

Research on Public Opinion Security under Blockchain Architecture

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Abstract: *With the rapid development of Internet technology, a large number of users on the online social network can express their opinions freely, many of which are spread wantonly without clear authenticity. Due to the lack of effective speech authenticity demonstration mechanism, some untrue speech flows into social networks, causing social panic and suppression of real speech in major events, causing great trouble to people's spirit and life. Taking blockchain technology as the core, this paper studies the public opinion security under the blockchain architecture by using its characteristics such as incentive mechanism, consensus mechanism, hard tampering and smart contract technology.*

Keywords: Public opinion security; Block chain; decentralization; consensus mechanism

1. Introduction

In the era of mobile Internet information explosion, online social network has become an indispensable part of people's life. During the occurrence of many major events, a small number of users with low literacy will release false statements at will to attract followers and attract attention, catering to the imagination of some people in social networks with the explosive news, thus causing rapid spread of rumors and serious harm [1]. On the contrary, the true speech of some vulnerable groups is treated as false speech because it violates certain interests. Therefore, for the speech with uncertain authenticity, it is not advisable to simply treat it as false speech and stop it. It is very necessary to establish a good mechanism for verifying the authenticity of speech, and it is imperative to design a method to suppress the spread of false speech from a technical perspective. In this paper, the authenticity of speech demonstration node is introduced to backspread the information of speech demonstration through blockchain platform, so as to identify the authenticity of speech as soon as possible, quickly kill false speech, and let more people know the true speech as soon as possible.

2. The propagation of speech and its authenticity demonstration process

In order to explore the demonstration method of the authenticity of speech, this paper first studies the communication characteristics of speech. Traditional speech propagation models mainly study the propagation of rumors, such as classical SEI (thinker and adopter), CSER (rumors-killer and Rational), etc. This kind of methods mainly use differential models. At the same time, the total number of participants in the speech, the psychological changes of users and other actual conditions are considered comprehensively, so as to determine the characteristics of rumor transmission. In this kind of model, the propagation threshold is firstly obtained according to the mean field theory, and then the corresponding operations are carried out by extracting the features that affect the propagation of

speech through the propagation threshold. The shortcomings of traditional methods mainly exist in the following two aspects: on the one hand, it does not consider the time for users to process information. Usually, only some users can judge and process the received speech quickly, and many users do not process the received speech in the first time. On the other hand, due to the user's personality characteristics, interpersonal relationship and other actual situations are different, resulting in different ways of user processing.

This paper will discuss the argumentation process of truthfulness of false speech and true speech respectively.

In the first part, when the speech is untrue, the user is set in the following states: state C means spreading false speech, state S means not contacting false speech, state R means spreading information after demonstration (refuting rumors), state T means believing false speech, and state I means not believing false speech.

The propagation process of speech in this part is as follows: If the state of a node is C, the user sends false speech to the neighboring node, that is, disseminates false speech. If the status of other neighboring nodes is S (no contact with false speech), such nodes receive false speech. If the state of a node is R, the node sends the rumor-refuting information after demonstration to other adjacent nodes, that is, propagates the rumor-refuting demonstration information. If the status of other adjacent nodes is S or C or T, such nodes receive the rumor refuting proof information.

Suppose V is the node and E_{ij} is the path from i to j , then the speech propagation algorithm is as follows:

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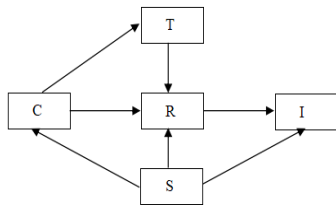
If  $V_i=C$  then
   $V_i$  Sends false statements
  For each  $V_j$  satisfies  $E_{ij} \neq 0$  do
    If  $V_j=S$  then
       $V_j$  Received false statements
    End if
  Endif

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Endif
If  $V_i == R$  then
 $V_i$  Sends false argument information
For each  $V_j$  satisfies  $E_{ij} \neq 0$  do
If  $V_j == S \parallel V_j == C \parallel V_j == T$  then
 $V_j$  Received false argument information
End if
Endif
Endif
    
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In this case, the rumor refuting process is shown in Figure 1,



If user S, who has not received false speech, believes false speech, it will be changed to C (rumor propagator); if user S believes false speech, it will be changed to R (rumor spreading); if user S does not believe the received false speech, it will be directly changed to I (rumor not believed). C, as a rumor propagandist, is considered to be a rumor propagandist, and its status changes to T (rumor propagandist). If T (rumor breaker) believes P (rumor breaker), it becomes R (rumor breaker). If R (spreading rumors) has spread rumor refuting information (P (rumor refuting)), it becomes I (disbelieving rumors). As can be seen from the figure, all users eventually become rumor disbeliever I through the intervention of P (rumor refuter).

In the second part, when the speech is true, the user is set in the following states: state C means spreading speech, state S means not contacting speech, state R means spreading demonstration information of speech, state T means believing speech, and state I means not believing speech.

