Application of data mining technology in Internet financial risk analysis

Tingyu Zheng, Tao Wang

School of Management and Economics, Beijing Institute of Technology, Beijing 100081, China

Abstract

In this paper, we study the Internet financial risk based on the data mining technology. In order to solve problems concerning credit generation and evolution and risk control in Internet finance, we make an empirical study of factors affecting credit in Internet finance and investigates the evolution of the Internet finance credit embedded with data mining. On this basis, the alien invasion into Internet finance is analysed, and complex networks and other related theories and real evidence are used to analyse above-mentioned problems. Moreover, effective evaluations are made of credit risks to circumvent or weaken credit risks and impose targeted supervisions on credit risks. The experiment result shows the data mining method is effective to the analysis of Internet financial risk.

Keywords: Media express, Internet financial risk, data mining, credit risk, credit generation.

1. INTRODUCTION

Rise and development of the Internet Finance in China is a fruit of innovative strategies and technological progress. China has been basically synchronized with foreign countries in Internet finance development. Moreover, China has made new innovation and development in specific forms of Internet Finance. Internet Finance showed its first appearance in China in 1997 and experienced a “blowout” and explosive growth in 2013. With its advantages in the organizational models and information processing capacities, Internet finance has gotten rid of existing channels, reduced transaction costs, partly alleviated the problem of asymmetric information, improved the efficiency of capital allocation, further integrated the capital supply and demand, satisfied demands of small retail investors and markets especially medium, small and micro-sized enterprises for financing services, and produced disruptive influence on social and economic life. However, it cannot be ignored that explosive growth and extensive development have been a main feature of Internet finance development in China in recent years (Thomas, 2002; Marshall et al., 1996). At present, China is still at the initial stage of “capital accumulation, risk aggregation, regulation absence” in its Internet finance development. Credit and risk-related problems existing in traditional financial transactions are still what Internet finance should invest great efforts to solve first.

The Internet has fully and deeply penetrated into and deeply changed various fields of the economic and social development. The combination of the Internet and the finance has given birth to Internet finance, which offers consumers especially vulnerable groups a way to meet the needs of financing and wealth growing. In 2013, with Yu’e bao’s officially going online as a symbol, Internet finance began to grow explosively. Internet finance has improved the efficiency of financing, promoted the process of inclusive finance, and become a useful supplement to the existing financial system(Mulvey, 1997). However, because there are no sound laws and regulations about neither Internet finance, nor risk prevention and supervision system which adapts to the characteristics of Internet finance, the Internet financial industry grow in a savage state, all kinds of risk problems have raised. To strengthen risk prevention and supervision has become a practical demand of promoting the sustainable and healthy development of Internet finance and maintaining the security and stability of the existing financial system(Grisse and Nitschka, 2015; Harris and Küçüközmen, 2001; Muñoz, 1988; Venter et al., 2009).

Internet finance is the integration of Internet and finance, the Internet has open sharing, the concept of everyone involved, and in the implementation has the congenital advantage on data acquisition and analysis, financial is to achieve the inter-temporal allocation of resources, reduce the degree of information asymmetry, both has the
natural fusion. In recent years, the fast development of the Internet finance, on the one hand, the Internet companies tap into the financial sector, and on the other hand, the traditional financial institutions but also facilitate the integration of the Internet, which enables the reform of China’s financial industry, built a different kind of financial ecological environment (Ahmed et al., 2014). Internet financial essence is the financial, as "financial intermediary" again, the process of the intermediate state is more flat and transparent, and at the same time make more small micro institutions or individuals using the Internet to facilitate participation in financial activities, expand the long tail market, gradually realize the universality, solved the problem of "the last kilometre" financial "capillary" develops, injected into the real economy. Financial as a kind of financial innovation, in a word, the Internet has injected new vitality to the financial industry in our country, is the highlight of China’s economic development and growth, and conforms to the needs of China’s national conditions, but in the process of development, the risk gradually exposed, especially large-scale P2P industry appeared the varying degree to honour the crisis, it is worth mentioning that the Internet financial "crossover" and "mixed" and "virtual" characteristics, both financial risk and risk of the Internet, very high risk of infectious and relevance, risk once the trigger point, easy to cause systemic risk, but the present stage our country adopts a system of "separate operation, separate supervision", have lagged behind the development of the Internet financial regulatory way. Therefore, to promote the financial innovation at the same time should also pay attention to the building of the regulatory system, and stable development of the economy.

