

# *Research on Integration Platform about Credit Risk Evaluation Based on SOA and FTA*

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**Abstract:** This paper expounds the research background and main research contents of integration platform about credit risk evaluation, including SOA echnology, SOA application module and FTA method, and puts forward reasonable technical research route and solutions to key problems. The credit grade is divided into five grades, which means the credit grade is from high to low, and the loan risk is from low to high, and the credit index is divided into three grades and nine categories. The indexes are trained with related algorithms, and different weights are obtained to determine the importance of the indexes. According to various indicators, draw the corresponding decision tree to study and predict credit risk. This paper discusses the related functions of SOA module and related evaluation technology of FTA module, analyzes the social and economic benefits of platform application, and expounds the related contents of achievement transformation and popularization and application, which provides theoretical support and new direction of technology application for urban managers.

## 1. Introduction

At present, Banks and credit enterprises need scientific and reasonable credit evaluation methods and application platforms to carry out credit evaluation and application, and take the credit evaluation results as the important basis and content of credit analysis. It is difficult to apply the traditional credit evaluation method to the local credit risk assessment. This paper focuses on the technical methods to improve the validity and accuracy of credit risk assessment, the quantitative methods which accord with the characteristics of credit risk assessment, and the comprehensive application platform of related indicators.

Banks and credit institutions are the important foundation of realizing the sustainable growth of local economy, and their innovation ability is the important carrier of industrialization. The financial credit enterprise and the information technology merge mutually, forms the sound financial credit diversification service system gradually. Based on the actual development of credit enterprises, this paper puts forward a scientific and reasonable risk analysis and evaluation method, studies the corresponding comprehensive application platform, and realizes the risk prevention and prediction, it has good theoretical and practical significance.<sup>[1]</sup>

Credit company belongs to risk industry, its operation will have an important impact on the

development and innovation of financial market. The scientific analysis and evaluation of credit risk, the integration of information technology and credit indicators and the study of risk evaluation is necessary, and it is a relatively new research direction, worthy of in-depth study and application.

## 2. Research content

### 2.1. Main content

Credit problem is an important problem that restricts the development of credit financial enterprises, this paper analyzes and researches from the following two aspects:

(1) This paper makes a qualitative analysis and Quantitative analysis on the indicators of the financial lending enterprises by using the FTA (Fault Tree Analysis) method; Then a scientific and reasonable risk assessment and prediction system is formed. The qualitative analysis includes the minimum cut set, the minimum path set, etc. The Quantitative analysis include the probability of the top event, the probability importance, etc. <sup>[2]</sup>

(2) The team established the credit platform based on SOA (Service-Oriented Architecture), including information management platform, marketing platform, risk evaluation platform, etc., the management of credit information, credit analysis and evaluation of credit users, and enhance the combination of information technology and financial credit, establish a new enterprise credit and evaluation system. <sup>[3]</sup>

This article divides the credit grade into F1~F5 altogether five grades, indicated the credit grade from high to low, the loan risk from low to high. Each index has a specific score weight, using the weighted algorithm to obtain credit score and credit rating, F1 score the highest, the lowest risk, F2, F3, F4, F5 credit gradually decreased, increased risk. Taking the specific credit index as an example, as shown in Table 1, credit index is divided into nine categories from M1 to M9. By setting weights, the relevant scores are calculated and compared with the target scores, subcategories were classified into large categories, and finally formed into S1, S2 and S3, as shown in Table 2.

Table 1: Credit details table

Category	Keyword	Target Score	A-Score	B-Score
M1	Credit Purposes	10	4	6.5
M2	Basic Information	5	0.5	4
M3	Living Conditions	5	5	5
M4	Working Conditions	10	5.5	9.5
M5	Economic Situation	20	0.5	13.5
M6	Credibility Status	10	5	6
M7	Safeguard Information	5	0	5
M8	Family Information	15	5	15
M9	Proof Information	20	0	15
$\Sigma$	/	100	25.5	79.5

Table 2: Credit category table

Category	Keyword	Target Score	A-Score	B-Score
S1	Funds, etc.	20	9.5	15.5
S2	Work, etc.	40	11	29
S3	Protection, etc.	40	5	35
$\Sigma$	/	100	25.5	79.5

Statistically, A has a score of F2, B has a score of F4, and B has a greater credit risk than A.

