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ANALYSIS AND EMPIRICAL RESEARCH OF INFORMATION VALUE ON BIG DATA IN INTERNET FINANCE DEVELOPMENT *

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Abstract: On the network advantage of Internet finance, we analyzed the business trait and the future development trend of Internet finance, and analyzed the positive information value on big data in Internet finance business development, such as the long tail user management, risk supervision, the third party payment, micro credit, crowd funding, online manage money matters, business recommendation, the transaction subject authentication etc, and the negative information value that big data probably bring to Internet finance. In the part of empirical analysis, we analyzed the constructing necessity and status of Internet finance big data analysis center, and the business distribution relationship of Internet finance and traditional finance in total finance business activities, making the lender and the borrower of micro credit business as an example, to construct the incomplete information static game model, for proving big data have information value in Internet finance business activities, illustrating the information value of big data by simulation experiment.

Keywords: big data; Internet finance; information value analysis; business distribution relationship; incomplete information static game

1. Introduction

1.1. *Research background*

With the development of cloud computing[Chekfoung Tan,*et al*, (2013)], Internet of things[Zhang Jie and Shao Li ping, (2013)][Jiang Jia and Su Kai, (2012)], mobile Internet technology, and the increase of information achievement ability, the data have been

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explosively producing with hitherto unknown speed. IDC (Internet Data Center) Statistics and forecast results showed: in 2012 the whole world data content arrived 2.7 ZB, furthermore it will be 8 ZB in 2015 and 35.2 ZB in 2020. The rapid increasing massive data come from all walks of life, in the data there are massive information knowledge, and the characteristics and manifestation patterns of the information knowledge show diversification. There are structured data, semi structured data, even unstructured data [Chen Ji rong and LE Jia jin, (2013)], including digital, text, graphics and video etc different type of data. So the data research institute Gartner implied big data as " big data is high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making" [Gartner, (citation time: 2015)] .

Internet finance is an emerging area which combines traditional finance industry and Internet spirit [Wang shu guang and Zhang chun xia, (2014)], and achieves development based on cloud computing, big data, social network [Xie Ping and Zou Chuan wei, (2013)], mobile Internet, electronic commerce. The service content contain the third party payment, P2P micro credit, crowd funding, online manage money matters, credit audit, and some other service that have appeared or have not yet appeared. The concrete products are: Alipay, Yu Ebao, quick money, micro wealth, paypal etc.

According to the indication of "China banking service improvement condition report" which published by China Banking Association:

(1) Comparing in 2012 to in 2013, the total Chinese online banking transaction grew 21.79%, mobile phone banking transaction grew 248.09%, personal online banking customer amount grew 28.09%, enterprise customer amount grew 29.92%, mobile phone banking individual customer amount grew 55.50%, enterprise customer amount grew 23.04%. In addition, the emerging TV bank and WeChat bank transaction user amount had also made the surprising results.

(2) Comparing in 2013 to in 2014, the total Chinese online banking transaction grew 17.05%, mobile phone banking transaction grew 149.12%, personal online banking customer amount grew 19.71%, mobile phone banking individual customer amount grew 30.49%. In addition, the total transaction of WeChat bank individual customer amounted to 161.45 times, the total TV bank personal customer transaction grew 172.55%, the off cabinet transaction of Chinese banking finance institution grew 17.9%, the banking average off cabinet rate arise from Internet e-finance reached 67.88%.

Fig.1 shows the amount of active P2P platform in 2009-2014 of China (Fig.1 data sources: "Internet finance report 2014" released by the team of China Investment Corporation Vice President Professor XiePing and "China Internet Finance Development Trend Research Report from 2015 to 2018" released by China Internet Finance Industry Association).

Fig.2 shows 2011-2014 P2P platform transaction in China(Fig.2 data source: 2015 Internet Finance Industry Investment Research Report in China released by Tsinghua Research Center)

Fig.3 shows 2009-2013 the third party payment industry transaction in China (2014-2016 data are forecast data, Fig.3 data source: China Internet Network Information Center, http://www.199it.com /archives/221859.html).

Fig.4 shows 2007-2014 the ratio of mobile phone netizens accounted for the overall Internet users in China (Fig.4 data source: CNNIC).

What all this means, Internet finance is developing rapidly in China. In these new finance industries, mobile transaction, Wechat and other mobile finance industries are widely accepted by individuals and enterprises and are extending rapidly. In the rest of the world, Internet finance shows similar development trend compared with in China.

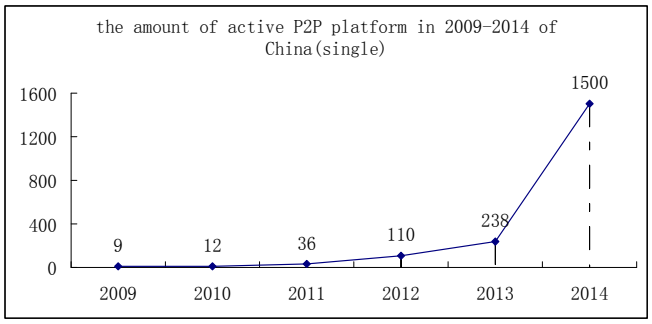

Fig.1. The amount of active P2P platform in 2009-2014 of China

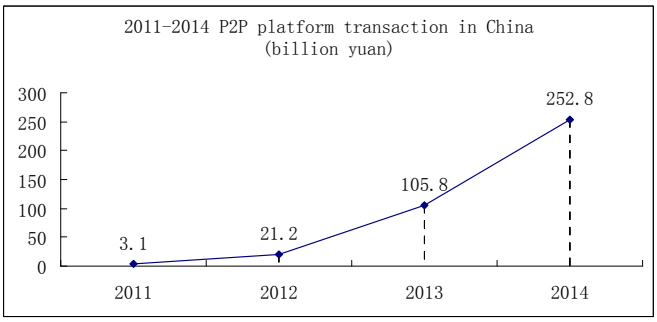

Fig.2. 2011-2014 P2P platform transaction in China

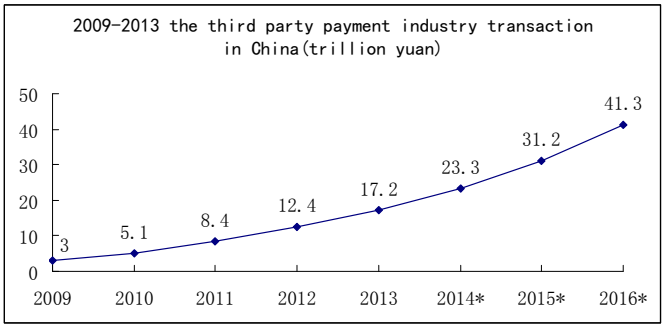

Fig.3. 2009-2013 the third party payment industry transaction in China

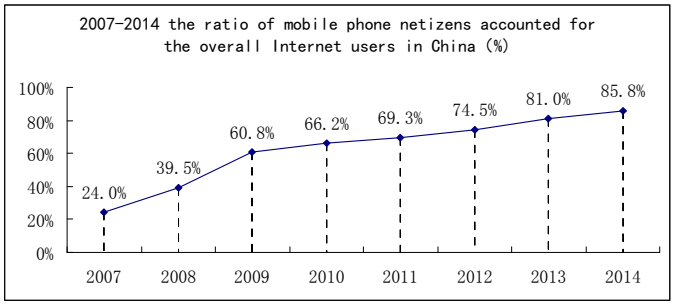

Fig.4. 2007-2014 the ratio of mobile phone netizens accounted for the overall Internet users in China

1.2. *The domestic and foreign research situation and the research necessity of this paper*