2. MATERIALS AND METHODS

2.1 The development of Internet financial risk in China

As a combination of the Internet information technology and finance, Internet finance has a strong vitality since it was born. And it makes a most spectacular development in our country. 2013 is known as the first year of Internet finance and in this year Taobao reached the scale of hundreds of billions within a few months, P2P network lending platform also made an explosive development China has now become the world’s largest P2P network credit market (Verguet, 2015). Compared with the development of the Internet finance in western developed countries, there is a big difference in scale and speed in our country. Internet finance in our country made a faster development than abroad and gradually formed an independent industry. Even in American which has the most advanced and popular Internet technology, Internet finance doesn’t have a rapid development situation. Then is the particularity of Internet finance’s development in China accidental or inevitable? Finance is the core of modern economy development, that the financial system can configure financial resources effectively is an important performance that the financial system plays a role. Since reform and opening-up, China’s financial system reform has made great achievement, financial scale, financial deepening degree enhances unceasingly. But we have to notice that the problem of insufficient financial inclusion in our country is very serious, a lot of financial demand is difficult to get satisfaction, such as small micro enterprise financing demand, rural financial demand and financial needs of the low-income groups. In this paper, we study the Internet finance from the perspective of improving financial inclusion, and points out that the insufficient financial inclusion of financial system in our country is an important reason which makes a rapid development in China’s Internet finance. The insufficiency of our country’s financial inclusion left a huge space for the development of Internet finance. On the other hand, developing the Internet finance is also an inevitable choice to promote China’s financial inclusion.

The Internet finance is the hottest topic in the financial field over the past two years. The Internet finance has a rapid development in a short period of time, the third party payment, P2P, and crowd funding business model also had rapid development, and brought a strong impact to the traditional financial industry. Internet financing such as balance of treasure emerged even makes national investment unprecedented, the Internet finance has become the focus of national attention (Wohl and Branscombe, 2014). The Internet financial as emerging financial, but also cannot ignored the traditional financial Internet. In a sense, the traditional financial Internet has more important meaning to the development of real economy. With the help of the Internet channel, the traditional financial displayed some new characteristics, such as pay more convenient, lower transaction costs, the degree of information asymmetry is reduced and the market transactions more efficient. Payment is the beginning and the end of economic activity; it is the foundation and platform for the normal operation of the national economy indispensable financial. With the gradual combination of Internet technology and finance, infrastructure and payment of financial services have rapid development and evolve many innovative models under the drive of Internet Financial. Different from the traditional mode of payment, the third-party payment system is not only the outstanding representative of the Internet financial innovation, in certain level; it has become an indispensable part of our existing payment system. Business financial model, P2P model of lending, crowd funding model, Internet financial are represent patterns in nearly two years.
With the remarkable improvement of the importance of the Internet in human society, the Internet will be combined with financial, and it not only greatly facilitate people’s daily life, but also changed people’s daily behaviour and the enterprise daily management way in the very great degree. Virtualization, network of the Internet financial has caused enormous impact to traditional financial institutions; it also brought the huge power of innovation and profit opportunities. Analysis the development trend of the Internet financial need to investigate the Internet financial reality value, risk characteristics and related influencing. In the real economy, the Internet finance not only effectively complement the blank of traditional financial institutions, but also enhance the financial market competition, brings the opportunity for our country to comprehensively deepen financial reform, improve the financial market system and the perfection of the socialist market economy (Foster et al., 2015). It affects the operation and development of China’s entity economy effective from three aspects, that is, to reduce financing cost, enhance innovation and vitality, and increase consumption demand. From the strategic value, the Internet finance brings developing and developed countries on a similar starting line, but because of China Internet huge population base and advantage, there is an important practical significance of Chinese Internet finance. The Internet is still in the initial stage of development, technology, platform and supervision environment is not mature enough, so that the Internet has not only widespread financial risks of financial institutions, but also has some risks that are specific to their own. In addition to these risks, the Internet financial development also depends on the regulatory laws and regulations can properly regulate and guide, the Internet financial industry safety effective self-discipline and cooperation, the Internet financial support technology and system, the Internet can improve financial institutions or the platform risk control ability can be improved and the traditional financial institutions respond to the reaction. It still need further observation that the Internet is becoming the traditional financial ornament or become the third kind of financial model match and direct financing and indirect financing. In this paper the characteristics are fully aware of the Internet finance has many differences from traditional financial institutions, including the open resource, cost intensive, market-oriented characteristics, channel selection, operation efficiency, the Internet user behaviour value etc., traditional finance do not have these characteristics.

