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Designing an Expert System for Credit Rating of Real Customers of Banks Using Fuzzy Neural Networks

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ABSTRACT

Currently, in Iran's banking system, non-repayment of facilities has become one of the biggest issues, and due to the lack of a proper system for proper allocation of facilities, they face a number of problems, including the problem of allocation of loans, the problem of failure to repay loans of the central bank, or the amount of facilities increased from the amount of reimbursement. The solution of this problem is the credit rating of the customers, which is based on a model based on the theory of fuzzy sets for validation of real customers of the Maskan bank of the East Azerbaijan in Iran in 2016. In this research a structured model was obtained for determination and categorization of input variables for application in the system by factorial analysis then an expert fuzzy system was modelled that consist of six steps. In the first step a fuzzy system is designed that its inputs are financial capacity, support, reliability, repayment record and its outputs is customer credit. In the second step input and outputs are partitioned, in the third step thee partitioned inputs and outputs are converted into fuzzy numbers. The fuzzy inference is compiled in step four. In step five the defuzzifier is conducted. Finally, the designed model is tested in step six. These results indicate research model efficiency compared to bank credit measuring experts that they predicate applicants performance according their judgment and intuition.

1 Introduction

The service efficiency and quality provided by banks not only have significant effects on the economic growth of a country but also influence every aspect of people's daily lives [14]. Banks require to identification of customers' needs and behaviour during offering credit. This affair reduces credit risks. Different researches have been conducted in this relation for identification of the good and bad customers. Because of error and time consuming judgment methods were replaced by parametric and non-parametric methods [15]. Parametric methods like Profit, Legit, discrimination analysis and logistic regression were used and then non parametric methods and data extraction methods like decision making trees, neural networks and expert systems were employed. Fuzzy expert system as one of the data extraction method with high comprehension capacity and optimal speed in learning pattern

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can be useful [1]. What is important for banks is to identify and evaluate probability of nonpayment before issuing of credit, security bounds and kinds of deposit documents. This conduct is possible by a comprehensive system with optimal structure and criterion [3]. Today the banks use credit measuring risk model for approve and payment of loans and they decide by using objective criteria and customers present and past information in export reports and decision making in different competent elements format. In payment of significant loans and based on a few number of these loans the exact evaluation is possible; thus in small and medium loans because of considerable number of applicants the exact evaluation is costly. So it needs to a model for reducing risk of credit [8]. When payment of loans it is important to assure on time payment. For reliability of payment of loan, it is necessary to evaluate the financial capability and tendency of the applicant [9]. Significant part of delayed payments is related to places that there is capacity but not tendency. Especially it has been proven that %99 of the people tend to pay in spite of having difficulties. The main point is that this tendency is internal and originated from mental and social factors. So, individual's tendency is measured by this system [5]. According to this fact that verbal variables should be used for evaluation these variables are not exact and add on complexity of modelling. Fuzzy mathematics is appropriate for modelling of these concepts. So an expert fuzzy system is the best method [4]. According to above mentioned subjects it is tried to propose the quantitative model based on fuzzy mathematics for measuring the reliability of the customers and design a model by format of expert system based on internal relations.

2 Theoretical Basics and Research Background

The banks all around the world play an important and essential role in business and economic activities and to the various borrowers and investors, they face with a variety of monetary and financial markets and therefore they constantly face with various risks [19]. Measuring reliability means evaluation of power of repayment of the customers and probability of non-payment. Today credit scoring and credit rating have been compiled [17]. From bank view point, credit risk is called change of credit property value from payment facilities to customer or bound in the market because of a credit phenomenon [18]. In this case non obligation like lack of payment profit is one of the important and common credit phenomena so this risk is equivalent to credit risk. Accordingly, some scholars defined credit risk anon observation of the customer credit obligations [24]. The history of measuring reliability of the customer's dates to period of invention of money. In the past people tried to consider individual's financial capabilities in payment of loan or barrowings but according to this fact that in that time they were limited effective variables so they institute paid loans. But the capability of the person who receives loan was considered [7].

