ideologies and diversified thoughts, how to make good use of the strengths and avoid the weaknesses to do a good job in the effective dissemination of Marxist ideology is a realistic problem that needs to be thought about urgently. In this paper, we firstly adopt complex network theory to analyze the communication characteristics of Marxist ideology in social platforms. Then, based on the SIR model, taking the competitive relationship between information into account, a model of information dissemination of Marxist ideology with improved SIR model is proposed, and the infection rate, conversion rate, and immunity rate of the model are simulated as well as analyzed in terms of effect. The experimental results show that the efficiency of Marxist ideology dissemination can be accelerated by increasing the infection rate, decreasing the conversion rate and immunization rate.

Index Terms complex network theory, SIR model, information dissemination, Marxism

I. Introduction

Marxism is a scientific social theory characterized by a complete theoretical system, rigorous logic, transcendence of the times and internationality. Through the dissemination of Marxist thought, it can help people establish a correct worldview, outlook on life and values, guide people to correctly understand the social reality, find the correct direction of social development, stimulate people's sense of social responsibility and sense of historical mission, promote exchanges and cooperation between countries around the world, and jointly promote the development of the world's socialist cause, and guide the construction of socialism [1]-[4]. Nowadays, social media has become an indispensable part of people's daily life. Through social platforms, people can easily keep in touch with friends, family and colleagues, share their lives, and get the latest information and entertainment. However, the spreading power of social media should not be underestimated. There are various social platforms, including but not limited to microblogging, WeChat, Facebook, Instagram, etc., each of which has its own unique characteristics and user groups, and thus the forms of social media communication are different [5], [6]. The speed of its dissemination is so fast that information can spread around the globe in a few seconds, which makes the information spread more widely and increases the probability of information being quoted and forwarded [7], [8].

Unlike traditional media, social media is an interactive platform, where users can communicate and interact with other users through comments, likes, shares, etc., which makes the information more humane, and increases users' participation and sharing of information [9]. It is such communication strength that social platforms provide an important battlefield for ideological communication. Social platform communication has its timeliness, plurality, randomness, dynamics, fragmentation, and all-round influence on people's values and ideological system, which makes the dissemination of information and ideology more diversified, comprehensive, timely and effective, so it is necessary to positively treat the advantages of social platforms for the further deepening of the dissemination of Marxist ideology [10]-[13]. However, at the same time that social platforms show strong communication strength, most of what people are happy to discuss are time-sensitive news and interesting events with network heat, which in the long run will affect the development of people's correct ideological concepts, and it is particularly important to further optimize the dissemination of Marxist ideology in this context. In addition, the dissemination of Marxist thought on social platforms is affected by three aspects, first, the content is scattered and the focus of dissemination is deviated. The second is that the target audience groups cannot be accurately docked in the dissemination process,

which reduces the effectiveness of dissemination. Third, the dissemination channel is limited or even ineffective due to information asymmetry, information dissemination restriction, and the restriction of the rules of the creation platform [14]-[16]. Only by strengthening the dissemination of Marxist ideology can the ideological advancement be fundamentally ensured, so it is necessary to optimize the dissemination network of Marxist ideology on social platforms.

This paper applies complex network technology to construct a Marxist ideology communication evolution model and analyze the evolution mechanism of Marxist ideology in social platforms. Taking the microblog platform as an example, the model is adopted to calculate and analyze the network structure characteristics of Marxist ideology dissemination from the aspects of overall characteristics, degree centrality, intermediate centrality, and proximity centrality. Considering that the simultaneous dissemination of multiple information in the network will have an impact on the dissemination process, drawing on the classic SIR model, we propose a SIR-based model for the dissemination of Marxist ideas. Through further analysis, we combined with such special environment as social platform to calculate the equilibrium point as well as the threshold analysis of the improved model, and simulated the influence of infection rate, conversion rate and immunity rate on the information dissemination, respectively. Finally, we summarize the evolution trend of Marxist ideology and the characteristics of communication effect, and put forward relevant suggestions for the dissemination of Marxist ideology on social platforms.

II. Evolutionary Model of Marxist Ideological Diffusion

The world contains a variety of forms of complex systems, and nowadays the research in the form of networks are neural networks, transportation networks, social networks, etc. Complex networks themselves are a complex topological structure with a large number of nodes and complex relationships between the nodes [17]. With the continuous development of information technology and the in-depth study of complex network theory, today's online social networks have new characteristics compared with traditional social networks, social network is a relatively stable relationship structure composed of interconnected social actors, which expresses the relationship between individuals in reality, and this relationship has a certain degree of complexity and inherent mechanisms, if only the use of the traditional graph theory, matrix analysis, and the mechanism. If we only use the traditional graph theory, matrix analysis and statistical probability theory to analyze and research, we will be more limited. Therefore, the introduction of the theory of complex networks is of great help to the study of social networks.

Generally speaking, the three most basic statistical features describing the topological properties of complex networks are the average path length, agglomeration coefficient and degree distribution of the network.