The process of speech transmission in this part is as follows: If the state of a user is C (speech transmission), the user sends speech to other adjacent user nodes, that is, speech transmission. No matter the state of other adjacent user nodes is S (no contact with false speech) or other states, they receive the speech demonstration information of P (argumentator of speech).

Suppose V is the node and E_{ij} is the path from i to j, then the speech propagation algorithm is as follows:

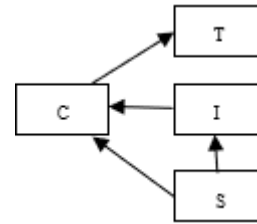
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If  $V_i == C$  then
 $V_i$  sends comments
For each  $V_j$  satisfy  $E_{ij} \neq 0$  do
If  $V_j == S$  then
 $V_j$  Received speech
End if
Endfor
Endif
If  $V_i == R$  then
 $V_i$  Sends argumentative information
    
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For each  $V_j$  satisfy  $E_{ij} \neq 0$  do
 $V_j$  Received argumentation message
Endfor
Endif
    
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If the speech is true, the speech confirmation process is shown in Figure 2,



If the user node of S, which has not received the speech, believes the speech, it changes to C (disseminator of speech). As the disseminator of speech, C considers the speech to be credible, it changes to state T (believe speech). If S does not believe the speech, it becomes I. If I believe the argument of P (who demonstrates the speaker), I become C (who disseminates the speaker). As can be seen from Figure 2, after the intervention of P, the demonstrator of speech, all users finally believe speech.

The refutation of the above false remarks and the verification of the authenticity of the true remarks are mainly completed by the public security organs, professionals and other authoritative organizations. The argument of authenticity of speech is not simply to eliminate false speech, but to some extent to produce new speech. Compared with ordinary speech speakers, argumentators have higher media literacy and greater legal responsibility.

3. Application of blockchain technology to demonstrate the process of speech

The refutation of the above false remarks and the verification of the authenticity of the true remarks are mainly completed by the public security organs, professionals and other authoritative organizations. The argument of authenticity of speech is not simply to eliminate false speech, but to some extent to produce new speech. Compared with ordinary speech speakers, argumentators have higher media literacy and greater legal responsibility.

The producer of the speech publishes the speech, and at the same time, according to the idea of the blockchain, the speech hashes to obtain a digital summary stored in the blockchain. In order to ensure the security, digital abstract is encrypted by asymmetric encryption algorithm. The private key is held by the user, and the corresponding public key and digital summary are made public in the block number of the blockchain. The method to locate the speech publisher is to decrypt the digital digest with the public key, Hash the information content, and then compare the results obtained by the two operations [2]. So producers of speech will have nowhere to run. As it is with producers of speech,

so it is with disseminators of speech. In such an online environment, all users will be careful what they say and what they do. On the other hand, online social network platforms based on block chain reward both speech makers and disseminators according to the quality of speech through content incentive mechanism, so as to encourage users to actively publish and disseminate high-quality content [3].

Users' comments or votes when browsing and reading on online social network platforms can influence the support rate of comments, so as to determine the position and order of comments. Users who initiate speech and participate in the discussion and dissemination of speech will receive certain rewards in proportion [3][4]. When users vote and get rewards, ordinary users, authorized users, professional institutions and other users have different weights, and the weights of users are dynamically adjustable. The weight of users who have made or spread false remarks decreases, and the weight of users who have demonstrated that speech can be rewarded increases. All of these factors will combine to influence the popularity of the speech.

As the comments with higher ranking have more influence on public opinion, arguments are conducted in accordance with their ranking order, and the comments with higher ranking are demonstrated earlier. Argumentation is issued by the authority and has a high weight. Therefore, the propagation speed of argumentative information is much faster than that of the argumentative without argumentation. Combined with what is said in the speech communication and argumentation, this article argument comments authority can change other user node status in time, change the state of the user node also forward reasoning information, quickly spread to the entire network, false speech eventually be rumours, real speech after argument, in order to achieve the sorting accordingly in advance and add already tagging [5]. At the same time, the weight of the argumentator will increase after the argumentation of the authenticity of the speech, and it will complete the argumentation of the speech more quickly in the next argumentation, thus realizing the virtuous circle of the authentication of the authenticity of the speech.

4. Conclusion

In online social networks, based on the current legal framework, although the release and dissemination of speech can be traced, the cost of tracing is high and the time is long. False remarks in major events cause social panic and pose a great threat to public opinion security. Blockchain technology, with its incentive mechanism, consensus mechanism, tamper-proof, smart contract technology and other characteristics, provides technical support for the credit transmission of the Internet in the technical practice led by Bitcoin. By analyzing different ways of speech transmission and speech argumentative methods, this paper builds a framework to demonstrate the authenticity of speech by applying blockchain technology, providing a theoretical basis for the research and

application of network speech governance based on blockchain technology. Due to the commercialization of blockchain technology in network speech governance and other reasons, this paper did not conduct in-depth research on the implementation details of authenticity demonstration of speech in blockchain. The next step is to conduct practical research on large-scale network speech governance through blockchain technology and real public opinion data.

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