Since 1936 Fisher [12] rated credit risk for bounds, some scholars considered the similarities between them. In this case it can be referred to him study on the first credit measuring system and Durand [11] by using discriminate analysis as the founder of credit measuring system. Since late 1950 most of the firms tent to improve this system. Isaac was founded in 1956 as a pioneer. Some authors proposed utilization of the computer for collection of the data and multi statics instruments led to progress in this case [6]. It can be referred to article of Beaver [6] by using some financial indicators, Altman [2] in designing Z score for evaluation of succeeds of the firms. At present use Moody, Standard & Poor, KMV rating in determination of model of credit risks and related methodologies [10].

The Table 1 summarizes the previous studies:

Table 1: A review of previous studies

The subject	The authors	Method used	Application areas
Genetic Algorithm for Feature Selection in Credit Risk Assessment	Oreski & Oreski. [21]	neural network	Assessing the credit risk of bank customers
Credit Risk Assessment Model for Jordanian Commercial Banks: Credit Scoring Approach	Bekhet & Eletter. [7]	neural network	Credit ratings of Jordanian commercial banks
Combined system with Genetic Algorithm and Artificial Neural Network for Assessing Retail Credit Risk	Oreski et al. [22]	neural network	Assessing the credit risk of bank customers
Predictive and distinctive feature selection models for Dana group for credit risk analysis	Gönen et al. [13]	Probit regression	Credit Risk Assessment
Fuzzy Goal Programming Model to Rolling Performance Based Budgeting by Productivity Approach	Kalantari et al. [16]	goal programming technique with fuzzy	performance-based budgeting

2.1 Customer's Credits Measuring

Selection of criterion and model is important. Banks and other credit institutes should consider their complex activities and environment [5]. Criteria ply an important role in screening of inputs in processes of credit scoring model. The important criterion is LAPP, 5s, 5s that the common one is 5s. Most of the banks and credit intuitions use this scale [7].

2.1.1 5c Criterion

5c Criterion involves the following items:

1. Character: investigation of commitment, social credit, credit of the applicant and accuracy of the actions in the past financial operations and activities.
2. Capital: investigation of applicant power in directing, income capacity for gain profit and production of income, management power and commercial capacity.
3. Capacity; investigation of capital and applicant statement
4. Coverage or collateral: prediction of collateral that is offered for bank or credit institution during or receiving loan.
5. Conditions: investigation of political, economic, social sand external factors that out of control of the applicant but they could effect on payment and credit commitments [20].

2.1.2 Liquidity, Activity, Profitability, Potential (LAPP)

LAPP is other criterion for evaluation of applicant conditions that involves followings:

1. Liquidity: in short term it means customer access to cash or his capability in providing this amount for meeting short term obligations or the main received credits that sometimes liquidly is more important than profit.

2. Activity: it investigates type and amount of the activity, operation turning period and etc.

3. Profitability: it investigates the amount of profit, cross and net profit compared to cost.

4. Potential: continuity of activity of a firm in the market depends on its potential so issues like management, human force, products, financial resources, power in the market and communications are investigated [13].

2.1.3 Criterion 5p: The Components are as Follow

1. People: investigation of people views points about economic unit like efficacy of production, trading and age of a management, insurance, profits of capital and control of properties, tendency toward obligations, place in the industry or economic sector [3].

2. Product: profitability, quality and quantity, value availability, marketing goals, insurance are investigated.

3. Protection: is there any internal protection based on financial statements or not?

4. Payment: the past payments, liquidity and properties and profitability, quality of foreign debates are investigated.

5. Perspective: investigation of the future plans of the company and profits of selling by market probability of changing of prices. The decision makers could decide about credits and credit ceiling and its duration and manner of payment [13].