(1) Average path length and effectiveness

In graph theory, the structure of a network can be viewed as a binary group $G=(V,E)$, where the set of points is $V=\{v_1,v_2,\cdots,v_N\}$ and the set of edges is $E=\{e_1,e_2,\cdots,e_M\}$. The nodes at the ends of all edges in the edge set E can correspond to those in the point set V. In the study of complex networks, the number of edges through which the shortest path between node i to node j passes is called the distance between two nodes and is used to measure the shortest distance between nodes in a network. The network diameter is the maximum distance value obtained by measuring the distance between two randomly selected nodes in the network. And the average value of the minimum distance value between any two nodes in the network is called the average path length of the network L. The average path length of the network in the interpersonal network is the value of the number of individuals in the chain of the shortest relationship between two individuals, and the formula is shown in (1):

$$L=\frac{1}{N^2}\sum_{i=1}^{N}\sum_{j=1}^{N}d_{ij} \tag{1}$$

where N is the number of network nodes. For an undirected network, the point pairs (i,j) and (j,i) belong to the same edge, i.e., $d_{ij}=d_{ji}$, and Eq. (1) reduces to:

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

Effectiveness is inversely correlated with path length, and estimating network topology distances can be valued using the value of effectiveness. The average path length reflects the efficiency of the network nodes and the network in real network applications.

(2) Clustering coefficient

From the perspective of graph theory, the clustering coefficient c_i is the ratio of the actual number of connected edges to node i and the number of connected edges that can exist, defined as the node i in the network, with the following formula:

$$C_i = \frac{2E_i}{k_i(k_i - 1)} \tag{3}$$

where k_i denotes the number of neighboring nodes of node i and E_i denotes the number of edges of node i that are connected to the neighboring nodes in the real situation. The network clustering coefficient is obtained by summing and averaging the clustering coefficients of the individual nodes in the network, i.e:

$$C = \frac{1}{N}\sum_{i=1}^{N} C_i \tag{4}$$

It can be seen that the clustering coefficients are in the interval range of [0, 1], C is 0 means that there is no existence of edges in the network, they are all isolated nodes. When C is 1, a node in the network are connected with other nodes in the network with edges to form a fully coupled graph.

(3) Degree and degree distribution

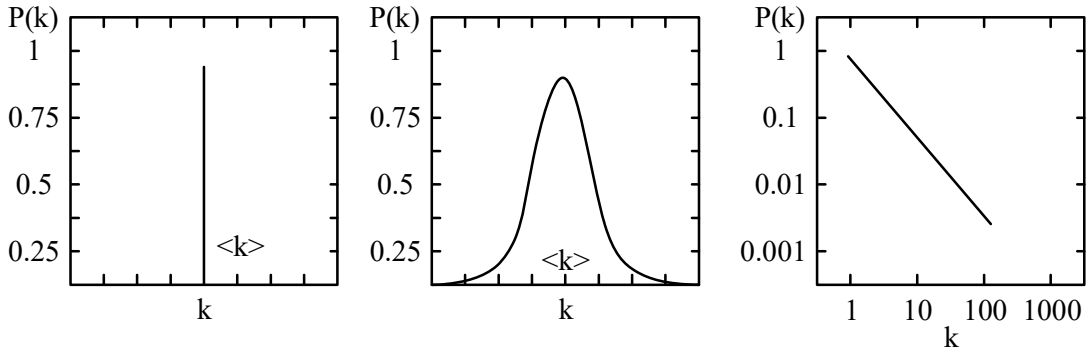
Degree is a basic attribute that describes a network graph. In an undirected graph, the number of neighboring nodes of a node i in the network is the degree of that node. However, in a directed graph, the degree is divided into two parts: out-degree and in-degree, where the number of edges of node i pointing to other nodes in the network is called the out-degree, and the number of all edges in the network pointing to node i is called the in-degree. Finding the average degree of a network is usually done by averaging the degrees of the nodes in the network, denoted as $\langle k \rangle$, which is:

$$\langle k \rangle = \frac{1}{N}\sum_{i=1}^{N} k_i \tag{5}$$

The degree distribution, i.e., the ratio of the number of nodes of a certain degree value in the network to the total number of nodes in the network, is usually described by $p(k)$, with k denoting a certain degree value and the p function value denoting the ratio, as given in the following formula:

$$p(k) = \sum_{k=k'}^{\infty} p(k') \tag{6}$$

For the degree distribution of the network there are several typical cases as shown in Fig. 1. From the point of view of the regular network, nodes with equal degree values, and in line with the Delta distribution, are shown in the form of a single spike is its characteristics. As long as the randomization phenomenon in the network will widen the peak tip, so the degree distribution of completely random network is approximate to meet the Poisson distribution, from the peak to the two sides of the exponential downward trend. We refer to these two types of networks as uniform networks. In real life, most of the real networks present neither Poisson distribution such as random networks, nor Delta distribution such as regular networks, but in the form of a power law distribution at larger network sizes $P(k) \propto k^{-\gamma}$. The network whose degree distribution satisfies the form of a power law distribution is then called an unscaled network, and its distribution can be called an unscaled distribution. The node degree size in this network varies greatly, with a few larger and most more, showing the structural characteristics of a non-uniform network.



a) Degree distribution of the regular network

b) Degree distribution of random networks

c) Degree distribution of scale-free networks

Figure 1: Degree distribution of several typical networks

The three basic physical properties of complex networks are described above, followed by a brief look at the four basic models of complex networks.

(1) Regular networks

Among the regular networks containing a large number of basic units, the nearest neighbor coupling network [6, 49] is the simplest, as shown in Fig. 2. It is having N nodes lined up in a circle, and each node can only connect with m neighboring nodes around it, where m = 4.

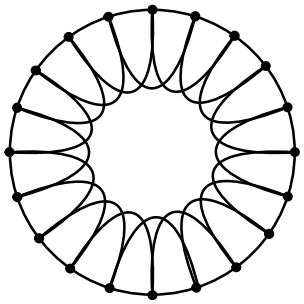


Figure 2: Nearest Neighbor Coupling Network Model

A regular network can represent some simple relationships between systems to determine the composition of the network in a simple way between network nodes and edges, where the average degree distribution of the network conforms to the δ functional distribution, independent of the number of network nodes, but the average path is positively correlated with the number of network nodes.