Research on Internet finance is a hot topic in academic circles and industrial circles at present, and many valuable research results have produced in recent years, some of these researches are also on the value of big data in Internet finance business construction, such as American Internet finance corporation ZestFinance had constructed credit evaluation model basing on big data, although the model had positive function to the application and development of big data in Internet finance business, but it was still in the immature stage from theory to practice, and the user amount was relatively small. [Wang tong, (2014)] proposed to identify the user through analyzing the user shopping behavior characteristics on a network. [Wang zhao, (2014)] proposed big data had already become a focus of traditional finance contested with Internet finance. [Yang Hu, *et al*, (2014)] proposed the potential Internet finance risk could be found in advance through analyzing Internet finance big data. [Huang Zi Jian and Wang Yan, (2015)] proposed big data could create "credit capital" and "credit guaranty" for Internet finance, and big data could eliminate the adverse selection and moral hazard in credit market. [Yao Wen Ping, (2014)] analyzed the applications of big data in different industries, and proposed strategies on big data development for government and enterprise decision makers. [Li Xin and Xu Wei shen, (2014)] proposed Internet finance was network finance service that based on Internet, big data, and powerful data processing ability. [Sun Jie and He Chen, (2015)] analyzed the differences between Internet finance and traditional finance, pointing out the challenges that Internet finance and traditional finance respectively faced, proposing the two should be merged, and Internet finance business' development should on the basis of traditional finance services. [Jiang Chang jun, *et al*, (2014)] proposed that big data resource service platform architecture included three levels: data resource identification and access, data resources storage and analysis, network information service platform, and introduced the application of trusted transactions in Internet finance. [José Esteves and José Curto, (2013)] based on a risk and benefit perspective, using the theory of planned behavior to develop a model that assessed the intention to adopt big data technologies. [Oren Hamami, (2014)] explored the big data security issue.

Counting the domestic and foreign scholars research results that can be searched, most of the current researches are aiming at the total impact on big data in Internet finance business, although some researches mention the information value on big data in Internet finance development (such as many papers discussed Internet finance credit management, risk management and security warning basing on big data analysis technology), the analysis are also one sided, and the contents are also speak generally. The present research results are rarely searched in detail analysis big data bring positive information value to Internet finance that promote Internet finance development, and rarely searched big data probably bring negative information value to Internet finance that affect it's decision. The present research results have not yet been searched empirically analysis the information value on big data in Internet finance development. In this paper, we combine the research situation of domestic and foreign scholars to Internet finance, analyzing the positive and negative information value that big data bring to Internet finance business, proposing the specific ideas of constructing big data analysis center, making the lender and the borrower of micro credit business as an example, to construct the incomplete information static game model, for proving big data have the information value in Internet finance business activities, and illustrating the information value of big data by simulation experiment.

1.3. *Research route*

The research content of this paper includes five parts:

(1) Introduction. The content includes research background, domestic and foreign research situation, and the research problems and the research thinking.

(2) Internet finance business trait and future development trend analysis. The content includes the trait analysis of Internet finance business, Internet finance realization difficulty analysis on the condition of affirming advantages, the suggestion to Internet finance future development direction.

(3) Information value analysis on big data in Internet finance development. The content includes the long tail user management, risk supervision, the third party payment, micro credit, crowd funding, online manage money matters, business recommendation, the transaction subject authentication etc positive information value of big data in Internet finance business activities, and the negative information value that big data probably bring to Internet finance.

(4) Empirical analysis. The content includes the construction and status analysis of Internet finance big data analysis center, the business distribution relationship of Internet finance and traditional finance in total finance business activities, the game relationship analysis between Internet finance transaction subjects, and simulation experiment analysis. In the simulation experiment, making micro credit business as an example, introducing the experiment by experiment purpose, experiment object, data sources and the relevant technology, credit evaluation index system and index value determination, experiment

implementation and analyzing data analysis results etc several aspects, to illustrate the information value on big data in Internet finance development.

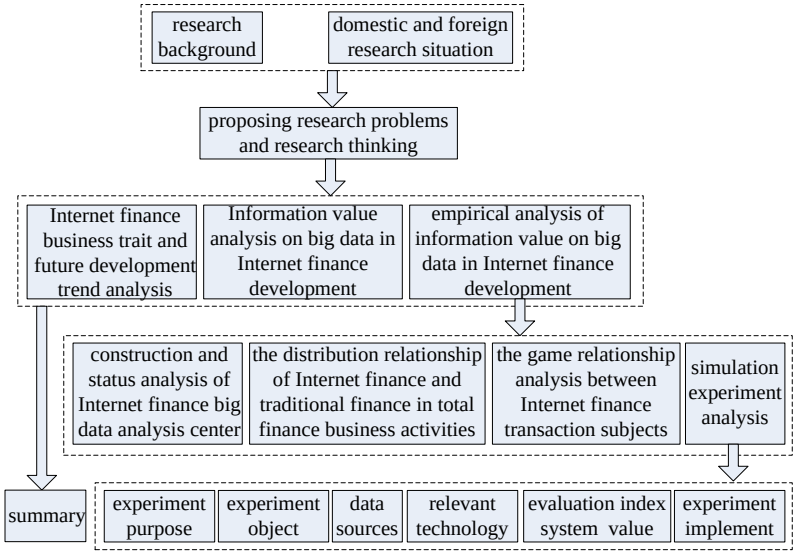

Fig.5 Research route

(5) Summary. The content includes this paper research deficiency analysis, and prospect for future research directions.

The research route figure as showed in Fig.5.

2. Internet finance business trait and future development trend analysis

Comparing with the traditional finance business, Internet finance embodies the greater convenience and flexibility, and the Internet finance characteristics of “Open, equality, cooperation, sharing”[Chen Yi xi, (2013)] make it win the consistent high praise from users. Internet finance relies on cloud computing, big data, mobile Internet etc technology, so it’s business embodies the characteristics of velocity, variety, value, volume of big data, at the same time possesses the characteristics of real-time, interactive, transparency, mobility and cheapness etc. However, because of the characteristics of virtual, new pattern etc Internet finance also encountered great difficulties in the application process, the most prominent problem is Internet finance credit problem, while solving Internet finance credit problem effectively must rely on big data technology and cloud computing technology, so the improvement of technical level of Internet finance big data collection, management, analysis, the legalization and safety of big data access routes, have become the urgent and key problems that needed to solve.

In future, Internet finance will develop more to the direction of intelligence, integration, legalization etc.

(1) Intelligence. Because of deficiency of traditional finance business staff to participate in, and the user knowledge level is uneven, so Internet finance

embodies more convenience and intelligence analysis function in business realization facet. On the one hand for the users who have specific business demand we need provide comprehensive, reliable transaction information for them, on the other hand for the users who don't have specific business demand we need maximize to mine their demand characteristics, according to the user demand characteristics to push business purposefully, making users easily to know the possible business relate to their own, and guiding the users to achieve their business demands.

(2) Integration. The business of Internet finance has the characteristics of diversification and decentralization, Decentralization respective business platform is not conductive for different platform competing and cooperating publicly, bringing great trouble for user understanding, selecting, and using, in future with Internet finance system gradually mature, it's business will be integrated in mobile finance, e-commerce, electronic payment platform etc emerging technology mode, constructing finance supermarket[He Ben lan, *et al*, (2014)], to realize one-stop comprehensive finance services.