3 Modeling Algorithm

According to concepts of designing of expert system modelling algorithm was proposed as Fig. 1 that consist of six steps:

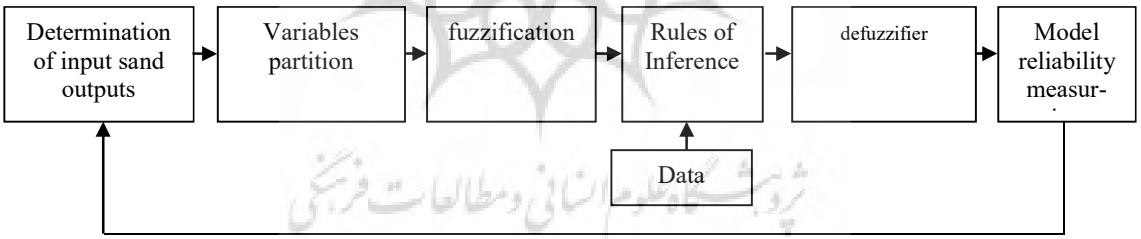


Fig. 1: Modelling Algorithm

The data were collected by field and library studies so that the model was determined and data of input and output variables and their relations were collected as library method. Also for reliability of the data the expert was employed by using flash cart and interview. For grouping of the criteria the questionnaire was used. And tables, matrices were employed and finally they were summarized in inference rules format. For application of model the tools should be used and for measuring inputs a questionnaire was designed [23]. After compilation of the inputs and outputs by factorial analysis the structured model was obtained. For fazzification train gluer numbers were employed and for inference of the fuzzy some recent method was used. The Gravity method was used for normalization of the

model and MATLAB was employed for calculations. As you see after test of the model in case of acceptable error the modelling process is ended. In other case the steps should be revised and corrected.

3.1 Main Steps of the Algorithm

Step One: Determination of inputs and outputs

In this section at first 31 customer's variables are factored by factorial analysis. By this analysis the relationship between variables are identified and factored. The output is used in the prose model then the confirmed model is employed as structured model. For test of validity of the questions content reliability was used. For measuring of reliability the opinions of the experts were used. In this step after interview the amendments were carried out. It was considered that this questionnaire measures the mentioned indicators. Reliability test was conducted by factorial analysis by SPSS software. In discovery factorial analysis KMO amount was 0.795 and the meaningfulness was zero. It indicates the efficiency of the sampling and appropriateness of factorial analysis for identification of structure. After factorial analysis questions 6, 10, 12, 13, 14, 16, 17, 23, 26, 31 were omitted because of low factor and based on expert's opinions. According to factorial truing matrix and replacement of some variables questions 1, 3, 4, 7, 27, 28 were allocated to factor one and questions 15, 19, 20, 25 were allocated to factor two and questions 8, 9, 11, 18, 21, 22, 24, 30 were allocated to factor three and questions 2, 5, 29 were allocated to factor four; so they were called financial capacity, Protection, reliability and payment record and then the results were investigated by conformed factorial analysis.

Table 2: Factorial Analysis Output

Factor 1		Factor 2		Factor 3		Factor 4	
Income conditions	0.691	Coverage	0.901	Clearances	0.506	Non return check	0.636
Statement	0.597	Converge level	0.803	education	0.541	Delayed payment	0.879
Customer asset	0.661	Credit target	0.58	Customer knowledge	0.45	Applicant debate	0.425
Inventory	0.540	Reliable guarantor	0.563	Job title	0.739	-	-
Working capital	0.619	-	-	Previous facilities	0.546	-	-
Physical possibilities	0.604	-	-	Good deed	0.496	-	-
-	-	-	-	Activities	0.678	-	-
-	-	-	-	License acquisition	0.535	-	
Sig	0.197	Sig	0.537	Sig	0.459	Sig	0.112

As seen all variables factorials are more than 0.4. It means all variables are confirmed in all factors; also all sigs are more than 0.5 and it means that there is no significant difference between real data and extracted model. Thus according to factorial analysis the research limitations are as follows:

Model inputs determining reliability level are as follows:

1. Finical capacity; 2. protection; 3. reliability; 4. payment record;

And output variable is:

- Customer credit level

Step Two: Variables partition

In this step according to limitations and opinions the outputs are shown tables 3 and 4:

Table 3: Input Variables

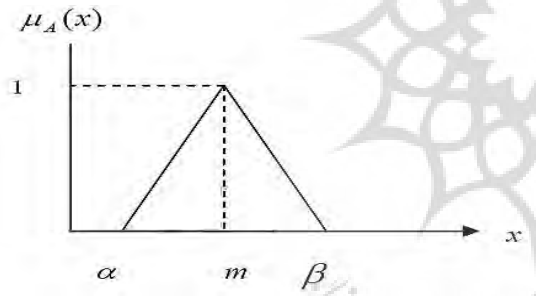
Financial capacity		Protection		Reliability		Payment record	
Low	P1	Low	S1	Low	R1	Bad	H1
Medium	P2	Medium	S2	Medium	R2	Medium	H2
High	P3	High	S3	High	R3	good	H3

Table 4: Output Variable

Reliability	
Low	C1
Medium	C2
High	C3

Step Three: Linguistic Variables Fuzzification

In this step, linguistic variables are fuzzification. For doing so, triangular functions have been used. Relation1 and Fig. 2 indicate this function.



$$\mu_A = \begin{cases} 1 & x = m \\ \frac{x-a}{m-a} & a \le x \le m \\ \frac{(\beta-x)}{\beta-m} & m \le x \le \beta \\ 0 & Otherwise \end{cases}$$

Fig. 2: Triangular Numbers

In this article each verbal variable triangular fuzzy numbers are shown by (α m β). Fuzzification step involves two stages.

Substep One: Input Variables Fuzzification

For fuzzification of inputs at first each variable is partitioned by linguistic variables according to review of literature by approach of modelling algorithm. Each linguistic variable was converted to fuzzy set by triangular number. Table 5 indicated these linguistic variables and equivalent fuzzy numbers. Figure 3 shows financial fuzzy numbers.

Table 5: Linguistic Variables and Fuzzy Numbers

Financial capacity		Protection		Reliability		Payment record	
Variable	Fuzzy number	Variable	Fuzzy number	Variable	Fuzzy number	Variable	Fuzzy number
Low	(0 0 0.5)	Low	(0 0 0.5)	Low	(0 0 0.5)	Bad	(0 0 0.5)
Medium	(0 0.5 1)	Medium	(0 0.5 1)	Medium	(0 0.5 1)	Medium	(0 0.5 1)
High	(0.5 1 1)	High	(0.5 1 1)	High	(0.5 1 1)	good	(0.5 1 1)

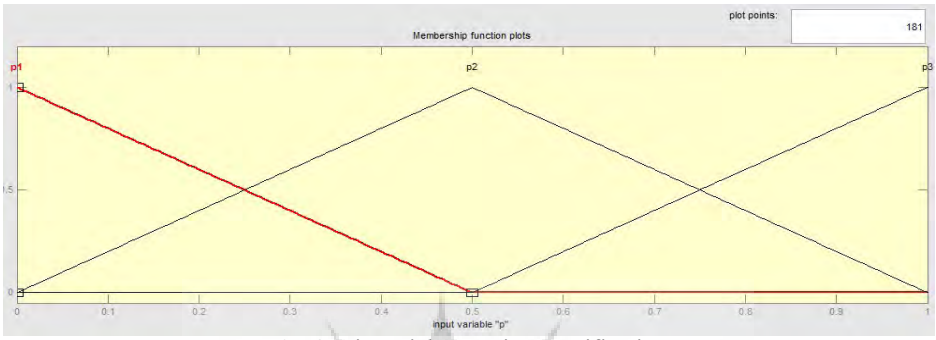


Fig. 3: Financial Capacity Fuzzification

Substep Two: Fuzzification of output variable

Output variable was partitioned to three linguistic variables. Table 6 the processes.

