Original Research Article

Study on the Correlation Between Information Dissemination Mechanisms and Public Psychological Characteristics

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Abstract: This study investigates the correlation between information dissemination mechanisms and the psychological characteristics of the general public. Information dissemination is a complex and multifaceted process, requiring targeted propagation strategies for different types of information. Many scholars have expressed a keen interest in information dissemination and have developed various models to explore the underlying mechanisms. This paper systematically summarizes and optimizes two commonly used information dissemination models: the social network model and the SIR (Susceptible-Infected-Recovered) model. These models are based on different assumptions, aiming to address the core question of "how information is disseminated." Furthermore, this study employs psychological analysis methods to examine the behavioral patterns of the general public during the information dissemination process, in order to validate the rationality of the proposed dissemination mechanisms. By conducting in-depth research and optimizing the dissemination models, we can better understand the regularity and influencing factors of information dissemination, providing theoretical support and practical guidance for the further development of this field.

Keywords: Information dissemination; Social network model; SIR model; Public psychology

1. Introduction

Information dissemination has always been a focus of academic interest, with rumors as the oldest form of mass media attracting extensive research. Rumors have taken different forms in different eras. During wartime, rumors often involve military movements and activities, while in peacetime, the forms and content of rumors are more diverse without a unified focus. Although rumors may spread at any time, their propagation is particularly prominent during crises and periods of turmoil, when uncertainty and anxiety are high. It can be said that rumors reflect both individual psychological states and serve as indicators of collective consciousness and group problem-solving [1]. With the rapid development of information technology, social media platforms like WeChat and Weibo have become one of the main channels for people to obtain various types of information [13]. However, the grassroots and anonymous nature of the internet has directly or indirectly led to a surge in the spread of online misinformation in recent years.

It is worth noting that the propagation states of information vary across different social networks. Currently, various social network models have been proposed, such as the scale-free model [4], the small-world model [5], and the random model [6]. Furthermore, why people are prone to believing and disseminating unknown information during the information propagation process has long been a research focus. Exploring the psychological mechanisms underlying rumor formation can help understand the deep-rooted reasons for the mix of misinformation and factual information in the social media era. This study also attempts to provide a new perspective by investigating people's trust attitudes towards the information they receive [7]. The primary focus of this research is on the forms of information propagation on the internet and the psychological states of people

during the information dissemination process.

2. Mechanisms of Information Dissemination

2.1. Friend Network Model

Word-of-mouth communication remains a widely existing phenomenon and is still a major form of information exchange among people. Social media platforms have significantly changed people's communication patterns and become new channels for information dissemination, but the information propagation states in different social networks are not the same. In general, friends tend to have similar interests, and the exchange of information related to their interests is a form of information dissemination. For example, in the currently popular concerts, only fans who are interested in the performers will actively browse relevant information and purchase tickets, while fans of other performers may not be very interested, indicating that interest is not only a bridge for interpersonal communication but also a medium for the spread of rumors. Therefore, a new network model based on interest has been proposed [8].

The basic assumptions of the friend network model are:

The population size remains constant within a certain period of time;

The maximum number of friends each individual can have is different;

Interests will affect whether two people can become friends;

The strength of the connection between two people will decay over time until they meet again [9].

The friend network model based on interest is built on the following cognitive foundation: people often establish connections due to shared interests, and the probability of establishing connections is higher between individuals with similar or the same interests. In other words, interest is the main factor in people's establishment of social relationships, and individuals with completely different interests are unlikely to become friends.

2.2. SIR Model

This study innovatively applies the SIR model to information propagation networks, as information propagation is similar to virus propagation. The propagation effects, network structures, and evolutionary processes are analogous in these two types of networks.

In the SIR model, participants are divided into three parts: S (Susceptible) stage represents the population at risk of infection with a probability of λ; I (Infected) stage represents the infected population, which is transmitted from the S stage; and R (Recovered) stage represents the recovered population that no longer transmits the virus, with a recovery probability of μ [10].

Figure 1. SIR model propagation diagram.