Softmax is used for normalization and TensorFlow library is used for training. After 10 times of training, the weight W is: [0.06266136, 0.68787533, 0.24946336]. Training 1000 times, the weight W is: [2.2234998e-08, 9.999893e-01, 1.1122712e-06], 6 decimal places reserved, the weight W can be written as: [0.00000, 0.99999, 0.00001]. From the running results,  $W_2 > W_3 > W_1$ , with the increase of training times, the relationship is more obvious. It can be concluded that job stability is an important basis for other relevant indicators such as financial information and security information. This provides an important reference for the study of other related indicators.

Taking the economic status of loan applicants as an example, this paper analyzes the basic information of loan applicants, such as monthly salary, family income, debt situation and whether there is a credit card, and draws a decision tree for loan application, visualize the relevant factors, as shown in Figure 1. Decision tree will be further used for credit risk prediction, credit data processing and credit data mining.

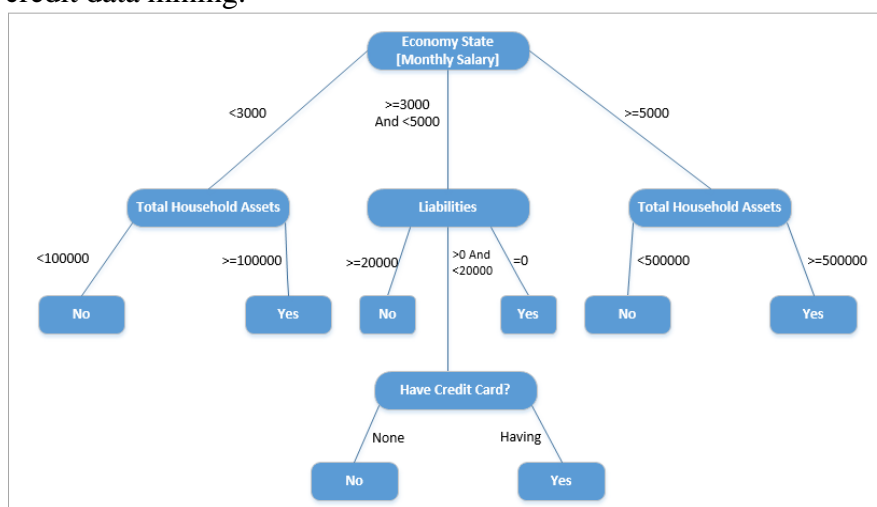


Figure 1: Decision tree for loan application

## 2.2. Technical route

By organizing and summarizing the relevant content of financial credit and credit evaluation, and conducting scientific research on related technologies, a solid and reliable theoretical basis has been provided for the progress of the project; this paper further carried on the indicator data within the scope of the research topic, reveal its laws and essence, explore comprehensive research methods for credit analysis and evaluation of credit enterprises, and conduct qualitative and quantitative analysis to establish a credit evaluation platform and mechanism. The technical route is as follows:

Research on relevant methods of credit and risk evaluation → Comparison and statistics of credit credit and risk → Analysis of the current situation and problems of credit enterprises → Analysis and research of credit indicators → Construction of service-oriented architecture (SOA) credit information platform, credit marketing platform, and credit risk evaluation platform → Technical analysis and summary → Platform promotion and improvement.

This paper makes use of the evaluation technology and comprehensive platform to further improve the credit index database of credit institutions and study more scientific and reasonable credit evaluation technology and methods.

## 2.3. Key issues

The key issues are as follows:

(1) This paper constructs a credit index analysis program with theoretical value and practical significance, and studies the instructive credit analysis report and evaluation technology.