Table 6: Verbal Variables and Fuzzy Numbers

Reliability	
Variable	Fuzzy number
Low	(0 0 0.5)
Medium	(0 0.5 1)
High	(0.5 1 1)

Step Four: Compilation of inference engine

The expert system involves four variable; and this variable partitioned as three fuzzy set. Thus in an ideal state (3*3*3*3=81) is required. But in this thesis inference engine were compiled based on the questionnaires; and the mean of the expert view points towards the rules was calculated by spss software. Then level of accuracy was entered as percentage of 0-1. So for designing of the inferenceengine198 rules was obtained. These rules are as if – then. For example, rule number two was as follow in the questionnaire.

If: financial capacity and reliability are high and payment record is medium.

Then credit level will be high (0.629)

If: financial capacity and reliability are high and payment record is medium.

Then credit level will be medium (0.371)

Step Five: Defuzzifier

The value of outputs of the previous step is in form of fuzzy. For simplification of the analysis the fuzzy numbers should be converted to normal numbers. In other words, in this step the value of outputs is defuzzifier. One of the common methods is the centre of gravity.

Step Six: Model measuring reliability

Since, the aim of this research is to offer an applied method so sufficient reliability in different conditions is necessary. Thus following schematics is used.

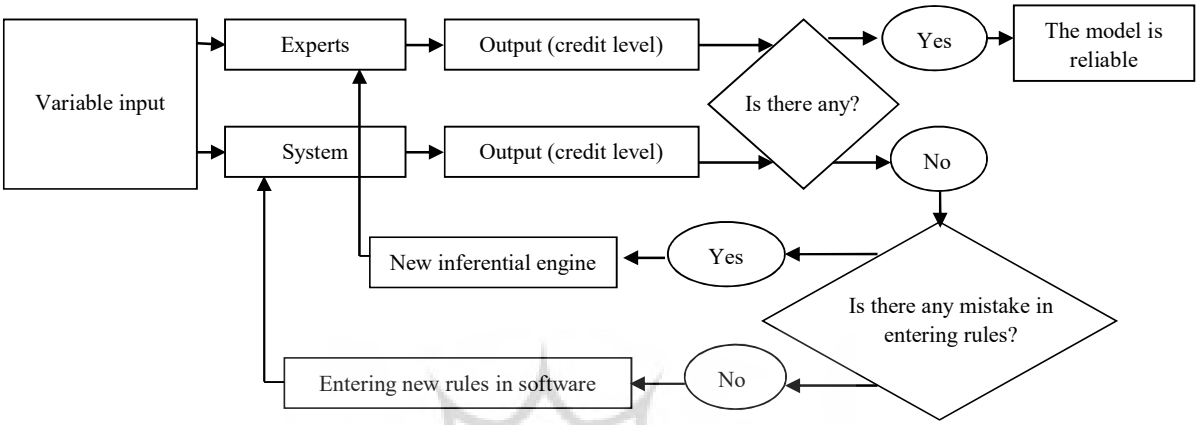


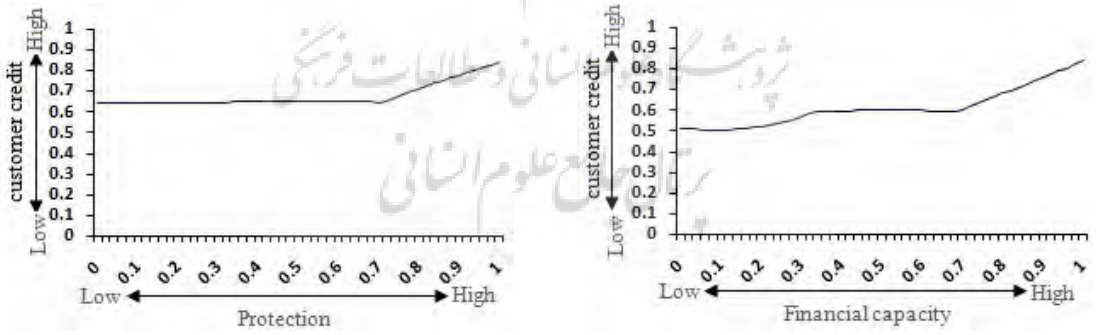
Fig. 4: Model Measuring Reliability

3.2 Methods of Solving

In this article two methods are used.