(3) Legalization. Because of diversity of Internet finance transaction subjects and transaction mode, Internet finance faces the special risk in the technical, business, and legal aspect. Therefore Internet finance must have a set of corresponding laws, regulations and management institution to stipulate, constraint and manage the responsibilities, rights and interests of corresponding transaction activities, and the corresponding laws and regulations should also be developed and improved gradually with the development of Internet finance, and the corresponding management institution permissions should also be dynamic adjusted. Because of Internet finance transaction subjects are broad, transaction subject identities are difficult to confirm, and transaction subject regions assume decentralization, meanwhile the respective transaction environment of transaction subjects has great complexity and variability, so for the part of laws and regulations incapable of stipulating and constraining, we need constrain and manage Internet finance by industry convention.

3. Information value analysis on big data IN internet finance development

Internet finance business activities and big data are inseparable, big data can eliminate the information asymmetry of Internet finance transaction subjects, can manage Internet finance medium and low income users' personalization long tail demands effectively, and can mine the potential user groups. Internet finance risk supervision, the third party payment, micro credit business, crowd funding, online manage money matters, business recommendation, the transaction subject authentication etc need a great deal of perfect data information to achieve, in turn Internet finance business have produced a great deal of data information in their process of business activities. The massive data information that sourced of Internet are the guarantee to Internet finance development,

also are the foundation of Internet finance business achieving competitive advantage compared with the traditional finance business.

Next, we will introduce the information value on big data in Internet finance business activities by seven aspects.

(1) Big data can manage the long tail demands of Internet finance medium and low income users effectively [Jonathon Day, *et al*, (2011)].

The traditional finance business activities less species, while the medium and low income user amount is large, and the demands appear diversification and personalization, resulting in many user demands unable to be satisfied. The traditional finance business activities operation process cumbersome, operation platform immobilization artificial, while medium and low income user transaction is lower, resulting in the marginal cost of transaction is higher, having greatly restricted these users' transaction behaviors. Internet finance business have the characteristics of diversity, dynamic, real-time etc. The transaction subjects' business transaction activities, other business activities and other social activities etc will produce a large amount of different structure, dynamic or static data information. The improvement of big data analysis technology level sharply decreases the cost of achieving valuable information from the complex big data information, that provides the possibility for mining and realizing the medium and low income user personal demand. These scattered users "many littles make a mickle", forming the long tail of Internet finance business.

(2) Information value analysis on big data in Internet finance risk supervision.

Internet finance belongs to the typical technology driven industry, in which potential risk than traditional finance business activities will be more complex. At present academic circles have also done a lot of researches on Internet finance risk problems, such as the reference [Ankit Kesharwani and Singh Bisht Shailendra, (2012)][Apostolos N.Giovanis, *et al*, (2012)][Richard A. Beidl, (2000)][Joaquin Aldas-Manzano, *et al*, (2011)] *et al*. Any kind of finance products are pricing risk on credit, and the related big data of Internet finance contain a lot of information that are relative to Internet finance business activities' risk supervision, using big data analysis technology can analyze the finance status, production and operation status, social reputation evaluation status, historical credit status etc, and confirm transaction subject credit level according to each index evaluation result. Besides, the users can also use big data analysis technology to evaluate the transaction risk of different Internet finance products, as the criterion of whether to use a particular Internet finance product. So, although the laws, regulations and supervision system that correspond to Internet finance business are much more different than traditional finance business, but these goals can still be achieved if we use big data analysis technology effectively.

(3) Information value analysis on big data in the third party payment.

After 10 years of development the third party payment platforms have accumulated massive customer data, these data contain the basic data information, transaction information, fund flow information, and asset information etc information of the buyers and the sellers. By analyzing the massive data, the third party payment platforms can manage the customer relationship among the sellers and the buyers, can mine the

customer oriented, various style Internet finance service business, and can provide information for other Internet finance business. The users can also evaluate the third party payment platforms' efficiency by analyzing their transaction big data, as the basis of selecting the third party payment platforms.

(4) Information value analysis on big data in Internet finance micro credit business and crowd funding business.

The traditional finance business loan process is complicated, the borrowers are required both have repayment ability and collateral in the aspect of credit funds, these restraint factors greatly reduce the turnover rate of traditional finance credit business. In reality, the user demands of micro credit are considerable, Internet finance micro credit business can commendably satisfy the demands of the borrower units or individuals that are constrained by mortgage, big data analysis technology can connect the lender and the borrower of Internet finance micro credit business primely, and can provide mutual transparent information for both sides. Internet finance micro credit business that based on big data not only can strive for an honest and reliable business environment for the lender, but also can remove traditional finance credit barriers for the borrower, meanwhile their simplified processes depress the transaction threshold. Therefore, constructing the credit evaluation system by using big data analysis technology effectively contributes to micro credit business realization and their business amount expansion. Analyzing micro credit business platform can find that at present most of this type of platform don't well use big data analysis technology to construct credit evaluation system, such as hexindai--P2P network credit platform (http://www.hexindai.com). The influence of small enterprises is relatively lower, and in traditional finance business activities the sources of capital are limited, whereas by crowd funding Internet finance business activities can finance for the small enterprises, the financing party achieves the small enterprise stock right according to the amount of financing, with big data analysis technology the financing party can effectively collect the small enterprises' business types, business history, scope, leadership team composition, geographical location, business philosophy etc information, through analyzing these information as the basis of whether to finance for the small enterprises. Therefore, big data analysis technology also has great application space in this type of Internet finance business activities. Analyzing the Internet finance business platform, at present most of this type of platform also don't well use big data analysis technology to improve the efficiency of financing, such as "zhongchou network"(http://www.zhongchou.cn)and "Chinese Monternet" (http://zc.qinminwang.cn) etc which were constructed in 2012, although Ali small credit company constructed credit evaluation system relying on the massive real consumption data of Alipay, providing loan services for medium and small size merchants, but because of the limited data sources and contents, resulting in credit evaluation system is not perfect, and the rate of bad financing service runs up to 0.72% (data source: 2014 Internet finance research report).

(5) Information value analysis on big data in Internet finance online manage money matters.

The major business subjects of Internet finance online manage money matters are the young people, so, these young people can use online manage money platforms to manage their wealth and investment. Online finance platforms and the other relevant information sources own massive information, in these information contain every aspect of information that finance subjects demand. Here, the other relevant information sources include some relevant forums, meetings, emails, news groups etc. With big data analysis technology the finance subjects can analyze these information to guide investment behaviors, not only including analysis the information for guiding the finance subjects themselves investment behaviors, but also including analysis the information for guiding the other finance subjects' investment behaviors.

(6) Information value analysis on big data in Internet finance business recommendation.

Finance industry has the potential benefits and risks for every entrants, how to maximize profit and avoid risk is the ultimate objective of every transaction subject, but in quite a lot of time transaction subjects are blind, bewilder when they face Internet finance business, so it is necessary to improve the intelligence of Internet finance. By integrating Internet finance resources, analyzing big data information that are produced by Internet finance industry and the other relevant industry, media, information sources etc, analyzing every entrant's identity, age, occupation, major, historical credit records and other information etc, recommending business purposely, will be the development direction of Internet finance in future.

(7) Information value analysis on big data in Internet finance transaction subject authentication.

Internet finance business subject authentication is an important content of ensuring transaction security, by using big data analysis technology to analyze the transaction subjects' operation device, operation process etc, comparing with historical operation, to realize multiple cross certification of transaction subjects on the basis of traditional identity authentication.

There are other information values on big data in Internet finance, but their principles are basically similar to the content of the above seven listed, because of the limited paper, we will no longer discuss.

Summarizing the above analysis, the information value of big data in Internet finance business as shown in Fig. 6.