(2) Randomized network

Figure 3 shows a random graph, which differs from a regular network by introducing a probability p that two points can be connected arbitrarily, such that a network is constituted with an expected value of 1 for the total number of edges, where N is the total number of nodes evolved.

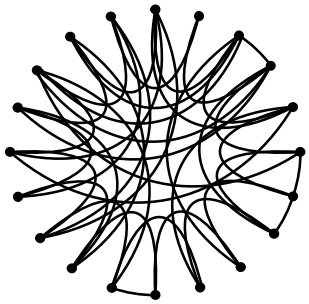


Figure 3: Random Graph Network Model

Analyzed from the perspective of network characteristics, its average path length is small, with small-world characteristics. The average degree is positively correlated with the network nodes, the degree distribution is Poisson distribution, the clustering coefficient is small, and the logarithmic value of the network size rises slowly with the increase of the number of nodes and other network characteristics.

(3) Small world network

Small world network has the characteristics of the actual system, which not only contains the characteristics of high clustering coefficient of the regular network, but also contains the characteristics of small average path length of the random network. Its basic algorithm consists of two steps, regular and random, the rule is to generate the nearest neighbor coupling network containing N nodes, which is connected with an even number of neighboring nodes. The random lies in reconnecting one of the endpoints of the originally connected edges randomly with probability p, which ensures that there are no self-connections and duplicate connections. Figure 4 is a visual representation of the reconnection model, where the probability p plays a moderating role between regularity and randomness, as shown in the figure, where p=0 forms a regular network, and p=1 forms a random network, which is close to the small-world network properties in the interval 0<p<1.

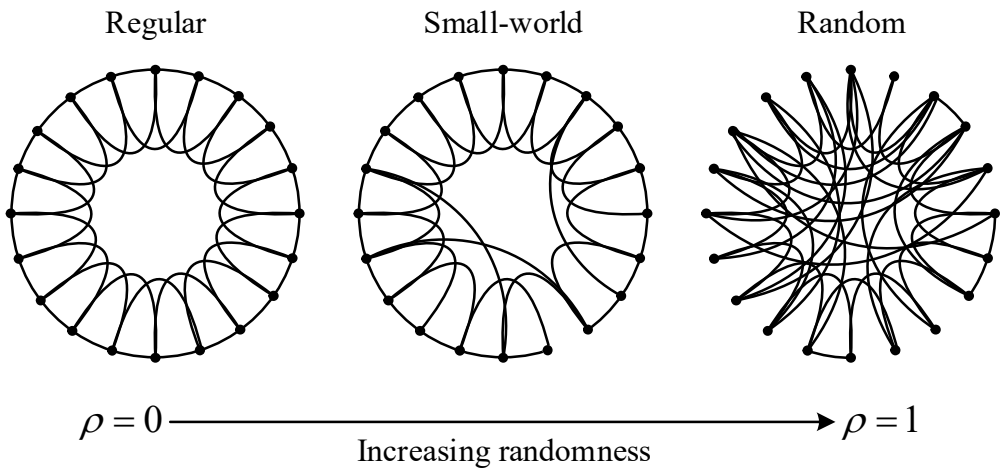


Figure 4: Small-world Network Model

Through the above model and the network generated, its clustering coefficient is larger, the average distance length is smaller, and the degree distribution is more in line with the Poisson distribution, at the same time contains the larger clustering coefficients of the regular network and the smaller average length of the path of the random network characteristics, including these properties of the network is a small world network.

(4) Scale-free network

Scale-free network also describes some of the characteristics of the real system, it is different from the small world characteristics, the degree of its distribution is a power law distribution, in which most of the real system of network connectivity distribution is a power law distribution characteristics, and the Hub point degree is very large, the rest of the nodes tend to the average degree. Scale-free networks where node growth and preferred connectivity are the two basic mechanisms of scale-free networks, which makes them more realistic in reflecting the characteristics of real systems. The network evolves according to the rules that have been formulated, so that its degree distribution conforms to $P(k) \square 2m^2k^{-\gamma}$ and its power law exponent γ = 3, which is not correlated with the number of nodes and naturally takes the form of scale-free, so that the model that conforms to the conditions of this distribution is called a scale-free model.

III. Model of Information Dissemination of Marxist Ideology

III. A. Model assumptions

We represent the contact network for the dissemination of Marxist ideological information as a graph of the set $G = (V, E)$, where $V = \{v_1, v_2, \cdots, v_n\}$ is the set of all user nodes in the network disseminating the information on Marxist ideology, and $|V| = N$ i.e. the total number of user nodes in the network, and E denotes the set of edges formed by the line between two nodes, i.e., $E = \{e_{ij} = \langle v_i, v_j \rangle \mid i \in V, j \in V\}$, and if there exists an edge e_{ij}, it means that the information can be disseminated along the edge e_{ij}, and it should be noted that It should be noted that all the simulation experiments in this paper use the undirected unweighted network, and all the connected edges are undirected edges.

Based on the idea of SIR model, the optimization model of Marxist ideology dissemination network proposed in this chapter classifies nodes into four states: S means that the node is in an unknown state for both messages but may be influenced by the surrounding neighboring nodes to be interested in the message, I_1 and I_2 means that the node is in a known state for message 1 or 2, and has the ability to disseminate information 1 or 2 [18]. R denotes that the node is immune to both messages, i.e., it is no longer interested in either message and no longer disseminates the message.

Figure 5 shows the state transfer graph of nodes in the competitive propagation model, where the parameters are defined as follows.