3.2.1 First method

In this method behaviour or sensitivity analysis is used so that three variables are constant and the other variable is changed. For each enhancement the customer level is obtained and finally a graph is obtained that x axes are non-constant variables and y axes are customer credit level. Fig. 5 shows these graphs. They are constant to review of literature. Credit changing trend is constant too these graphs were shown to some experts and they were confirmed.



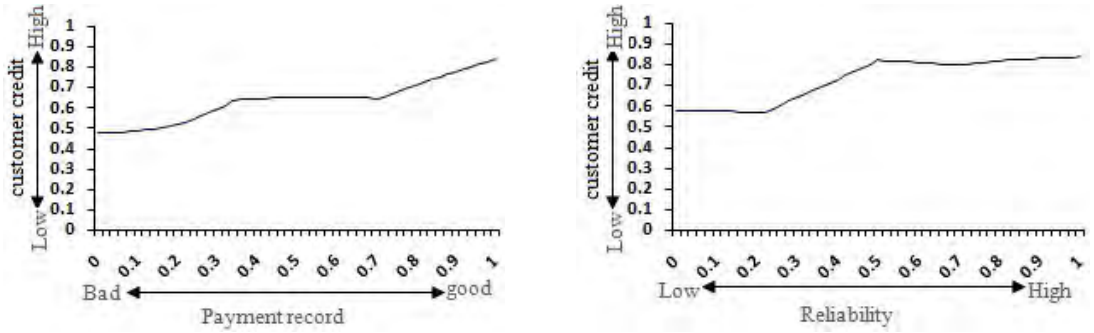


Fig. 5: Behavior of Credit Level for Each Change in the Variable

3.2.2 Second method

In this method the data of the case study were entered to expert system.0.663 was allocated to first customer, 0.448 was allocated to second customer and 0.388 was allocated to third customer. Number of first customer approaches to high credit, number of second customer approaches to medium credit and number of third customer approaches to low credit. These data were studied by three experts and they proposed high credit for first customer, medium for second and low for third customer. Thus according to the sameness proposed credit level and model output the model is reliable.

4 Case Study

In this part for sowing the model efficacy and explicit expression of the model a case study is offered involved Maskan Bank of East Azerbaijan.

For calculation of variables showing customer reliability of

1. Financial capacity
2. Protection
3. Reliability
4. Payment record

The questionnaires were designed. The data involved three customers of the bank. After extraction of the data the responds were converted to fuzzy number by using triangular functions and then triangular average was obtained. For obtaining fuzzy average and normalization Bojadif method was used. Relation 1 shows fuzzy average.

$$A_{ave} = (m_1, m_2, m_3) = (\frac{1}{n}\sum_{i=1}^{n} a_1^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_m^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_2^{(i)}) \quad (1)$$

Table 7: Customer One Data Fuzzification

	Questionnaire Number								Fuzzy mean
	1	2	3	4	5	6	7	8	
Financial capacity	(0.5 0.5 1)	(0.5 0.5 1)	(0.5 0 1)	(0.5 0 1)	(0.5 0.5 1)	(0.5 0 1)	-	-	(0.25 0.75 1)
protection	(0.5 0 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	-	-	-	-	(0.5 0.75 1)
reliability	(0.5 1 1)	(0 0.5 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	(0.44 0.94 1)
payment record	(0.5 1 1)	(0 1 1)	(0 0 1)	-	-	-	-	-	(0.166 0.666 1)

Table 8: Customer Second Data Fuzzification

	Questionnaire Number								Fuzzy mean
	1	2	3	4	5	6	7	8	
Financial capacity	(0.5 1 1)	(0 0.5 1)	(0.5 1 1)	(0 0.5 1)	(0.5 1 1)	(0 0.5 1)	-	-	(0.25 0.75 1)
protection	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	-	-	-	-	(0.5 1 1)
reliability	(0.5 1 1)	(0 0.5 1)	(0 0.5 1)	(0 0.5 1)	(0.5 1 1)	(0 0.5 1)	(0 0.5 1)	(0 0.5 1)	(0.125 0.625 1)
payment record	(0.5 1 1)	(0.5 1 1)	(0.5 1 1)	-	-	-	-	-	(0.5 1 1)