(2) The team established a service-oriented architecture (SOA) credit rating platform to enhance the integration of information technology and financial credit. The credit platform includes information management module, marketing module, and risk evaluation module. The credit information module is the foundation of credit collaborative operation. The credit marketing module includes order management, customer data, commodity management, etc. The credit risk evaluation module implements credit analysis and risk evaluation for credit users.

(3) This paper analyzes and studies the index of Financial Credit Enterprise, establishes the credit system based on information technology, realizes the fusion innovation of information technology and finance, and realizes the security early warning of credit credit.

This paper introduces the FTA into the credit system and analyzes the deficiency of the current credit system, starting from information management, risk analysis, decision support, etc., the construction credit information, the credit marketing, the credit risk appraisal and so on function module. This paper combines information technology and finance closely, designs a service-oriented architecture (SOA) credit system, realizes scientific and efficient collaborative management, and applies FTA technology to risk analysis, the establishment of financial credit risk assessment mechanism.

### **3. Related functions of platform modules**

#### **3.1. SOA module**

The construction of this module is based on the credit credit evaluation module of SOA, enhancing the integration of information technology and financial credit. The credit function can include information management, marketing, risk evaluation, etc. The credit information module is the foundation of credit collaborative operation. Credit marketing includes order management, customer data, commodity management, etc. Credit risk evaluation realizes credit user credit analysis and evaluation technology, etc.

This article is available in HTML and. NET and other related technologies, functional development, including: background management, customer management, entrusted application, loan management, form printing, customer categories, staff management and other related functions.

**Background management:** By logging in to the super customer's permission information, enter the background management and modify passwords and other related data in the "Employee Management" module. After being authorized by the general manager (super administrator), department managers can also log in to the backend to modify and manage relevant information.

**Customer management:** The general manager can view basic customer information and delete customers. You can modify the customer's status. There are 6 types of customer statuses: registration completed, loan application, analysis and review, review passed, contract printing, and loan completed. The user clicks on the user's current state to change to the next state. In "Customer Management", it includes "contracted customers". After the loan is completed, the customers will be automatically archived to "contracted customers".

**Entrusted application:** If the customer entrusts the company to fill in the loan application information, the general manager or department manager can use this function to apply for the customer's loan. More than 80 fields for loan application customers have been set as default data. When applying, users only need to click on the confirmation to add, can complete the pre-application of loan data. The pre-application customer information is the initial information, and further modifications to the loan data are needed to complete the final application of the loan.

**Loan management:** Users select the "Modify" module to modify and supplement the pre applied

customer loan information. The new or modified loan information will display "Under review" in the loan level column. The general manager clicks on "Loan Scoring" to check if the data and score of each item are accurate. If they are accurate, you can click on the score to save. The loan level will be automatically calculated and displayed, for example, the level will be displayed as "AAA".

Application form printing: The general manager or customer can print the "loan application form", and the fields in the application form can be intelligently read without filling in again. In the print "Loan application form" page, the user uses the right mouse click, in the pop-up menu select print preview or print, you can print out "Personal loan application form".

Contract printing: The general manager or customer can print a "personal consumption loan contract", and this module automatically generates the 14 digit loan contract number. The printing method is the same as the loan application form, as shown in Figure 2.

Loan Scores	Loan Grade	Loan Application	Loan Contract
<a href="#">Credit Scoring</a>	AAA	<a href="#">Print Application Form</a>	<a href="#">Print Contract</a>
<a href="#">Credit Scoring</a>	Audit	<a href="#">Print Application Form</a>	<a href="#">Print Contract</a>
<a href="#">Credit Scoring</a>	Audit	<a href="#">Print Application Form</a>	<a href="#">Print Contract</a>
<a href="#">Credit Scoring</a>	Audit	<a href="#">Print Application Form</a>	<a href="#">Print Contract</a>

Figure 2: Loan scoring printing function diagram

Other related functions: customer category, which can modify regular customers, VIP customers, or add other types of customers; Loan classification, enabling modification and viewing of loan categories and subcategories; Employee management, which allows you to view or modify employee information, etc.