2.2 Data mining model and algorithm

As for data mining (DM), there are two themes of agent and DM interaction and integration in the literature: DM for agents, referred to as mining-driven agents; and agents for DM, referred to as agent-driven DM, commonly known as Multi-Agent Data Mining (MADM). The former concerns' issues of transforming the discovered knowledge extracted by DM, into the inference mechanisms or simply the behaviours of agents and multi-agent systems; as well as the arguable challenge of generating intelligence from data while transferring it to a separate, possibly autonomous, software entity. A FIPA-compliant multi-agent platform is based on mining-driven agents (Agent Academy) that offer facilities for design, implementation and deployment of MAS. That is the agent academy as an attempt to develop a framework through which users can create an agent community having the ability to train and retrain its own agents using DM techniques (Amin et al., 2014; Kannadhasan, 2015).

Internet financial essence is the financial, as “financial intermediary” again, the process of the intermediate state is more flat and transparent, and at the same time make more small micro institutions or individuals using the Internet to facilitate participation in financial activities, expand the long tail market, gradually realize the universality, solved the problem of "the last kilometre” financial “capillary” develops, injected into the real economy. Mining-driven agent system is concerned with the use of agent and MAS to perform DM activities, which provide a broad review of prominent MADM approaches that benefit to gain the individual agent-based DM architectures. DM techniques concerned with the collaborative work of distributed software in the design of MAS directed at DM, which involves various systems that have been developed for MADM. These systems can be categorized according to their strategy of learning, into central-learning, meta-learning and hybrid-learning. Most data warehouse projects strive to deliver integrated data, which supports decision makers throughout the organization. Data's integration is a fundamental but challenging in the design of DW and DSS that involves combining data residing in different sources and providing users with a unified view of these data8. This process becomes significant in an integrating for DM and MAS with BI applications. It appears with increasing frequency as the volume and the need to share existing data explodes and the focus of extensive theoretical work, and numerous open problems remain unsolved in the process of BI. When data passes from the sources of the application oriented operational environment to the Data Warehouse, possible inconsistencies and redundancies should be resolved, so that the warehouse can provide an integrated and reconciled view of data of the organization. In the design of a data integration system, an important aspect is the way in which the global schema is specified, i.e., which data model is adopted and what kind of constraints on the data can be expressed. Figure 1 shows the architecture of agents’ components in the mining process and figure 2 shows the conceptual model of data mining blessing and disambiguates framework.
Figure 1. The architecture of agents’ components in the mining process

Figure 2. Conceptual model of data mining blessing and disambiguates framework

The significant of data integration towards DM and BI is the key concept of DW that reflects the informational needs of an organization, which define in terms of a global, corporate view of data. Integrating for DM and BI is the roadmap to integrate the available information about the solution to queries posed by the user in terms of the data combination schema (i.e. from general to independent and called Global-as-View (GAV) and vice versa. (Local-as-View (LAV). These views should be provided in terms of conceptual representation mechanism that can be abstract from the physical and logical organization of data in the sources, which follows the need and requirements for maintaining an integrated, conceptual view of the corporate data in the organization are stronger with respect to other contexts. I.e. the query processing depends on the form of the data integration system that the GAV or LAV approach is adopted and on the form of constraints allowed on the global schema, which is an application of the DW.