Propagation probability: β_i is the propagation probability of message i, if a node is in state S, it will receive message i with probability β_i after contacting with its neighbor who is in state I_i, as shown in Fig. 5 β_1, β_2 denote the propagation probability of message 1 or 2, respectively.

Immunity probability: γ_i is the immunity probability of information i, a node in state I_i will spontaneously transition to state R with probability γ_i and will no longer propagate information i. This means that the node is no longer interested in the information i, i.e., it will not propagate the information i anymore. This parameter can describe the persistence of the node in capturing the information, a higher γ indicates a lower persistence in capturing the information, as shown in Fig. 5 where γ_1,γ_2 denote the immunization probability of information 1 or 2, respectively.

Competition factor: δ_i is the competition factor of information i, the larger δ_i is, the more competitive information i is. As shown in Fig. 5, δ_1,δ_2 are the competitive factors of information 1(2) to information 2(1), respectively, and the larger δ_1 is, the stronger the competitiveness of the information 1 is, and the more the node state of the disseminated information 2 can be converted to the state of the disseminated information 1. For δ_2 in the same way. The definitions of the symbols used in this chapter are shown in Table 1.

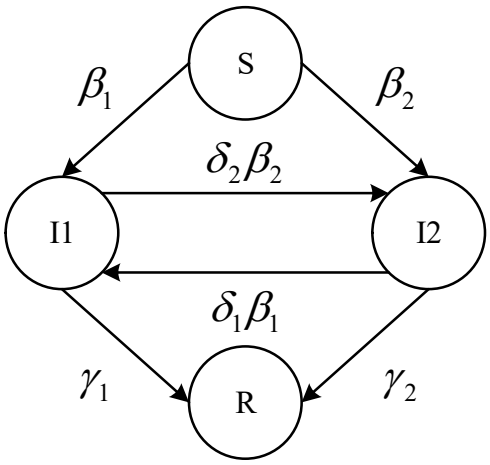


Figure 5: State transition diagram

Table 1: Symbols and their definitions

Symbol	Define
V	Set of nodes
E	A set of connected edges
N	Number of nodes
$\beta_{1(2)}$	Information 1 (2) propagation probability
$\gamma_{1(2)}$	Information 1(2) immune risk
$\delta_{1(2)}$	Information 1(2) the competition factor for information 2(2)
$\langle k\rangle$	The average of the contact network
S	The information is located in the unknown
$I_{1(2)}$	The ability to spread information 1(2) to information 1(2) is known

In the network, the states of the nodes will all change according to their connection states as well as the states of their neighboring nodes, and based on the mean field theory, the propagation evolution process of the competing model in the homogeneous network can be represented by a set of differential dynamics equations shown in Eq. (7):

$$\begin{cases} \dfrac{dS(t)}{dt} = -\beta_1 S(t) I_1(t)\langle k\rangle - \beta_2 S(t) I_2(t)\langle k\rangle \\ \dfrac{dI_1(t)}{dt} = \beta_1 S(t) I_1(t)\langle k\rangle + \delta_1\beta_1 I_1(t) I_2(t)\langle k\rangle - \delta_2\beta_2(t) I_2(t)\langle k\rangle - \gamma_1 I_1(t) \\ \dfrac{dI_2(t)}{dt} = \beta_2 S(t) I_2(t)\langle k\rangle + \delta_2\beta_2 I_1(t) I_2(t)\langle k\rangle - \delta_1\beta_1(t) I_2(t)\langle k\rangle - \gamma_2 I_2(t) \\ \dfrac{dR(t)}{dt} = \gamma_1 I_1(t) + \gamma_2 I_2(t) \end{cases} \tag{7}$$

where $S(t), I_1(t), I_2(t), R(t)$ are the proportions of the number of nodes in each state, and $\langle k\rangle$ is the average degree of the network.

III. B. Propagation threshold

In order to derive the propagation threshold for the proposed model, we analyze the steady state of the propagation process of Marxist ideology according to Equation (7), i.e., under what conditions information 1 or information 2 can be propagated in the network. Observing Eq. (7), we find that the first three equations in the formula do not contain the R state, in order to simplify the analysis of the model, we can ignore the evolution process of the R state, i.e., we only consider the first three equations in the formula. When the number of nodes in each state in the model are no longer changing, the process of Marxist ideology dissemination is in a stable state, i.e., the rate of change of $S(t), I_1(t), I_2(t)$ are all 0, then $dS(t)/dt = 0, dI_1(t)/dt = 0, dI_2(t)/dt = 0$, combining Eq. (7) leads to Eq. (8):

$$\begin{cases} -\beta_1 S(t) I_1(t)\langle k\rangle - \beta_2 S(t) I_2(t)\langle k\rangle = 0 \\ \beta_1 S(t) I_1(t)\langle k\rangle + \delta_1\beta_1 I_1(t) I_2(t)\langle k\rangle - \delta_2\beta_2 I_1(t) I_2(t)\langle k\rangle - \gamma_1 I_1(t) = 0 \\ \beta_2 S(t) I_2(t)\langle k\rangle + \delta_2\beta_2 I_1(t) I_2(t)\langle k\rangle - \delta_1\beta_1 I_1(t) I_2(t)\langle k\rangle - \gamma_2 I_2(t) = 0 \end{cases} \tag{8}$$