Table 9: Customer Third Data Fuzzification

	Questionnaire Number								Fuzzy mean
	1	2	3	4	5	6	7	8	
Financial capacity	(0 0 0.5)	(0 0 0.5)	(0 0.5 1)	(0 0 0.5)	(0 0 0.5)	(0 0 0.5)	-	-	(0 0.083 0.583)
protection	(0 0.5 0.5)	(0.5 1 1)	(0 1 0.5)	(0 0 0.5)	-	-	-	-	(0 0. 5 0.625)
reliability	(0 0 0.5)	(0 0.5 1)	(0 0 0.5)	(0 0 0.5)	(0 0 0.5)	(0 0.5 1)	(0 0 0.5)	(0 0 0.5)	(0 0.125 0.625)
payment record	(0 0 0.5)	(0 0 0.5)	(0 0 0.5)	-	-	-	-	-	(0 0 0.5)

4.1 Results of Credit Level Investigation for Studied Samples

As you seen from fuzzy of input variables, the average of each variable determining credit level. is as follows:

Table 10: Average of Each Variable Determining Credit Level

	First customer	Second customer	Third customer
Financial capacity	(0.25 0.75 1)	(0.25 0.75 1)	(0 0.083 0.583)
Protection	(0.5 0.75 1)	(0. 5 1 1)	(0 0. 5 0.625)
Reliability	(0.44 0.94 1)	(0.125 0.625 1)	(0 0.125 0.625)
payment record	(0.166 0.666 1)	(0.5 1 1)	(0 0 0.5)

Now the fuzzy average should be defuzzifiered. Bojadzif is used in this case.
After entering inputs following results were obtained:

Table 11: First Customer

Financial capacity	**Protection**
$x^1_{\max}=\frac{0.25+0.75+1}{3}=0.666$ $x^2_{\max}=\frac{0.25+2(0.75)+1}{4}=0.687$ $x^3_{\max}=\frac{0.25+4(0.75)+1}{6}=0.708$ $z^*=\max\{0.666, 0.687, 0.708\}=0.708$	$x^1_{\max}=\frac{0.5+0.75+1}{3}=0.75$ $x^2_{\max}=\frac{0.5+2(0.75)+1}{4}=0.75$ $x^3_{\max}=\frac{0.5+4(0.75)+1}{6}=0.75$ $z^*=\max\{0.75, 0.75, 0.75\}=0.75$
Reliability	**payment record**
$x^1_{\max}=\frac{0.44+0.94+1}{3}=0.79$ $x^2_{\max}=\frac{0.44+(0.94)+1}{4}=0.83$ $x^3_{\max}=\frac{0.44+4(0.94)+1}{6}=0.87$ $z^*=\max\{0.79, 0.83, 0.87\}=0.87$	$x^1_{\max}=\frac{0.166+0.666+1}{3}=0.61$ $x^2_{\max}=\frac{0.166+2(0.666)+1}{4}=0.625$ $x^3_{\max}=\frac{0.166+4(0.666)+1}{6}=0.638$ $z^*=\max\{0.61, 0.625, 0.638\}=0.63$