To establish the baseline behavior of a given user, this baseline acts as the genuine behavior of a given user. This behavior is also referred to as past behavior.

To establish a recent behavior of a given user and to compare the past behavior and the recent behavior of a given user, we give the following data mining algorithm.

SHM solution vectors are randomly generated according to the variable range for each variable (Zhang, 2015). Namely.
Hence, we have equation (2):

\[ x_i^{\text{new}} = \begin{cases} x'_i, & j \in \{1, 2, \ldots, S_{HM}\}, \text{ if } \text{rand} < \text{HMCR} \\ \bar{x}_i \in X_i, & \text{otherwise} \end{cases} \quad (2) \]

As for \( x_i^{\text{new}} \) from harmony memory, we have equation (3):

\[ x_i^{\text{new}} = \begin{cases} x_i^{\text{new}} + \text{rand} \times \text{BW}, & \text{if } \text{rand} < \text{PAR (Continuous)} \\ (k + \lambda) \times x_i^{\text{new}}, \lambda \in [-1, 1], & \text{if } \text{rand} < \text{PAR (Discrete)} \\ x_i^{\text{new}}, & \text{otherwise} \end{cases} \quad (3) \]

The worst harmony is replaced with the new harmony, i.e.,

\[ x^{\text{worse}} = x^{\text{new}}, \text{ if } f\left(x^{\text{new}}\right) < f\left(x^{\text{worse}}\right) \quad (4) \]

According to the analysis and description of routing problem in express delivery, the constraints can be expressed as:

(1) Distribution route length does not exceed the maximum value, i.e.,

\[ \sum_{i=1}^{n} d(k-1,k) + d(n,0) \leq MD \quad (5) \]

(2) The mathematical model of route programming can be defined as

\[ L = \min \left( \sum_{i=1}^{n} d(k-1,k) + d(n,0) \right) \quad (6) \]

Based on the gradient descent method, node center and base width parameter are:

\[ w_j(k) = w_j(k-1) + \eta \left( y(k) - y_n(k) \right) b_j + \alpha \left( w_j(k-1) - w_j(k-2) \right) \quad (7) \]

\[ \Delta b_j = \left( y(k) - y_n(k) \right) w_j \left( \frac{X - C}{b_j} \right) \quad (8) \]

\[ b_j(k) = b_j(k-1) + \eta \Delta b_j + \alpha \left( b_j(k-1) - b_j(k-2) \right) \quad (9) \]

\[ \Delta c_{ij} = \left( y(k) - y_n(k) \right) w_j \left( \frac{x_{ij} - c_{ij}}{b_j} \right) \quad (10) \]
\[ c_{ij}(k) = c_{ij}(k-1) + \eta \Delta c_{ij} + a(c_{ij}(k-1) - c_{ij}(k-2)) \]  
(11)

\[ b_{ij}(k) = b_{ij}(k-1) + \eta \Delta b_{ij} + a(b_{ij}(k-1) - b_{ij}(k-2)) \]  
(12)

\[ \Delta c_{ij} = \left( y(k) - y_m(k) \right) w_j \frac{x_j - c_{ij}}{b_j^2} \]  
(13)

\[ c_{ij}(k) = c_{ij}(k-1) + \eta \Delta c_{ij} + a(c_{ij}(k-1) - c_{ij}(k-2)) \]  
(14)

Jacobian matrix algorithm is shown as follows:

\[ \frac{\partial y(k)}{\partial u(k)} = \frac{\partial y_m(k)}{\partial u(k)} = \sum_{j=1}^{m} w_j b_j \frac{c_{ij} - x_i}{b_j^2} \]  
(15)

Where \( x_i = u(k) \).

In a closed or semi-open network which, the security is assured; this paper uses data mining algorithms of Bayesian incremental learning to classify user data for obtaining the characteristics of user behavior and data model then using Bayesian incremental learning algorithm to optimize the model to orientate consumer behavior accurately. In addition, the user behavior analysis system can connect directly with operator’s business systems. More specifically, the user behavior analysis system can help to find more potential users in the way of advertising. We analyze the networks operators that are meeting brand-new business challenges, introducing the system diagram of user behavior analysis.