We assume that the equilibrium point is $B = (S, I_1, I_2)^T$ when the process of Marxist ideology dissemination tends to a steady state. It can be visualized that $B_0 = (1,0,0)^T$ is an equilibrium point when the competitive propagation model tends to a stable state, and at the equilibrium point $B_0 = (1,0,0)^T$, the Jacobi matrix of Eq. (8) can be obtained as shown in Eq. (9):

$$J(B_0) = \begin{bmatrix} 0 & -\beta_1\langle k\rangle & -\beta_2\langle k\rangle \\ 0 & \beta_1\langle k\rangle - \gamma_1 & 0 \\ 0 & 0 & \beta_2\langle k\rangle - \gamma_2 \end{bmatrix} \tag{9}$$

Assuming that the characteristic polynomial of the above matrix is expressed as $\lambda^3 x_3 + \lambda^2 x_2 + \lambda^1 x_1 + x_0 = 0$, the polynomial is solved as follows:

$$\begin{aligned} |J(\lambda I_B - B_0)| &= \begin{vmatrix} \lambda & -\beta_1\langle k\rangle & -\beta_2\langle k\rangle \\ 0 & \lambda - \beta_1\langle k\rangle + \gamma_1 & 0 \\ 0 & 0 & \lambda - \beta_2\langle k\rangle + \gamma_2 \end{vmatrix} \\ &= \lambda(\lambda - \beta_1\langle k\rangle + \gamma_1)(\lambda - \beta_2\langle k\rangle + \gamma_2) = 0 \end{aligned} \tag{10}$$

where I_B is the unit matrix, which is obtained from Eq. (10):

$$\begin{cases} x_0 = 0 \\ x_1 = (\gamma_1 - \beta_1\langle k\rangle)(\gamma_2 - \beta_2\langle k\rangle) \\ x_2 = \gamma_1 + \gamma_2 - \beta_1\langle k\rangle - \beta_2\langle k\rangle \\ x_3 = 1 \end{cases} \tag{11}$$

This is obtained according to the Routh-Hurwitz stability determination method:

$$\begin{cases} x_0 = 0 \\ x_1 > 0 \\ x_2 > 0 \\ x_3 = 1 \end{cases} \tag{12}$$

We can obtain the propagation threshold of the model as shown in equation (13):

$$\begin{cases} \frac{\beta_1}{\gamma_1} < \frac{1}{\langle k \rangle} \\ \frac{\beta_2}{\gamma_2} < \frac{1}{\langle k \rangle} \end{cases} \tag{13}$$

Then, under the conditions of Equation (13), neither message 1 nor 2 will be propagated in the network.

IV. Simulation and model effect analysis

IV. A. Characterization of complex networks of Marxist communication

Social network analysis usually assumes that if there is a relationship between actors, this "relationship" often represents a specific contact or a substantive relationship that occurs in reality. The "relationship" between actors in the microblogging platform mainly includes "comments", "forwards" and "favorites", among which the "forwarding" behavior can bring about the retransmission and diffusion of information, while the "commenting" behavior cannot produce a large number of consistent information dissemination. This paper mainly explores the forwarding relationship between actors of Marxist thought on the microblogging platform, and measures the entire network structure of Marxist thought, including various chart characteristics, network density, node roles and locations.

IV. A. 1) General characterization aspects

(1) The density and scale of the whole network

In this paper, the “attribute data” and “relationship data” of 989 nodes are collected, so the scale of the whole Marxist ideology dissemination network is 989, and the density of the network is 0.9981, and the standard deviation of the relationship in the network is 0.0511. The data indicate that the whole network is larger in scale, and the network density is higher, and the degree of discretization is lower. The data indicate that the whole network is larger, the network density is higher, the degree of discrete is lower, and the network state is more stable.

(2) Distance between network members

The optimal route refers to the route with the smallest “cost”, where the “cost” of a route is the sum of all the values assigned to that route. Calculation shows that the average distance of the network is 1.09, and the cohesion index based on the “cost distance” is 0.90 (the range of this value is [0, 1], and the larger the value is, the stronger the cohesion is). Therefore, after data calculation, it can be judged that the average distance between the nodes of the complex network is 1.09, and the relationship between the nodes of the network is relatively close and cohesive.

IV. A. 2) Centrality analysis

Centrality analysis can quantify the power of individuals in a network, and is usually used to measure the power attributes, status distribution and information dissemination control weight of individuals or an organization in the network, which plays a more important role in understanding the information channel and information transmission mechanism of the whole Marxist ideology dissemination network. Specific analysis can be carried out through three quantitative methods: degree centrality, middle centrality and proximity centrality.

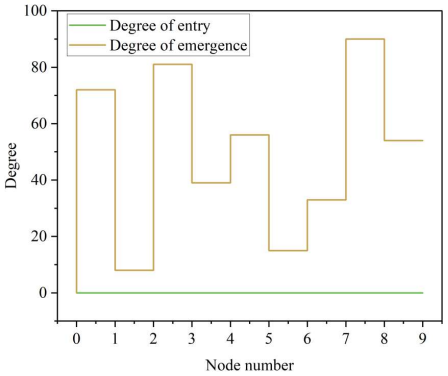


Figure 6: Shows the centrality distribution curve of the source node degree

(1) Degree centrality

Degree centrality represents the number of nodes directly connected to the node, and each node has its corresponding out-degree and in-degree. Node out-degree is the total number of nodes pointed out by the node, and node in-degree is the total number of nodes directly pointing to the node. Taking Twitter information

dissemination as an example, node out-degree indicates the degree of node “being retweeted”, and node in-degree is the degree of node “retweeting others” (other nodes).

Through the division of the forwarding level, the distribution curve of the degree center of each level is plotted. We analyze the curve from three perspectives: frequency of change, peaks and valleys, and the range of curve values.