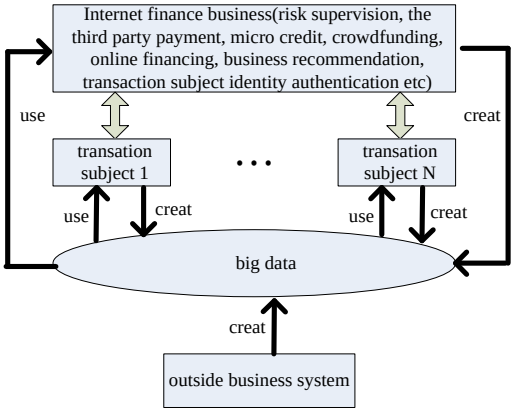

Fig.6. Information value of big data in Internet finance business

Big data can both bring valuable analysis information for Internet finance, and bring confusion to Internet finance. The massive data contain a lot of redundant information, and some valuable information are difficult to obtain, resulting in the decision activities are influenced. Sometimes big data information sources are constrained, that will also lead to deviation or error results of decision guidance. Therefore, how to extract high quality information from Internet finance big data effectively becomes the key of using Internet finance big data. In addition, big data contain a large amount of private information, how to achieve valuable information reasonably and don't cause the data leak also are the issues that needed to consider in the process of using big data.

After analyzing, in the process of Internet finance big data analysis, we need to consider the following several problems.

(1) The authority problem of big data sources.

The majority of big data are from the network, and some information are from official websites, and some information are from the enterprises or the institutions themselves statistics and published data, the information that achieved by analyzing these big data are generally more authoritative, can provide right guidance for Internet finance business decision activities. Moreover, some information are sources of emails, news groups, forums, operating behavior information, identity information, location information etc, for these big data, analyzing their authority and objectivity are necessary, if these data are correct and objective, they will be used to support the activities' decision-making, if can't ensure the accuracy, they will be removed.

(2) Big data information asymmetry problem.

Sometimes the decision-making is based on the statistics and analysis of several indexes, if influenced by characteristics some statistics index requirement information appear less frequently, while some other statistics index requirement information appear highly frequently, it will let the overall statistics and analysis results deviate from the truth. If the information that some index requirement appear repeatedly in the collected big data, and the data forms are not uniform, while the information that other index requirement can't be collected, cleaning data and eliminating the "noise" are necessary.

(3) Big data analysis cause privacy leakage problem.

The amount of information in big data is huge, even harmless huge information pile up can also gradually expose the transaction subjects' or institution's privacy, so Internet finance business platforms are needed to set the display permissions for big data analysis results, and layer the analysis results. The users will only get the part of data analysis results that are helpful to their transaction decisions, while can't unlimitedly achieve the access permissions of big data analysis results.

4. Empirical analysis

For analyzing the information value of big data in Internet finance development, we need ascertain data process institution firstly, then collecting, managing, and analyzing Internet finance big data with specific fixed data process institution. In order to save costs, improve the efficiency of big data collection, management, and analysis, proposing to construct Internet finance big data analysis center, we can advice one single Internet finance business to construct its big data analysis center, or a few Internet finance business jointly to construct their big data analysis center, along with Internet finance industry development and gradually mature in the future, we will advise the third party to construct special and independent big data analysis center, which will open to all Internet finance industry.

In the next, we will analyze the status of Internet finance big data analysis center.

4.1. *Constructing Internet finance big data analysis center*

Big data analysis center entertains all kinds of big data analysis business, the same time responsible for big data management and information confidentiality, layering to authorize the achievement information and analysis results to different management personnel or transaction subjects to use. The sources of big data include historical transaction data that are provided by each Internet finance business platform, identity data that is provided by each transaction subject, the data that are provided by national economic information management institution, the data that are provided by some other related social agency, the Internet data that are crawled from online forums, blog etc data information sources.

Some data are managed by big data analysis center itself, and more time big data analysis center construct the links with the data sources, from where big data information will be achieved when needed to analyze.

Fig.7 is the status structure of Internet finance business big data analysis center (in Fig.7, ① represents providing data and ② represents providing analysis result).

4.2. *Business distribution relationship analysis of Internet finance and traditional finance in total finance business activities*

Supposing some total finance business have two concrete types as Internet finance business and traditional finance business, so the different demand conditions of finance business demanders (customers) to some total finance business in Internet finance business and traditional finance business, embodying the distribution relationship of Internet finance business and traditional finance business in this total finance business activities. Supposing the total demanders and quantity of some total finance business are fixed, so the total demanders and quantity of Internet finance business and traditional finance business in this total finance business are fixed. For research convenience, we make finance business provider set and finance business demander set as a whole respectively, analyzing from customer transaction credit, Internet finance business is risk asset to the finance business provider, and traditional finance business is non risk asset to finance business provider.

Supposing the finance business provider set (abbreviated as L) achieve the total living demand by providing finance business, the consumption of period t for L as c_t, the Internet finance business (abbreviated as M) amount and traditional finance business (abbreviated as N) amount for L as a_t, b_t respectively, the total finance business (abbreviated as T) amount as $a_t + b_t$, the yield of period t for L as x_t. Supposing the yield of period t for M as r_t, the variance as $V(r)$, the yield of period t for N as r_t^f.

L pursuit the maximization of utility present value, as $\max_{\{c_{t+s}, a_{t+s}, b_{t+s}\}} V_t = \sum_{s=0}^{\infty} \beta^s E_t[U(c_{t+s})]$ (E_t represents the expected value of period t, $U(c_{t+s})$ represents the instant utility, $0 < \beta = 1/(1+\theta) < 1$ represents discount factor, θ represents discount rate), so, the budget constraint of period t for L is:

$$c_t + a_{t+1} + b_{t+1} = x_t + a_t(1 + r_t) + b_t(1 + r_t^f) \tag{1}$$

Defining $W_t = a_t + b_t$, so M and N account for L respectively as: $w_t = a_t / W_t$, $1 - w_t = b_t / W_t$. The budget constraint is:

$$c_t + W_{t+1} = x_t + W_t[1 + r_{t-1}^f + w_t(r_t - r_{t-1}^f)] = x_t + W_t(1 + r_t^p) \tag{2}$$

In here, $r_t^p = r_{t-1}^f + w_t(r_t - r_{t-1}^f)$ expresses the profit of combining M and N.

The first order condition of maximum V_t is [Michael Wickens, (2008)]:

$$\frac{\partial V_t}{\partial c_t} = U'_t - \beta E_t[U'_{t+1}(1 + r_{t+1}^p)] = 0 \tag{3}$$

$$\frac{\partial V_t}{\partial w_{t+1}} = -\beta E_t[U'_{t+1} W_{t+1}(r_{t+1} - r_t^f)] = 0 \tag{4}$$

Because W_{t+1} is decided by the variable of the period t, for U'_{t+1} using approximate Taylor expansion with $w_{t+1} = 0$, and defining $U'^*_t = U'[x_{t+1} + W_{t+1}(1 + r_t^f) - W_{t+2}]$, so the Eq. (4) can be defined as:

$$\frac{\partial V_t}{\partial w_{t+1}} = 0 \approx U'^*_t E_t(r_{t+1} - r_t^f) + W_{t+1} U''^*_{t+1} w_{t+1} E_t(r_{t+1} - r_t^f)^2 \tag{5}$$

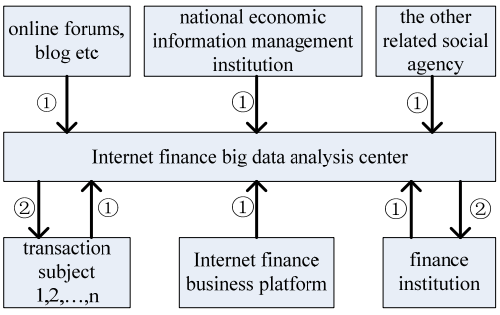

Fig.7. the status structure of Internet finance business big data analysis center

With Eq.(5) we can achieve:

$$w_{t+1} = \frac{E_t c_{t+1}}{W_{t+1}} \frac{E_t(r_{t+1} - r_t^f)}{\sigma_t E_t(r_{t+1} - r_t^f)^2} \tag{6}$$

In here, $\sigma_t = -(E_t c_{t+1} U''_{t+1^*} / U'_{t+1^*})$ is coefficient of relative risk aversion (CRRA)[Michael Wickens, (2008)].