3. RESULTS AND DISCUSSION

The Basel Accord III and CBRC, who issued Capital Management Method of Commercial Bank in 2013, have put the operational risk into the capital regulatory framework. Higher requirements are put forward for banks risk management. According to the Basel Accord III, the operational risk centres around breakdowns in imperfect or invalid internal procedure, staff and system, or external events. Such breakdowns can lead to financial loss through error and fraud (Nakov and Ng, 2014). The IF, which is a new thing, provides convenience for financing, payment and finance, but modern financial IC card, telephone bank and super net bank are imperfect more or less due to congenital defects of IT and bad motive of hackers. Once the financial participants operate errors or attack by hackers, they will suffer great financial loss. On the other hand, bank, E-commerce business, and other internet businesses in the internet environment have been linked through the internet. Financial risks, which once appear, will spread quickly and lead to greater relative risks among industries. Therefore, operational risk cannot be neglected in the internet financial environment. Under the internet environment, liquidity risk refers to the uncertainty of meeting liquidity supply by selling the assets or borrowing funds at reasonable price in internet financial institutions which have established E-commerce or P2P platform. Customers make fast payment on the internet simultaneously without seeing each other. The trade volume surges instantly by real time settlements. Once errors appeared, they cannot be corrected on time fundamentally. These faults will spread quickly and need higher remediation costs. Liquidity crisis of funds will happen. There are enough funds to cash at one time. Liquidity risk is induced.

The IF is the financial activities which highly rely on IT with paperless transactions and terminal diversification. With the rapid development of IT and communications technology, new technologies, such as mobile internet technology and cloud computing technology, are of important immaturity. Financial transactions can be realized on the internet. E-record cannot be checked like paper documents. It is difficult to regulate. The hackers, who are lack ethics when seeing profit, can modify the financial system without any trace. In the meantime, internet
financial businesses have no sufficient investment in security and are lack of IT talents of high quality and quantity. Technology risk may happen in the IF. Many P2P businesses, such as Haocredit Net, Renren Credit, Paipai Credit and Wingdragon Credit, have suffered attack from hackers since 2014. They need to pay protection money to avoid attacking. The servers paralyzed very quickly after suffering attack. The protocol is of birth defects and cannot be ruled out. The website cannot be opened and the financial transactions cannot be accomplished. Hence, we should pay more attention to the technology risk of IF. To tell the truth, the level, degree and type of IF differ from internet financial business to business because of different financial services. From the perspective of the six models of IF, such as the third party payment, P2P credit, Big data finance, crowd funding, informative financial institutions and internet financial portal website, there are other IFRs, such as market risk, different country origin risk and reputation risk. All in all, IFRs are very complex. Effective measures from the legal, talents, IT, ethnic and financial management aspects should be taken. To curb the IFRs effectively, these suggestions include strengthening legislation and regulation, establishing synergetic control mechanisms of IF.

The essence of internet financial services is still finance. Financial activities such as financing, payment and finance carried out by internet businesses have many similarities with counterparts traditional financial institutions do after information, such as purchasing funds, insurance, credit on the internet and payment and settlements. There are some differences in place, manner, amount size, frequency of payment, time, space and other financial products of financial activities. On the other hand, many internet financial activities have many connections with traditional commercial banks, insurance companies, funds, securities and trust. For example, Balance Bao of Alibaba has connection with Tianhong fund. They are typical strategic and operational synergy. In some sense, traditional finance and IF are the relationship of competition and cooperation, not confrontation relationship, more than the relationship of life and death. Therefore, to strengthen the synergetic development of traditional finance and IF can be beneficial to maintain the order of financial development without affecting the financial innovation and financial stability. C. Synergy between Regulation and Development of Internet Finance Internet finance is the product of innovation of internet and finance. With the rapid development of IF from e-payment to all kinds of 'Bao' and varieties of 'Credit', the effect of catfish took place, which brings many benefits to national economy. Chinese government has issued some regulations to protect the interest of customers and play an important role in controlling IFRs since 2010. But direct relative laws have not been published. Regulators should grasp the degree of supervision. If not doing so, financial bubble and disorder will appear. But excessive regulation will stifle the innovation. Table 1 shows the typical factors to evaluate the risk in the proposed model.