The source node degree center degree distribution curve is shown in Fig. 6. The total outgoing degree of the source node layer is larger than the total incoming degree. The five nodes 1, 3, 5, 8, and 9 with the largest degrees have outgoing degrees of 72, 81, 56, 90, and 54, respectively, and the incoming degrees are all zero.

The first level forwarding layer node degree center degree distribution curve is shown in Fig. 7, the first level forwarding layer nodes have a high frequency of outgoing and incoming degree changes, and the total incoming degree is greater than the total outgoing degree. The nodes with larger degrees are 7, 170, 202, 349, 602, and 881, with out-degrees of 5, 2, 1, 3, 2, and 2, and in-degrees of 1, 3, 2, 2, 2, and 3, respectively.

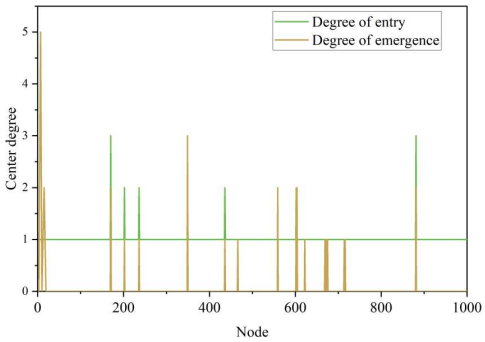


Figure 7: Distribution of the center of the transfer node

The distribution curve of node degree center degree of the second level forwarding layer is shown in Fig. 8, the second level forwarding layer changes more frequently compared to the first level forwarding layer, and the node's in-degree state is more stable compared to the out-degree. The nodes with larger degrees are 13201, 26501, 29101, 60201, 85101, with out-degree of 2, 4, 3, 4, 4, and in-degree of 1, respectively.

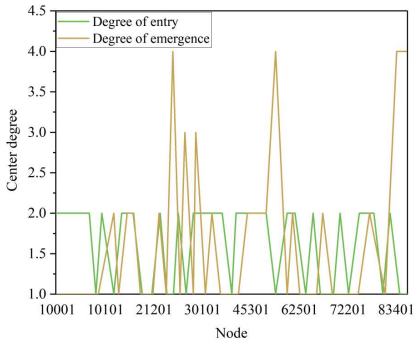


Figure 8: Distribution of the center degree of the secondary forward node

The central potential of outgoing and incoming standardized points of the whole network is 15.094% and 0.363% respectively, and the value of the central potential tends to be closer to 1, which indicates that the network has a centralized tendency. The data show that the outward central potential is larger than the inward central potential, and the central potential of the “forwarded” group is larger, which has a more obvious concentration trend. The central potential of the “forwarded to others” group is lower, the centralization trend of the group is not obvious, and the dispersion is stronger.

(2) Intermediate centrality

Usually, if a node is in more than one network path, it can be inferred that it is in an important position in the whole network and can influence the group by controlling or modifying the transmission of information. The degree of intermediate centrality can be used as an index to measure the degree of control of nodes over network resources.

The distribution curve of intermediate centrality degree of the complex network of microblogging Marxist ideology dissemination is shown in Fig. 9, and the fluctuation range of the whole intermediate centrality degree distribution

curve is more concentrated, with a larger range of change in the value domain, which is [0, 8367]. The intermediate centrality value of the central node is higher, and mostly concentrated in the source node level and the first forwarding level, and the intermediate centrality value of the forwarding level of more than 3 levels is close to 0. The average intermediate centrality degree of the whole Marxist ideology dissemination network is 133.63, and the standard deviation is 668.252, with the maximum value of 7665, and the minimum value of 0. The standardized intermediate centrality potential is 4.17%. The low value of the intermediate centrality potential of this network indicates that the degree of network consistency is low and the state tends to be dispersed.

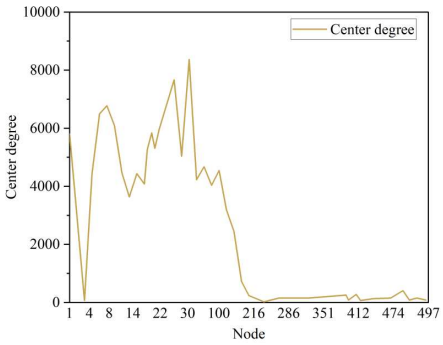


Figure 9: The distribution of the center of the network of weibo and marxism

(3) Approaching centrality degree

The research data shows that the average intermediate centrality degree of the whole Marxist ideology dissemination network is 0.658, the standard deviation is 0.309, the maximum value is 1.35, the minimum value is 0, and the standardized approaching centrality potential is 49.93%.

IV. B. Impact analysis of the information dissemination process

Based on all the above analyses, we want to verify the improved SIR model to a certain extent, including the test of the reasonable degree of adding the improved parameters, therefore, we construct the BA scale-free network on the basis of using the simulation simulation data, constructing the structure of the network with the number of nodes equal to 1200, and randomly selecting the number of nodes of 8 as the infected state, and the other nodes as the unknown state. In order to fully analyze the impact of each influencing factor on the model, multiple parameter schemes are comprehensively set to go for a better reflection of the effect of the improved model.