Eq.(6) is expression that M account for T, in Eq.(6), $\frac{E_t c_{t+1}}{W_{t+1}}$ is the ratio that consumption c_{t+1} accounts for the total business W_{t+1}, CRRA σ_t represents the attitude of L to risk, $\frac{E_t c_{t+1}}{W_{t+1}}$ and σ_t are decided by the subjection intention of L, and little relative to the risk degree of finance business itself.

$E_t(r_{t+1} - r_t^f)$ expresses expected excess profit, $E_t(r_{t+1} - r_t^f)$ is higher, the share w_{t+1} that M account for T is higher. That is, if the expected value of the gap of Internet finance business yield compared to traditional finance business yield is higher, in a fixed long period time Internet finance business will bring higher profit to L than traditional finance business, L will more willing to accept Internet finance to realize the finance asset' value-added.

$E_t(r_{t+1} - r_t^f)^2$ is the condition volatility of excess profit, $E_t(r_{t+1} - r_t^f)^2$ is smaller, the share w_{t+1} that M account for T is higher. $E_t(r_{t+1} - r_t^f)^2$ reflects the difference stability of the Internet finance business compared to the traditional finance business, when the value of r_t^f is relative stable, $E_t(r_{t+1} - r_t^f)^2$ reflects the r_{t+1} value's stability. When the volatility of Internet finance business yield is smaller (that is, Internet finance business can provide more stable profit for L), L will more willing to accept Internet finance business to realize the finance asset' value-added.

Analyzing the influence factor of Internet finance business yield r_t, when business provider can achieve business demanders(customers)' information more accurately, the transaction risk will more smaller, r_t will more bigger, and its value will more stable. Therefore, Internet finance business provider need analyze customer business relative big data with big data analysis center, providing more accurate and complete customer information for themselves, as the basis of Internet finance business provider evaluate customers and supervise customer behaviors, as the decision basis of providing business to customers.

Therefore, with big data analysis technology we can improve the proportion of Internet finance business in total finance business, promoting Internet finance business to achieve the advantage compared to traditional finance business.

4.3. *Internet finance transaction subject game relation analysis*

In next, we make micro credit business as an example to prove the information value on big data in Internet finance. With the improvement of big data analysis technology and management level, the big data in Internet finance will provide positive information value for Internet finance application and development, so the empirical research make big data analysis technology provide positive value information for the borrower as a starting point, including the research about perfecting the borrower's information and capturing the borrower's fraud behaviors with big data information. With the technology level improvement and lower cost of cloud computing and big data analysis technology, the cost k of micro credit business big data analysis can be ignored relative to the big data information value. So, in the next research we ignore the influence of cost k to the model.

In the micro credit business transaction, the lender and the borrower in line with the hypothesis of "rational people" in economics, the transaction relationship model belongs to incomplete information static game model. After constructing Internet finance supermarket and Internet finance big data analysis center, the overall of each micro credit business platform, each lender and each borrower finally fit the characteristics of a perfectly competitive market, that is, the finance products are homogeneity, and the interest rate is equal. So the transaction platforms, the lenders can lend dispersedly, also can combine together to lend, and the interest rate is unchanged.

In order to understand the game model easily, we define as following [Zhang Wei ying, (2012)]:

(1) The process of Internet finance big data analysis center capturing the borrower's fraud behavior and other behavior information, is the process of analyzing and extracting the true information from the borrower's big data information, and the true information content is corresponding to the borrower's providing information, whether big data analysis center can capture the borrower's true information is irrelevant to whether the borrower provide fraudulent information. Supposing the probability of big data analysis center capturing the borrower's true information as $P_L(0 \le P_L \le 1)$, so the probability of not capturing the borrower's true information is $1-P_L$. Supposing the probability of the borrower i provides fraud information in one borrowing process as $P_i(0 \le P_i \le 1)$, so the probability of not providing fraud information is $1-P_i$.

(2) Supposing the borrower set as: $i \in \Gamma$, $\Gamma = (1,2,\cdots,n)$.

(3) Supposing the lender type space as Θ_L, the borrower type space as: $\Theta_1,\cdots,\Theta_n$, the other borrowers who relate to the borrower i type space as Θ_{-i}, the lender type as $\theta_L \in \Theta_L$, the borrower type as $\theta_i \in \Theta_i$, the other borrowers who relate to the borrower i type as $\theta_{-i} \in \Theta_{-i}$, the lender type dependent strategy space as $A_L(\theta_L)$, the borrower i type dependent strategy space as $A_i(\theta_i)$, type θ_L dependent payment function as $u_L(a_L,a_1,a_2,\cdots,a_n;\theta_L)$, type θ_i dependent payment function as $u_i(a_L,a_1,a_2,\cdots,a_n;\theta_i)$, $a_L \in A_L$ as a specific action of the lender, $a_i \in A_i$ as a specific action of the borrower i.

(4) Supposing v_L as the lender expectation utility, v_i as the borrower i expectation utility.

(5) Supposing $G=\{A_L,A_1,A_2,\cdots,A_n;\theta_L,\theta_1,\theta_2,\cdots,\theta_n;P_L,P_1,P_2,\cdots,P_n;u_L,u_1,u_2,\cdots,u_n\}$ as this game.

As for any lender's lending behaviors, the corresponding borrowers' borrowing behaviors are independent for each other, so the payoff function $u_L(a_L,a_1,a_2,\cdots,a_n;\theta_L)=u_L(a_L,a_1;\theta_L)+u_L(a_L,a_2;\theta_L)+\cdots+u_L(a_L,a_n;\theta_L)$. So, the game behavior analysis among one lender's credit activities and many borrowers' credit activities, can be converted to the game behavior analysis between one lender's credit activities and one borrower's credit activities, therefore, the game expression can be simplified as $G=\{A_L,A_i;\theta_L,\theta_i;P_L,P_i;u_L,u_i\}$, here, i represents the borrower i . Defining $a_i=(a_{i1},a_{i2},\cdots,a_{ik})$, $a_{it}(1\le t\le k)$ represents the t index of appraising the borrower's credit (including name, age, occupation, historical credit record etc). These indexes are either qualitative or quantitative, either are achieved by big data analysis technology or are provided by the borrower himself, in the specific application process, according to the index important degree and content, we will quantify the qualitative indexes and set corresponding weight for the indexes of the index system.

So, the game G strategy combinations are four types: (capture, fraud), (capture, not fraud), (not capture, fraud), (not capture, not fraud), that is: $A_L(\theta_L)$ ={capture, not capture}, $A_i(\theta_i)$ ={fraud, not fraud}. The payoff matrix as shown in Fig. 8.