Table 1 The typical factors to evaluate the risk in the proposed model

<table>
<thead>
<tr>
<th>Classification of risks</th>
<th>Risk factor</th>
<th>Possible outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schedule risk B1</strong></td>
<td>Early procedures are not perfect C11</td>
<td>Affect the normal progress of the project</td>
</tr>
<tr>
<td></td>
<td>Human, material, machinery and other resources supply C12</td>
<td>Affect the normal project</td>
</tr>
<tr>
<td></td>
<td>job schedule C13</td>
<td>the project cannot be carried out on schedule</td>
</tr>
<tr>
<td><strong>economic risks B2</strong></td>
<td>High inflation rate C21</td>
<td>Lead to suspension or termination of the project</td>
</tr>
<tr>
<td></td>
<td>financial risk C22</td>
<td>Prices are rising and the cost is increasing</td>
</tr>
<tr>
<td><strong>Management risk B3</strong></td>
<td>Project team organization C31</td>
<td>Affect work efficiency</td>
</tr>
<tr>
<td></td>
<td>Lack of construction management technology C32</td>
<td>Affect work efficiency and progress, increase cost</td>
</tr>
<tr>
<td></td>
<td>Subcontractor coordination risk C33</td>
<td>Affect work efficiency and progress</td>
</tr>
<tr>
<td><strong>Technology risk B4</strong></td>
<td>Design risk C41</td>
<td>Delay project progress</td>
</tr>
<tr>
<td></td>
<td>New technology application C42</td>
<td>Increase the cost, affect the time limit for a project</td>
</tr>
<tr>
<td><strong>Security risk B5</strong></td>
<td>Interface C51</td>
<td>Interface is not clear, the impact of construction period</td>
</tr>
<tr>
<td></td>
<td>Sudden accident C52</td>
<td>Affect the normal project</td>
</tr>
<tr>
<td></td>
<td>Delay C53</td>
<td>Affect work efficiency, increase cost</td>
</tr>
</tbody>
</table>
The balance between regulation and development should be attained to maintain the vitality and dynamism of the development of the IF and to further promote the innovation and development of the finance. D. Synergy among regulatory departments, there are many participants in the IF; plus lack of regulation. A lot of non-financial institutions including those without sufficient talents and software and hardware facilities have taken an active part in competition. Their financial activities are easy to touch legal redline, even bring systematic IFRs. The service attributes of finance are mixed, one service or several services are simultaneously carried out such these services as investment, payment, finance, financing, consumption, settlement and debit and credit. It is difficult to define clearly which service belongs to which regulatory department to monitor. It is easy to induce squabbling passing the buck. At present, Chinese regulators include PBC, CBRC, CIRC, CSRC, MIIT, Ministry of Commerce and industry associations. There is segmentation in information system and function. Information cannot be shared. It is difficult to deal with the regulation of financial risk induced by mixed financial services. Therefore, it is high time to strengthen the reform of regulatory institutions, restructure the monitoring function and establish the synergetic regulatory mechanisms including synergy between regulatory measures, synergic regulatory standards and synergetic information disclosure. These synergetic mechanisms can stop squabbling passing the buck. It is no small matter in financial risks, which need to be controlled effectively. The experiment result is shown in table 2.

