**CONCLUSIONS**

From the user behavior data and the basic information data of multiple messages under a hot topic being discussed on a social network, this article extracted the driving mechanisms of both the user and the multi message interaction and proposed a prediction model of the user’s participation behavior in the discussed topic. First, the user’s participation behavior was predicted by a BP neural network model, which copes with the complex nonlinear relationships between the input of the driving mechanisms of the user and the multi message interaction and user behaviors’ prediction output. Meanwhile, due to the iterative guidance of multi information interaction on user behavior, the BP neural network was degraded by the over fitting problem. After correcting the over fitting by a simulated annealing algorithm, the accuracy of the prediction was improved. Finally, we defined the multiple-message correlation metrics, statistically analyzed the model outputs, and estimated the proportion of users participating in one message, who also participated in other messages. The calculation results quantified the mutual influence strength between the multiple messages and accurately represented the influence of the hot topic on user participation behaviors. The proposed method was experimentally evaluated on multi message data under a hot topic discussed on the online social network, Sina Weibo. The model not only accurately predicted the user’s participation behaviors but also quantified the intensity of the mutual influence between the multiple messages. Moreover, it dynamically perceived the situational changes in the hot topic, providing strong support for public opinion control.