Analyzing the payment function, so long as the borrower i is not fraud in the credit process, the credit transaction will be realized between the lender and the borrower (the transaction amount will be zero for the condition of the borrower i not having credit qualification). When the borrower i use fraud in the process of transaction, if it is captured, the transaction will not achieve between the lender and the borrower, the borrower i will be punished and get negative payment. If it is not captured, the transaction will achieve, the lender will be swindled and get negative payment. When the borrower i doesn't use fraud in the process of transaction, both payment are not influenced regardless of the lender get the borrower i real information. If the borrower i succeed in fraud, it will get higher payment than not fraud, otherwise it will not commit fraud behavior. Therefore, $u_{L1}=0$, $u_{L3}<0$, $u_{L2}=u_{L4}\ge 0$, $u_{i1}<0$, $u_{i3}>u_{i2}=u_{i4}\ge 0$. The game extension form as shown in Fig. 9.

		the borrower i	
		fraud	not fraud
lender	capture	u_{L1},u_{i1}	u_{L2},u_{i2}
	not capture	u_{L3},u_{i3}	u_{L4},u_{i4}

Fig.8. The game payoff matrix on the lender and the borrower i

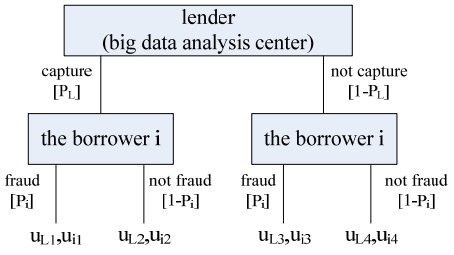

Fig.9. The game extension form on the lender and the borrower i.

The lender expectation utility value is : $v_L = \sum_{\theta_i}\sum_{\theta_L} P_L(\theta_i \mid \theta_L)u_L(a_L(\theta_L), a_i(\theta_i); \theta_L, \theta_i) = [P_L \times u_{L1} + (1-P_L)\times u_{L3}]\times P_i + [P_L \times u_{L2} + (1-P_L)\times u_{L4}]\times(1-P_i)$ .As $u_{L1} = 0$, $u_{L3} < 0$, $u_{L2} = u_{L4} \geq 0$, so, after simplifying, $v_L = u_{L3} \times P_i \times (1-P_L) + (1-P_i)\times u_{L4} = [(1-P_L)\times u_{L3} - u_{L4}]\times P_i + u_{L4}$. In the expression v_L , P_L and P_i are mutual independent, the same time v_L is increasing function on P_L and decreasing function on P_i. When $v_L = 0$, $P_L = 1 + (1/P_i - 1)\times u_{L4}/u_{L3}$, P_L is positively related to P_i. After analyzing the lender expectation utility value: for protecting the lender rights and the interests, if the borrower fraud probability increases, the lender also need improve the ability of capturing the borrower real information helped by big data analysis center.

The borrower i expectation utility value is: $v_i = \sum_{\theta_L}\sum_{\theta_i} P_i(\theta_L \mid \theta_i)u_i(a_i(\theta_i), a_L(\theta_L); \theta_i, \theta_L) = [P_i \times u_{i1} + (1-P_i)\times u_{i2}]\times P_L + [P_i \times u_{i3} + (1-P_i)\times u_{i4}]\times(1-P_L)$. As $u_{i1} < 0$, $u_{i2} = u_{i4} \geq 0$, $u_{i3} > 0$, so, after simplifying, $v_i = (u_{i1} - u_{i3})\times P_i \times P_L + u_{i3} \times P_i + (1-P_i)\times u_{i4} = [(1-P_L)\times u_{i3} + P_L \times u_{i1} - u_{i4}]\times P_i + u_{i4}$. In the expression v_i , P_L and P_i are mutual independent, the same time v_i is decreasing function on P_L . When $(1-P_L)\times u_{i3} + P_L \times u_{i1} - u_{i4} \neq 0$, if $P_L < (u_{i3} - u_{i4})/(u_{i3} - u_{i1})$, v_i is increasing function on P_i, if $P_L > (u_{i3} - u_{i4})/(u_{i3} - u_{i1})$, v_i is decreasing function on P_i. When $v_i = 0$, $P_L = [u_{i3} + u_{i4}\times(1/P_i - 1)]/(u_{i3} - u_{i1})$, P_L is inversely proportional to P_i. After analyzing the borrower i expectation utility value: when the ability of the lender capturing the borrower real information is lower, the borrower will use fraud information much more, and when the ability of the lender capturing the borrower real information reach a certain degree, it will be the better selection for the borrower providing real information.

From the above proof we can conclude: collecting, analyzing and processing the borrower information by constructing Internet finance big data analysis center will contribute to avoid the borrower fraud behavior, to improve micro credit business transaction integrity, to promote Internet finance micro credit business development.

4.4. *Simulation experiment analysis*

We make Internet finance micro credit business as an example to carry out simulation experiment. The experiment purpose is simulating Internet finance micro credit business to evaluate users' transaction credit. Simulation experiment analysis business platform use a commercial bank business simulation system to act. This simulation system is similar to Internet finance business platform in the characteristics of humanized management, no mortgage, no proof of paper etc. The data sources include the user filled data, data that achieved by depth interview with users, data that achieved from transaction platform and the third party data sources. For user filled data in the process of

transaction and data that achieved by depth interview with users, we make as the user filled total data in simulating Internet finance transaction process. For the data that achieved from transaction platform and the third party data sources, we make as user big data that simulating Internet finance business activities. Although the simulation experiment has some gap with Internet finance true business activities, but their transaction principle and credit evaluation principle to users are similar. Simulation experiment intended to analyze the information value on big data in Internet finance business development. Therefore simulation experiment results have the same problem description ability to Internet finance business platform's true operating results.

The simulation experiment is presented as following:

(1) Experiment purpose

Simulating customer transaction credit evaluation activities in Internet finance micro credit business.

(2) Experiment object

Selecting some universities and colleges internal master degree candidate, doctoral degree candidate, partial teachers and some representative entrepreneurs, lawyers, bus drivers etc amount to 2000 people. The reason for selecting these populations for simulation analysis is because these populations are more representatively, and transaction historical information is plentiful, data can be collected more easily.

(3) Simulation experiment data sources

Simulation experiment data sources include transaction platform (simulation system) providing data (including (i) and (ii)), users (experiment subjects) themselves providing data (including (iii)), the third party data sources providing data (including (iv)) three parts.

(i) The historical transaction records of users in the simulation system.

(ii) The data from commercial banking business simulation system that generated by simulation experiment, the content include user filled their own name and identity card number, asset condition, annual income, occupation, work unit, guarantor's name and identity card number.

(iii) Making depth interview with experiment subject, the interview content include e-mail, annual consumption list, mobile phone call records, historical transaction self evaluation, work condition (learn condition) self evaluation.

(iv) The third party data source providing data. Experiment subjects' files, work condition record (learn condition record) real data, and other social institution (traffic management department, judicial administrative department, other finance institution etc) providing data (the data provided by experiment subjects after depth interview), and user related data that achieved from Internet, etc.

(4) Experiment process related technology

In the process of simulation experiment, the users carried the experiment with commercial bank business simulation system. The experiment content included simulation experiment data collection and management, simulation experiment data analysis and decision support altogether two aspects. Basing on the experiment purpose,

we have only analyzed the business data of the commercial bank business simulation system, and haven't analyzed the realization technology. In next, we analyze the related technology of simulation experiment data collection and management, analysis and decision support two aspects.