To better study and distinguish it from disease propagation, we redefine these three stages as the information SIR propagation model: stage S represents the information publishers, i.e., the propagation population; stage I represents the uninformed population who have not yet received the information; and stage R represents the population that no longer propagates the information[6].

Figure 2. Information SIR propagation model.

The information propagation process on social platforms can be described as follows: stage S (i)represents the information publishers, with a relatively small proportion in the initial time steps. Stage I(i) represents the followers of stage S(i), who have never received the information. When they receive the information, they enter stage S and start propagating at a rate of λ. In the initial time steps, this stage has the largest population proportion. Stage R(i) represents users who have received the information but no longer propagate it. They transition from stage S to stage R at a rate of μ, and their proportion is 0 in the initial time steps.

During the information propagation process, once a piece of information is published or forwarded, it will be received by all followers. However, not all followers will accept and forward the information; some may only receive it without forwarding, becoming immune directly. As the information is only focused on a specific population at a certain time, some of the users who have accepted and propagated the information will transition to the immune population at a certain rate over time steps. Therefore, when constructing the information propagation model, two scenarios need to be considered: one is that the susceptible population no longer propagates the information, directly becoming immune; the other is that the propagating population transmits the information, indirectly transitioning to the immune population [11].

3. Public Psychology Analysis

Generally, rumors can be categorized into two types: hope-inducing rumors and fear-inducing rumors. Hope-inducing rumors refer to those that evoke feelings of hope, while fear-inducing rumors are those that provoke fear or disappointment. Some rumors are considered "spontaneous" or "temporary" as they arise naturally from people's logical instincts in crisis situations [1].

When facing uncertain and fearful circumstances, individuals tend to explore their cultural, religious, and mythological records or stories to construct meaning and seek rational explanations. In the 1934 Indian earthquake disaster, rumors "based on the traditional and cultural heritage of specific groups" were widely circulated. Research indicates that by cross-referencing historical accounts of earthquake-related rumors across India and other countries, certain forms and content of rumors tend to recur in all societies that have experienced similar disasters [13]. These recurring rumors reveal the human inclination to seek "cultural and social heritage" support under stress, including a tendency to revert to "traditions, mythological beliefs, superstitions, and legends" in search of explanations.

Studies show that three factors - authoritarian personality, value orientation, and exposure to rumors - significantly influence individual belief in rumors. Individuals with authoritarian personalities are more likely to readily believe sensational rumors, while those holding conservative values are more prone to believing rumors critical of social issues [14]. Additionally, prior exposure to rumors negatively impacts attitude change, further confirming the role of "cognitive conservatism" in shaping rumor attitudes.

Research also indicates that people sometimes believe rumors because others believe them, and for self-regulatory purposes, to maintain consistency with majority opinion[15]. Furthermore, conformity psychology is another driver of rumor propagation. In dangerous situations, people are more susceptible to conformity pressures and influences. Facing uncertainty, individuals tend to refer to others' behaviors, believing that what the majority accepts is more likely to be correct. Additionally, to integrate with the group, people tend to focus on the topics of discussion, targets of complaints, and future prospects, seeking acceptance from the entire group. This behavior of following group opinions and seeking others' approval further contributes to the spread of rumors.

In general, when individuals face an increasing threat or are in an unknown situation, they tend to rely on rumors to calm their emotions and seek rational explanations for events.

4. Conclusion

This paper elucidates two mechanisms of information propagation: the friend network model and the SIR (Susceptible-Infected-Recovered) model. The friend network model is based on the premise that interest is a crucial factor in forming social relationships, while the SIR model proposes three roles involved in the information dissemination process and describes the role transitions during the interactive dynamics, thereby constructing a model of rumor propagation.

These two models have constructed information propagation mechanisms based on different assumptions. Although they hold significant importance in driving the development of this research field, further exploration of information propagation mechanisms is still needed. In the process of information dissemination, the public exhibits distinct psychological characteristics. In a state of panic, individuals tend to place hope in rumors to obtain emotional support or satisfaction, whereas in times of peace, people are more likely to refute misinformation upon receiving authoritative information.

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