### Table 2 The experiment result

<table>
<thead>
<tr>
<th>Target layer A</th>
<th>Time limit</th>
<th>Economics</th>
<th>Security</th>
<th>Technology</th>
<th>Administration</th>
<th>Behavior</th>
<th>Wi</th>
<th>AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time limit</td>
<td>B1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0.299</td>
</tr>
<tr>
<td>Economics</td>
<td>B2</td>
<td>1/3</td>
<td>1</td>
<td>1/4</td>
<td>4</td>
<td>1/4</td>
<td>1/3</td>
<td>0.059</td>
</tr>
<tr>
<td>Security</td>
<td>B3</td>
<td>1/2</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>1/3</td>
<td>3</td>
<td>0.190</td>
</tr>
<tr>
<td>Technology</td>
<td>B4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/5</td>
<td>1</td>
<td>1/5</td>
<td>1/5</td>
<td>0.026</td>
</tr>
<tr>
<td>Administration</td>
<td>B5</td>
<td>1/2</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>0.327</td>
</tr>
<tr>
<td>Behavior</td>
<td>B6</td>
<td>1/2</td>
<td>3</td>
<td>1/4</td>
<td>5</td>
<td>1/5</td>
<td>1</td>
<td>0.099</td>
</tr>
</tbody>
</table>

Firstly, at present, Internet Finance is a new thing in China and still at its initial stage of development. In existing research on Internet finance, scholars mostly make comments, but rarely make empirical research and dynamic analyses. In this thesis, a comparative analysis is made of the foreign Prosper Platform and domestic P Platform as representative Internet finance credit platforms in China and foreign countries, to obtain valuable conclusions.

Secondly, in this thesis, the data mining theory is applied to analyse theories and behaviours related to the core issue (credit) in the Internet finance credit. Adjustments are made to balance the trust or fraud in the Internet finance credit to get the general and extreme equilibrium solution, abandon undesired ones and analyse convergence of equilibrium.

Thirdly, on the basis of the equilibrium adjustment, the author takes the lead in applying the alien invasion model to control Internet risks. To better describe the nature of group default risks, the credit default risk is compared to a “virus”, and the single population infectious disease model is transformed into a “multi-population infectious disease model” with various populations invading each other. On this basis,
non-linear coupling differential equations about interactions between multiple populations are presented. Some simplified hypotheses are used to solve these non-linear coupling differential equations.

Fourthly, in the case of a uniform network, the possibility of a wide-range default risk proliferation is quite small. In the case of a scale-free network, the default risk threshold value would be significantly (negatively) affected by the value of network scale. The value is calculated and a simulation graphical analysis is made. This is conducive to control of financial risks. A larger value of the network scale indicates a closer link between different individual members in this scale-free network and a higher complexity degree of the network, showing typical features of a “small world”. Such a scale-free network is likely to experience a substantial increase in default risks. In fact, the outbreak of the subprime crisis in 2008 has a great impact on the complexity of the relationship network structure in the human world attempts are made to use Data mining model to make an empirical analysis of credit risks in Internet finance, because it would be quite difficult to collect relevant data to make an empirical study of the multi-population alien invasion model generated in this thesis (it would be another topic). These conclusions are of great significance for further analysing the credit and risk problem in Internet finance. On this basis, the Data mining Model are used to analyse credit risks in Internet finance. This model was used mainly for estimating credit risks of commercial banks. This model has been constantly evolved and improved through research. Several models derived from the Credit Risk+ Model, including the CSFB Credit Risk Model, the Mixture Credit Risk+ Model, Two-stage Data mining Model and Poly-system Risk Data mining Model, are compared to figure out their advantages. Loan data of four industries on the Internet loan platforms is used to make a comparative analysis of Internet finance credit risks in different models, at different confidence levels.

4. CONCLUSIONS

In order to solve problems concerning credit generation and evolution and risk control in Internet finance, the author makes an empirical study of factors affecting credit in Internet finance and investigates the evolution of the Internet finance credit embedded with data mining. Analysis the development trend of the Internet financial need to investigate the Internet financial reality value, risk characteristics and related influencing. In the real economy, the Internet finance not only effectively complement the blank of traditional financial institutions, but also enhance the financial market competition, brings the opportunity for our country to comprehensively deepen financial reform, improve the financial market system and the perfection of the socialist market economy. It affects the operation and development of China’s entity economy effective from three aspects, that is, to reduce financing cost, enhance innovation and vitality, and increase consumption demand. The experiment result shows the data mining method is effective to the analysis of Internet financial risk.

REFERENCES

related resource-rich languages, Journal of Artificial Intelligence Research, 44(1), 179-222.