(i) Simulation experiment data collection and management technology

i Cloud computing technology. The massive amount of Internet finance big data make single system can no longer undertake the collection and management tasks well, while the development and wide application of cloud computing just meet the demand of processing Internet finance big data. Cloud computing technology can greatly improve the collection timeliness and process efficiency of Internet finance big data, present strong technology support for Internet finance business. In this experiment, we use map/reduce model in hadoop system[Li Zhi juan, (2013)] to realize user network big data collection task.

ii Web crawler technology [Luo Gang, (2011)]. Internet finance big data sources have widespread, variability etc characteristics, for the related network big data of Internet finance micro credit business customers, the arise and variety assume real time and dynamic, so the collection of Internet finance micro credit business big data need more use network information retrieval tool to achieve, such as web crawler algorithm. With web crawler algorithm we can in real time achieve customer related big data from dynamically changing web according concrete demand, supporting for Internet finance micro credit dynamic business activities. For the data that routine web crawler algorithm can't achieve, we will use deep web crawler algorithm [Zheng Qing Hua, *et al*, (2013)] to achieve.

iii Data mining technology. Because of the diverse of Internet finance micro credit business data type, in advance we don't know the concrete content and manifestation of business data. So when we further realize valuable data collection, we need more use data mining knowledge, that is, we need use classification, clustering, association rule analysis etc related technology, mining the structure pattern and related association relationship of valuable data from collected Internet finance related big data. In addition, for the achieved Internet finance big data, we will analyze the data sources, and the performance of objectivity, completeness, and redundancy etc, filtering and cleaning data, if necessary, we will collect data once more.

For the collected big data, in the premise of physical security protection, we will construct the use or access log file, the analysis results of the log file will as the basis of determining reliability and safety of access behaviors.

The collection and management structure of Internet finance big data is shown in Fig.10.

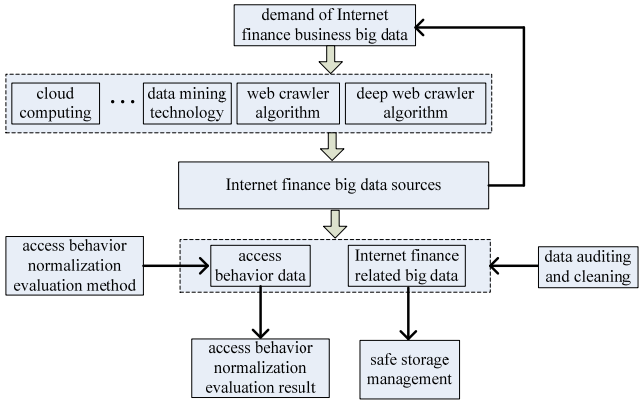

Fig.10. The collection and management structure of Internet finance big data

(ii) Simulation experiment data analysis and decision support technology

i Setting up data dictionary. The valuable data of Internet finance micro credit business contained in the overall big data, because of the diversification of data form, resulting in simple retrieval model is difficult for collecting the valuable data, basing on this, we will construct corresponding data dictionary for different types of Internet finance micro credit business big data. Data dictionary is the basis of information retrieval, and is the basis of information semantic analysis.

ii Setting up data summary [YIN Cun yan, *et al*, (2006)][CHEN Zhi min, *et al*, (2006)][GUAN Li he, (2007)]. For improving data processing efficiency, setting up corresponding data summary algorithm for a specific type of Internet finance micro credit business big data, analyzing corresponding big data to form concrete data summary and key words. Combining data summary and data dictionary is helpful for improving efficiency of analyzing and extracting valuable information from Internet finance business big data.

In addition, it is also necessary for us using cloud computing technology in the process of data analysis, and in this experiment we also analyzed user big data using map/reduce model in hadoop system.

For Internet finance micro credit business, we need present user credit evaluation index system. Analyzing the occurrence frequency of user specific index different evaluation results in business big data, the highest occurrence frequency evaluation result of each index will as the index utmost evaluation result, comparing each index credit evaluation result achieved by analyzing big data with the credit evaluation result achieved by analyzing simulation system and user personal providing data, to confirm the information value status of big data in Internet finance micro credit business.

The process of Internet finance big data analysis and decision support as shown in Fig.11.

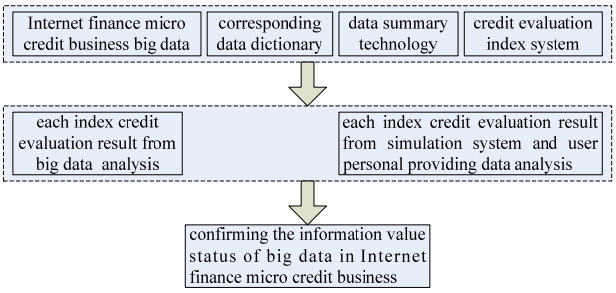

Fig.11. The process of Internet finance big data analysis and decision support

(5) Confirming credit evaluation index system and its value

To Internet finance micro credit business, we need construct business customer credit evaluation index system structure, after analyzing and considering simplicity, presenting index system structure and its value content. The experiment data analysis indexes include:

transaction subject name(A), transaction subject ID number(B), asset situation(C), annual income(D), occupation(E), work unit(F), guarantee name(G), guarantee ID number(H), transaction subject historical transaction record(I), transaction subject work situation(learn situation)(J), transaction subject social activity situation(K), legal records (L).

In this experiment, the data of A, B, C, D, E, F, G, H are provided by transaction user self. We need achieve the data of A, B, C, D, E, F, G, H index, and the data of I, J, K, L index by analyzing Internet finance micro credit business. Some index data are for confirming integrity of the user self providing data (such as A, B, C, D, E, F, G, H index data), some index data are for perfecting user providing data (such as I, J, K, L index data).

In this experiment, transaction subject social activity index data (K) include if transaction subject has illegal behavior in traffic department, and if has bad business records in the other finance institutions etc. Also needing to note, we only use the judgment of if customer have provided false data, and if the data that customer have not provided but have achieved by big data analysis are illegal records, to evaluate customer credit, in addition, in this paper, the index system and credit evaluation method are relatively simple, the reason is this paper research content is analyzing information value on big data in Internet finance business development, simple index system can also explain research problems, and we needn't require too much to credit evaluation method.

Part of indexes and its values for Internet finance micro credit business as shown in Table Ⅰ.

In addition, for the index A, B, E, F, G, H, L, because their value only have " true ", " false " or "exist", " nothing" two dimension traits, so these indexes weren't listed in

TABLE Ⅰ. In this experiment, we only judged if these indexes' value those users present are true, or only present these indexes' specific results.

(6) Simulation experiment implementation and data analysis

For protecting users' privacy, we assign number for users before constructing user evaluation index structure and total data value table, make user number as the key to construct user index data value table. In the process of researching, respectively extracting 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700 people from 2000 add up to 8 times to implement the simulation experiment and analyzing the experiment data.

In the process of depth interview we require users to fill in if they have provided fraud data, that is, we have already confirmed the user data content (including the user data that are fraud data) before randomly extracting user data. The experiment is divided into three steps:

(i) The first step, using user historical transaction data to analyze if users have provided fraud data in simulation experiment. Corresponding to each evaluation index, we count the ratio of capturing fraud amount of people account for total providing fraud data amount of people.

(ii) The second step, using the user simulation system historical transaction data, combining with the archive department, household sector, work unit(or learn unit) providing data to analyze if users provide fraud data in simulation experiment. Corresponding to each evaluation index, we count the ratio of capturing fraud amount of people account for total providing fraud data amount of people.

(iii) The third step, using the user simulation system historical transaction data, combining with the archive department, household sector, work unit(or learn unit), other finance institution, traffic management institution, judicial administrative institution etc the third specific institution providing data, and big data achieved from Internet, to analyze if users have provided fraud data in simulation experiment. Corresponding to each evaluation index, we count the ratio of capturing fraud amount of people account for total providing fraud data amount of people.

Fig.12 is the three dimensional data diagram for A index simulation experiment, as data diagram for B, E, F, G, H index simulation experiment are similar to A index, we haven't presented. Fig.13 is the three dimensional data diagram for C index simulation experiment, as data diagram for D index simulation experiment are similar to C index, we also haven't presented. Fig.14-17 are the three dimensional data diagrams for I, J, K, L index simulation experiment.

