A New Threat Evaluation Method Based on Cloud Model

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Abstract. Along with the prevalence of Internet, the threat for the network is increasing steadily. This paper proposed a new threat evaluation approach, which mapped the uncertain threat into quantitative expressions. By the model, the threat situation could be showed directly.

Keywords: mobile network, threat evaluation, Cloud Model

1 Introduction

Along with the development of the computer technology and the prevalence of Internet, computer has become more important in the people's life. At the same time, the threat for the mobile network is increasing steadily. Mobile network is just like the sword with two blades. It benefits the scientific researcher, and even the common people, but it make the threat increase more quickly and more widely.

The work to detect and control the Threat Situation of Mobile Network (TSMN) has outspreaded accordingly, and we have implemented a system which depicted how to watch and control the threat situation of computer network in detail [1]. At this junction, a new method to evaluate the TSMN based on cloud is proposed. The theory of cloud techniques is presented in section 2. Then, section 3 will expound the new mechanism on how to calculate the qualitative influence of the TSMN and how to assess the situation with cloud-based technology. Furthermore, section 4 gives the results of experiment and corresponding curve. Lastly, conclusion and discussion are presented in section 5.

2 The Actuality of Cloud Technology

Cloud model is an uncertain transition model that bridges the gap between the qualitative analysis and the quantitative by language value, as in [3]. Cloud is made of a lot of cloud drops, and every drop is an instance that expresses the qualitative concept in quantity. And in the last ten years, the thinking of the cloud technology has been consummated and used in many evaluation systems and prediction systems

successfully, e.g. reliability evaluation of electronic products in [2], reliability count evaluation of computers in [3], representation and prediction of K-line in [4], and so on as in [5,6]. A more successful appliance of cloud technology is the inverted-pendulum, which is a hard problem in fuzzy control, and the result of the application is surprised.

A one-dimensional cloud to the range of the affected computer in a network is proposed in Fig. 1, and the parameters Ex, En, He of moderate range cloud are labeled. From the left to the right, the range and the parameters are described as the following:
Small Range: A (0, 50, 0.5);
Moderate Range: A (200, 50, 0.5);
Big Range: A (500, 100, 2);
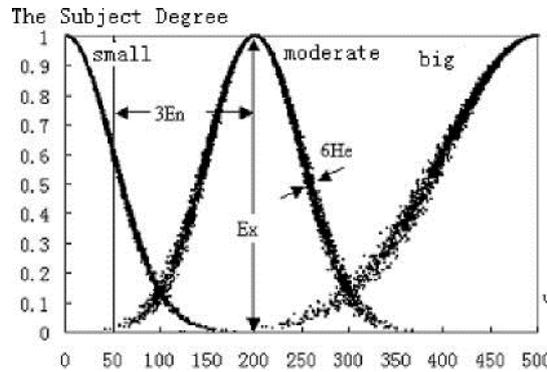
Fig.1. The Cloud-based model of The Range of The Affected Computers

The qualitative meaning is very obvious: along with the increase of the number of the affected computers, the membership degree of u in U to the term A (0, 50, 0.5) decreased and to A (200, 50, 0.5) increased accordingly; if the number of the affected computers is greater than 200, the membership degree of u in U to the term A (200, 50, 0.5) decreased and to A (500, 200, 2) increased along with the increase of the number.

3 Experiments in Network Threat Evaluation

As the formulas in part 3, we give an example of the cloud-based evaluation model. According to formula 3 and formula 4, and let $_{tmax=500,}$ the cloud is described as following:

$$Ct = t (500, 167, 2); \qquad (5)$$
$$C4=4(9, 3, 0.03); \qquad (6)$$

Then the final cloud of the TSMN is described as following:

$$C (t,4) = Ct \cap C4$$
$$= C((500,9),(167,3),(2,0.03)) \qquad (7)$$

Fig. 2 is the cloud of the formula 7. But in our system, we are only concerned about the ascending half cloud, where $\square < \square_{max}$ and $4) < 4)_{max}$.
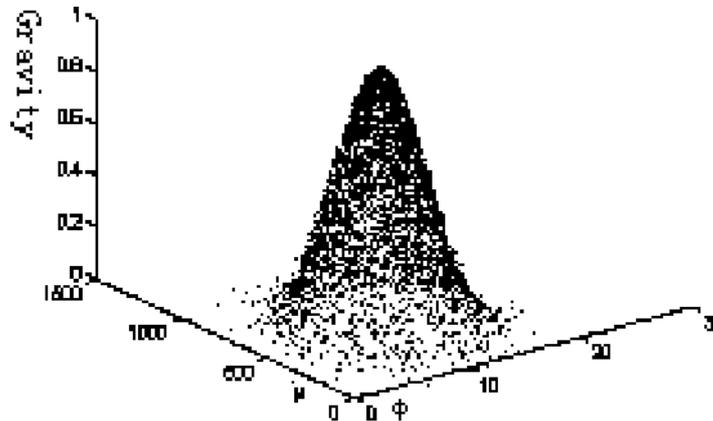

Fig. 2. The Gravity Cloud of TSMN

5 Conclusion

In brief, design a TSMN evaluation model and make a qualitative analysis of TSMN is important and necessary in TSMN prediction. The cloud methods not only bridge the gap between quantitative and qualitative knowledge, but also between different granularities of knowledge. Particularly, the soft inference based on cloud methods can not only maintain the uncertainty of the linguistic atoms, but also enhance the robustness of the predictive results. There is extensive real practical value to use the cloud technology introduced in this paper to assess TSMN.

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