IV. B. 1) Impact of infection rates on the information dissemination process

Figure 10 shows the effect of infection rate on the information dissemination process. From the figure, we know that we change the infection rate β, which will make the s, i and r curves will be changed to some extent and affect the information dissemination accordingly. We make the infection rate β increase, it will make the i curve move to the upper leftward direction, the r curve also move to the upper upward direction, and the s curve move to the lower downward direction. We can see from the above changes that increasing the infection rate β can largely increase the maximum magnitude of the infected, prompting the transmission of unknowns to the infected in a short period of time, accelerating the efficiency of information dissemination, enlarging the effect of information dissemination, and increasing the impact caused by the event on the society. If the event is a positive dissemination of significance, such as the dissemination of information on the topic of traditional culture in Henan, we can increase the rate of infection, thus creating a positive information dissemination effect on society, so that more people understand the rich and colorful traditional culture of the Central Plains. Therefore, to a certain extent, it provides a good idea for us to spread Marxist ideas in society, we can change the information dissemination of Marxist ideas by changing the rate of infection, such as increasing the rate of infection, to further increase the emergence of infected people, so that we can control the number of dissemination groups from the source, increase the dissemination of a larger range of information, and better achieve the dissemination of Marxist ideas to the society.

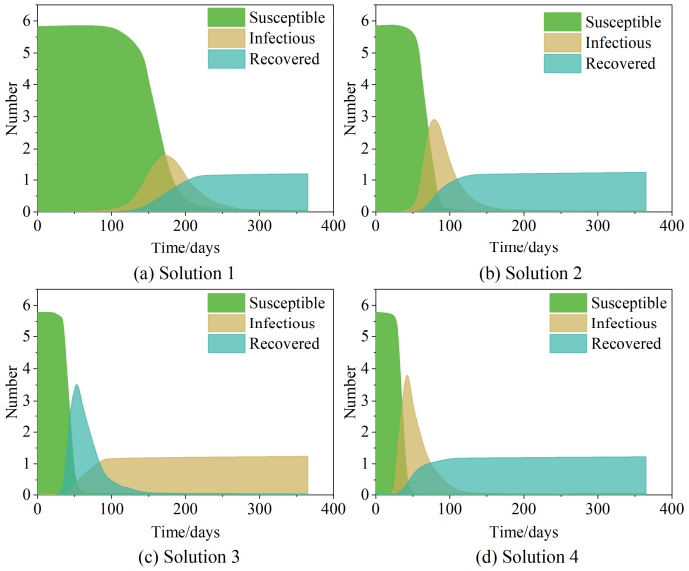


Figure 10: Influence of infection rate on information dissemination process

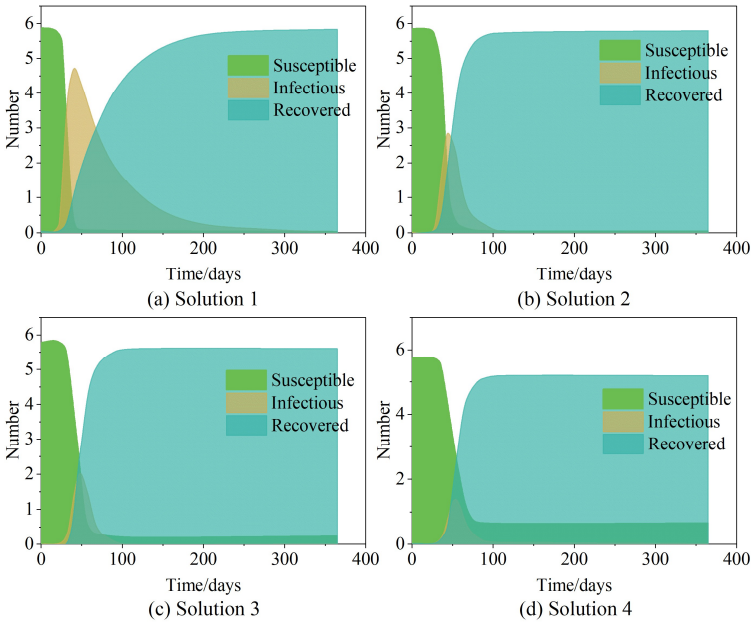


Figure 11: Influence of conversion rate on information dissemination process

IV. B. 2) Impact of conversion rates on the information dissemination process

Figure 11 shows the effect of conversion rate on the information dissemination process. From the figure, we know that changing the conversion rate α will make the i and r curves will be changed in some way and affect the information dissemination accordingly. According to the equation model, we make the conversion rate α increase, which will cause the i curve to move in the direction of the image bias downward, the r curve also moves to the direction of the bias downward at the same time, and the s curve moves upward. According to the above changes, it can be seen that increasing the conversion rate α largely increases the maximum magnitude of the immune, which in a short period of time prompts the unknowns to transmute to the immune, reduces the efficiency of information dissemination, and narrows the effect of information dissemination. If the event is the significance of negative dissemination, such as the information dissemination of rumors in the social network to say, we can increase the conversion rate α, thus on the suppression of the adverse effects of the dissemination of this information, and effectively avoid the social network of bad information on our infringement. Therefore, to some extent, we, the official media and the government level, the dissemination of Marxist ideas in society provides a good idea, we can change the conversion rate to change the direction of information dissemination of Marxist ideas speed and ways, such as

reducing the rate of conversion, so that the unknown to avoid the transformation of the immune, and directly increase the target population to improve the positive effect of social Marxist ideas on society.