Table Ⅰ Part of indexes and its value for Internet finance micro credit business

index	value	remark	index	value	remark
C	good	C_1	I	good	I_1
	medium	C_2		medium	I_2
	bad	C_3		bad	I_3
D	below 1000 yuan	D_1	J	good	J_1
	1000-3000 yuan	D_2		medium	J_2
	3000-7000 yuan	D_3		bad	J_3

	7000-10000 yuan	D_4	K	good	K_1
	10000-30000 yuan	D_5		medium	K_2
	above 30000 yuan	D_6		bad	K_3

For expression convenience, we call the first step data analysis result (ratio of capturing fraud amount of people account for total providing fraud data amount of people) as “fundamental data”, the second step data analysis result as “routine data”, and the third step data analysis result as “big data”.

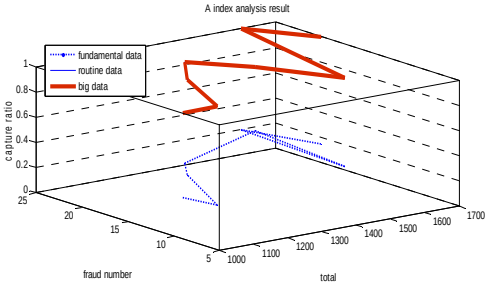

Fig.12. A index data analysis result

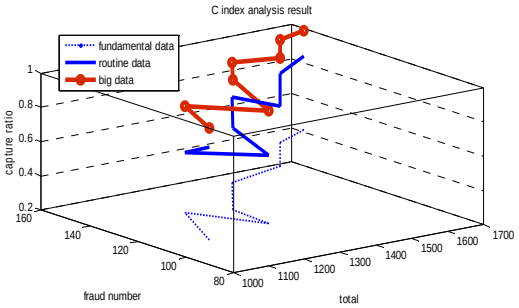

Fig.13. C index data analysis result

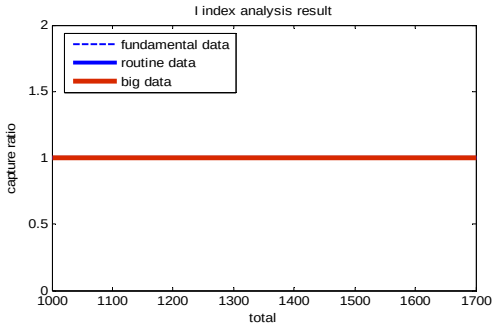

Fig.14. I index data analysis result

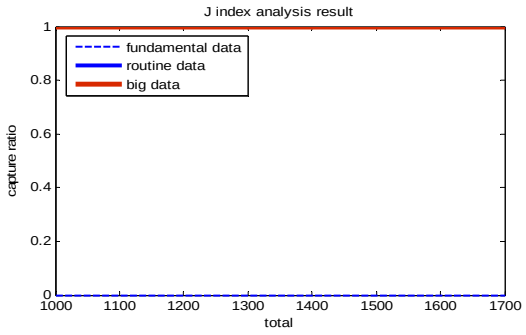

Fig.15. J index data analysis result

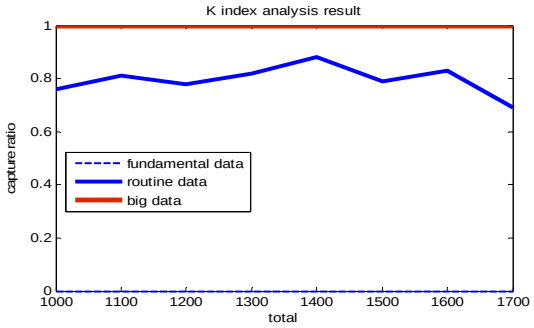

Fig.16. K index data analysis result

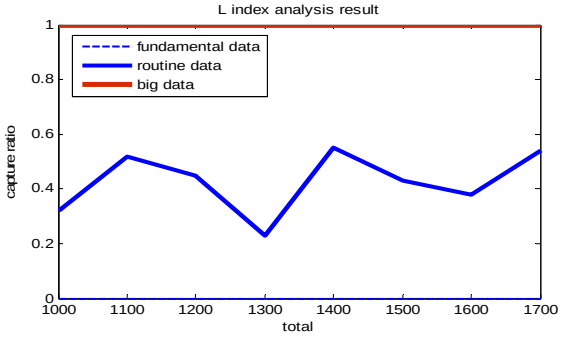

Fig.17. L index data analysis result

Illustrating experiment result:

(1) In Fig.12, the "routine data" is equal to "big data", and the "big data" values are constant as "1". In Fig.13, the "big data" values are higher than "routine data" values, and the "big data" values are constant as "1". In Fig.14, the "fundamental data" values, "routine data" values, and "big data" values are equal and are constant as "1". In Fig.15, the "fundamental data" values are constant as "0", and the "routine data" values are equal to "big data" values and the values are constant as "1". In Fig.16 and 17, the "fundamental data" values are constant as "0", and the "routine data" values are between "0" and "1", and the "big data" values are constant as "1".

B, E, F, G, H index analysis results are similar to Fig.12, with the experiment results we can find B index is high related to A index, and G index is high related to H index, so for the true index system, we will consider remove index A and index G.

(2) Except for I index, in the first step the other indexes haven't well achieved data. For A, B, C, D, E, F, G, H index, one cause is simulation system user historical transaction information are limited, with these information we unable to capture user fraud behavior effectively, it is corresponding to the truth that in Internet finance development early time people transaction historical records are not perfect, and is corresponding to the situation that most people haven't Internet finance transaction records. The other cause is the index data values are dynamic variable, and the simulation system data specialty is strong, unable to effectively reflect user credit evaluation index information overall perspective. For J, K, L index, in the first step we unable to achieve any index information about them, because the data of simulation system are irrespective to J, K, L index.

(3) From the experiment analysis we can conclude, with the expansion of credit evaluation data range, the probability of capturing user fraud is increasing, and for some evaluation index data values that can't be achieved from user transaction system, we can achieve the data values with big data analysis technology.

(4) Needing to explain, in the process of big data collection and analysis we have considered the authority of data, we collect data from reliable data sources, eliminating the condition of false data resulting in false analysis results. In addition, in this experiment, in the second step and the third step some user big data information make the user evaluation result improvement, these superior users' credit lines will improve in the process of simulating Internet finance micro credit business.

Because the big data in Internet finance micro credit business activities are dynamic changing, so the credit evaluation also need have the characteristics of openness, that is, the process of credit evaluation should also be dynamic and real time, the dynamic credit evaluation process form the supervision to user credit, also form the continuous update to user credit evaluation results.

With the above empirical research we have analyzed the information value on big data in Internet finance micro credit business activities, to the other Internet finance

business activities, we can also analyze them with similar method, and because of the limited paper, we will no longer discuss.

5. Conclusion

Aiming at the particularity of Internet finance transaction mode and platform, we propose to use big data analysis technology to improve Internet finance transaction efficiency, analyzing the positive and negative information value on big data in Internet finance business. Proposing the specific idea of constructing Internet finance big data analysis center, analyzing the distribution relationship of Internet finance business and traditional finance business in total finance business, making micro credit business activities as an example to construct the incomplete information static game model between the lender and the borrower, to prove the information value on big data in Internet finance business activities. Illustrating big data have information value in Internet finance development by simulation experiment. For the further development and getting more competitive of Internet finance industry, the research is a positive guidance. At present, in Internet finance industry, the target of sufficiently and widely using Internet finance big data analysis technology to improve the transaction transparency, and the target of improving the overall transaction activity efficiency, have not yet realized well. The paper research is intended to analyze problems and provide suggestion. In the future, on the basis of theoretical analysis we will devote to the application research of the field.

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