### 3.2. Credit risk module

The credit risk module studied in this article includes SOA modules, FTA module,s and Integrated modules, as shown in Figure 3.

In the SOA modules, the platform invokes the relevant functions on the network side to achieve indicator system display, information management, credit product marketing, risk evaluation, etc. In the FTA module, the platform realizes the calculation and application of the minimum cut set, the minimum path set, the probability of the top practice and the probability importance. In the integrated module, the platform realizes the analysis and display of credit usage, the classification of credit status, the calculation of credit score, the calculation of credit level, classification and application, etc.

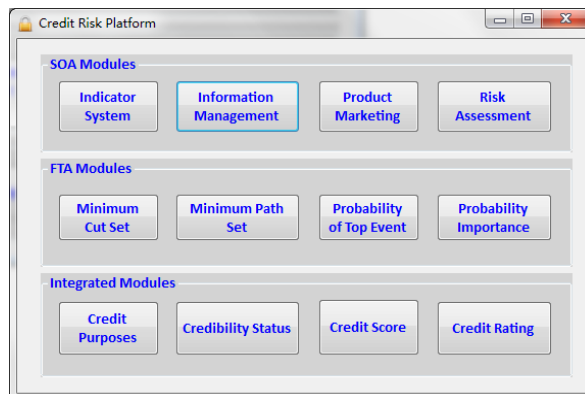


Figure 3: Credit risk platform

#### **4. Social and economic benefits**

This paper introduces the FTA technology into the credit system, analyzes the deficiency of the current credit, starting from information management, risk analysis, decision support, etc. , the credit information module, credit marketing module and credit risk evaluation module based on SOA are constructed. This paper combines information technology with financial credit, designs credit system, realizes scientific and efficient cooperative management, carries on risk evaluation analysis, and establishes financial credit risk evaluation mechanism.

Analyzing and researching the credit evaluation of financial credit has important reference significance for improving the risk system of financial credit and promoting the integration of information technology and financial credit.

This paper analyzes the financial credit index, gives full play to the integration of information technology and financial credit, promotes the construction of financial credit system, and provides reference for local managers in financial credit management.

This paper analyzes the causes and characteristics of loan risk, probes into the factors affecting the credit risk, puts forward the solutions to reduce the risk, and gives the evaluation methods and ideas, this paper puts forward the research methods from the aspects of benefit, credit, risk and evaluation, and provides the theoretical basis and scientific suggestions for the construction of credit system.

#### **5. Achievement transformation and promotion**

This project will transform and promote achievements in the following aspects:

(1) In this paper, a credit evaluation platform based on SOA is established, which enhances the combination of information technology and credit, and is beneficial to the innovative development of credit enterprises, including information module, marketing module, risk evaluation module, etc. , it realizes the credit analysis and technical evaluation of credit users.

(2) This paper analyzes the financial credit index deeply, constructs the credit index analysis scheme with the theoretical value and the practical significance, forms the credit analysis report with the guidance, and establishes the credit coordination and the incentive system. The research results are of great significance for perfecting the credit risk system and promoting the cohesion between information technology and credit.

(3) This paper uses FTA (Fault Tree Analysis) to carry out qualitative Analysis and Quantitative Analysis on the indicators of credit enterprises, realizes the credit risk prediction, and puts forward the solutions to reduce the risks, from the benefit, credit, risk, evaluation and other aspects of the proposed methods, and gradually establish a financial credit risk evaluation mechanism.

#### **6. Conclusions**

We have comprehensively conducted the scheme design, technical analysis, and implementation of the credit platform, developed technical methods for financial credit indicator analysis and risk evaluation research, and proposed analysis methods and risk evaluation techniques for credit indicators. Further research and analysis of key technologies were conducted, and relevant research methods and technologies at home and abroad were studied. This paper analyzes the background of the research, and expounds the research contents and research methods. The focus was on the functions and applications of SOA and FTA modules, analyzing social and economic benefits, and elaborating on the transformation and application of achievements. The research results provide important theoretical basis and application value for urban managers.

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