IV. B. 3) Impact of immunization rates on the information dissemination process

Figure 12 shows the effect of immunization rate on the information dissemination process. From the figure, we know that changing the immunization rate γ will make the s, i, and r curves will be changed in some way and affect the information dissemination accordingly. Therefore, according to the equation model, we make an increase in the immunization rate γ will cause the i curve to move in the downward direction, the r curve to move in the downward direction, and the s curve to move in the upward direction. The change in the direction of the curve is similar to the case of increasing the conversion rate α. We can see from the above changes that increasing the immunization rate γ can largely increase the maximum size of the infected to the immune, prompting transmutation from the infected to the immune in a short period of time, decreasing the peak of transmission, and furthermore decreasing the efficiency of the information dissemination and suppressing the information dissemination effect. If the event is the significance of negative propagation, such as inappropriate remarks on social networks, there are things that jeopardize the security of social information as well as the emergence of network disinformation and rumors, we can increase the rate of immunization γ, so that more people can not be exposed to the information, thus suppressing the impact of the spread of the information in society. Therefore, in a way, it also allows us to provide good ideas for spreading Marxist ideology in society, we can change the spread of information about Marxist ideology by changing the immunization rate γ, such as decreasing the immunization rate, increasing the time that more infected people are present, which in turn will increase the spread of Marxist ideology by the infected people, increasing the appearance of infected people, and better increasing the number of people in the transmission group, which in turn increases the spread of information about Marxist ideas.

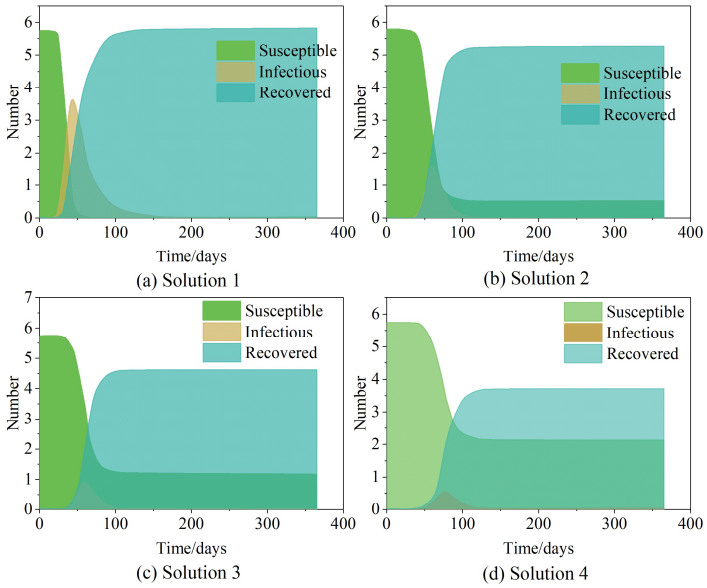


Figure 12: Influence of immunization rate on information dissemination process

V. Strategies for the dissemination of Marxist ideas on social platforms

(1) Strengthening awareness and improving communication management mechanism

In the context of the new media era to further strengthen the masses of people's awareness of the importance of the dissemination of Marxist ideology and cultivation, so that the masses as a whole realize the importance of establishing the correct ideological values in the current era of cultural pluralism for the development of individuals. For the administrators it ensures the construction of the correct ideological system of the masses. For the masses, the more information is developed and diversified, the more they should know how to recognize what is excellent and what is not conducive to their healthy development, and they should know how to reasonably filter the information they obtain.

To establish a high technical level of new media operation team, real-time supervision of the school new media channel content, to ensure the healthy development of online and offline culture, and more can give full play to the

advantages of the new media to further disseminate the excellent Marxist ideology, so that the modern masses of the era of the essence of the concept of inheritance to carry forward.

(2) Pay attention to the popularization of the dissemination of ideas, effectively realize the popular and easy to understand

In the past, people's view of Marxist thought is boring, tedious, difficult to understand, too far from reality, has been as a communicator are trying to find ways to make people improve the view of Marxist thought, to change their previous refusal of the psychological, can take the initiative to the outstanding ideas and concepts to the same, combined with the practical inheritance and innovation. In the new media era, too much fast food culture occupies the public's field of vision, which makes the dissemination of traditional excellent ideas difficult, so it is particularly important to realize the innovation of Marxist thought with the times, easy to understand.

Administrators should focus on the actual situation, explore more relevant ways of expression, so that Marxist thought is accepted and recognized by more people, so that students as the backbone of the dissemination of Marxist thought. Make good use of platforms such as public numbers, microblogs, website communities, WeChat, and short videos that are popular among college students, and present them in a variety of forms such as vivid images, for example, getting rid of the traditional hard textual expressions, it can be a short film in animation form, with a small section as an episode. It can also be in the form of humorous drawings, interpreting each concept. Through such a new way plus the powerful dissemination of new media, we believe that Marxist ideology can be well popularized in colleges and universities and even in the society at large.

(3) Pay attention to the gradual development of dissemination

Although Marxist thought is an excellent product of human history, which needs to be inherited and innovated and carried forward from generation to generation to guide the development of society, it needs a process of public acceptance and in-depth understanding after all, and it should focus on the gradual and orderly development of the dissemination process, which should not be in a hurry, and on the contrary, it will help the growth of the seedling, and should gradually realize the purpose of its dissemination in the state of being easy to understand and submerged in the society.

VI. Conclusion

In the context of the new era, the Internet has increasingly become the main position, the main battlefield and the forefront of ideological struggle. Therefore, promoting the optimization exploration of Marxist ideology's dissemination in social platforms is an objective requirement to ensure the long-term stability of the country and an inevitable move to build a good network ecology. In this paper, through the evolution model of Marxist communication based on complex network theory, we learn that the average network distance and cohesion index of Marxist ideology spreading on microblogging platform are 1.09 and 0.90, respectively, which show that the relationship between nodes is close and cohesive. From the analysis of the impact of the information dissemination model based on the SIR model on the dissemination process of Marxist ideology, it is known that it is possible to improve the dissemination effect of Marxist ideology in social platforms and the positive effect on the society by changing the rate of infection, conversion rate, and immunity rate.

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