Table12: Second Customer

Financial capacity	Protection
$x^1_{\max}=\frac{0.25+0.75+1}{3}=0.666$ $x^2_{\max}=\frac{0.25+(0.75)+1}{4}=0.688$ $x^3_{\max}=\frac{0.25+4(0.75)+1}{6}=0.708$ $z^*=\max\{0.666,0.688,0.708\}=0.708$	$x^1_{\max}=\frac{0.5+1+1}{3}=0.833$ $x^2_{\max}=\frac{0.5+2(1)+1}{4}=0.875$ $x^3_{\max}=\frac{0.5+4(1)+1}{6}=0.92$ $z^*=\max\{0.833,0.875,0.92\}=0.92$
Reliability	**payment record**
$x^1_{\max}=\frac{0.125+0.625+1}{3}=0.583$ $x^2_{\max}=\frac{0.125+2(0.625)+1}{4}=0.594$ $x^3_{\max}=\frac{0.125+4(0.625)+1}{6}=0.604$ $z^*=\max\{0.583,0.594,0.604\}=0.604$	$x^1_{\max}=\frac{0.5+1+1}{3}=0.833$ $x^2_{\max}=\frac{0.5+2(1)+1}{4}=0.875$ $x^3_{\max}=\frac{0.5+4(1)+1}{6}=0.92$ $z^*=\max\{0.833,0.875,0.92\}=0.92$

Table 13: Third Customer

Financial capacity	Protection
$x^1_{\max}=\frac{0+0.083+0.583}{3}=0.222$ $x^2_{\max}=\frac{0+2(0.083)+0.583}{4}=0.187$ $x^3_{\max}=\frac{0+4(0.083)+0.586}{6}=0.152$ $z^*=\max\{0.222,0.187,0.152\}=0.222$	$x^1_{\max}=\frac{0+0.5+0.625}{3}=0.375$ $x^2_{\max}=\frac{0+2(0.5)+0.625}{4}=0.406$ $x^3_{\max}=\frac{0+4(0.5)+0.625}{6}=0.403$ $z^*=\max\{0.375,0.406,0.403\}=0.406$
Reliability	**payment record**
$x^1_{\max}=\frac{0+0.125+0.625}{3}=0.25$ $x^2_{\max}=\frac{0+2(0.125)+0.625}{4}=0.22$ $x^3_{\max}=\frac{0+4(0.125)+0.625}{6}=0.187$ $z^*=\max\{0.25,0.22,0.187\}=0.25$	$x^1_{\max}=\frac{0+0+0.5}{3}=0.166$ $x^2_{\max}=\frac{0+2(0)+0.5}{4}=0.125$ $x^3_{\max}=\frac{0+4(0)+0.5}{6}=0.083$ $z^*=\max\{0.166,0.125,0.083\}=0.166$

Table 14: The Result of Examining the Level of Validity for a Study Sample

	First customer	Second customer	Third customer
Financial capacity	0.708	0.708	0.222
Protection	0.75	0.92	0.406
Reliability	0.87	0.604	0.25
payment record	0.63	0.92	0.166
Output	0.663	0.448	0.388

5 Conclusion

Customers' credit measuring is one of the most important components in the success of banks. Although similar Researches have been presented in many respects on the Customers' credit measuring in different banks, there is no coherent model that uses the findings of these theories to be used simultaneously for validation. In designing of the expert system and compilation of inference engine,

number of variables and their partitions specify number of inference engines. So that by increases of a variable it is probable that number of rules is doubled that it leads to complexity of the model and reduction of efficacy. In this research in order to preserve of model and better performance and easy application, all variables were categorized by factorial analysis into four groups as input that in case of increase of input variables number, the exact model could show reliability level. Also non collaboration of some bank experts in allocation of their free time for respond to questionnaires and lack of interview led to difficulty. Reasons like optimal access to resources and information and lack of field study and paying less attention to research related to credit measuring issues were limitation of the research. Customers' credit measuring is one of the main components in success of the banks. According to this fact that some customers do not offer accurate information for banks and the banks have to decide under uncertainty so fuzzy expert system is the best way for decision making. Although there are many theories in this relation but there is no integrated model for using these theories. A model was proposed by using fuzzy specialist system that it has better performance than credit measuring experts of the studied bank. These results indicate research model efficiency compared to bank credit measuring experts that they predicate applicant's performance according their judgment and intuition. There is limitation in theoretical results so the present model is not certain and it should be improved by new theories related to measuring reliability. The proposed system was not goal in this article it is only tool for scoring and it is used when it leads to improvement. Before any actions identification of the credit is necessary and then scoring is conducted in this case it will be effective.

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