Optimizing Agricultural Loan Distribution Through Fuzzy Logic Based Digitalized Process

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Abstract- ***The level of agricultural information is an important part of the modernization of a country. It is important to set up a fair evaluation code system for agricultural informatization and evaluation methods to promote agricultural loan information. The previous method cannot effective in analyzing the season, environment, rainfall for the loan process. It cannot show the proper results for the agriculture loan constructions.so the crop or seed loan procedure will not be proper method based upon the previous statistical report. Due to the lack of support for irrigation and harvesting techniques are ineffective. While the impact of seasonal change on Indian agriculture loan is still clear, monitoring the user data and their different impacts will be crucial. To resolve these issues, propose a Fuzzy Logic, Method. The proposed method provides a flexible and advanced process is important for the field, especially the proposed method and response in the critical environment that can monitor the agriculture loan issues. The proposed Fuzzy Logic method monitors the season, environment, and rain study for loan process. Fuzzy Logic model can not only use them for loan procedure in different areas depending on the level of informatization but can also achieve quality assessment based on agricultural information in different parts of the rating system. Finally, the built-in agricultural information evaluation system would be useful, and the evaluation method that is going to be used is simple and easy to use.***

Index Terms- ***Agricultural informatization, Fuzzy logic, Construction Index, quality assessment, cultivation.***

I. INTRODUCTION

Agricultural informatization plays an important role in the process of agricultural modernization, and the development of agricultural modernization should include the process of agricultural informatization. Based on the comprehensive development of modern information technology and information system applications for agricultural land, agricultural informatization provides effective information support for the best service for agricultural production, distribution and marketing, and related management and development. The potential of agriculture loan and the level of agricultural production. It is to study the problems in the construction of informatization for the healthy development of agricultural informatization in India and to establish a scientific and fair evaluation code system.

Describes that loan process is a process that requires the expertise of computer scientists to explore the suitability of farmland and specialize in geological, environmental information, and interpretation. The intelligence system implements the Geographical Environmental Factors and Programs Attribution Table results to evaluate crops' suitability for tropical and subtropical regions for different types of soil.

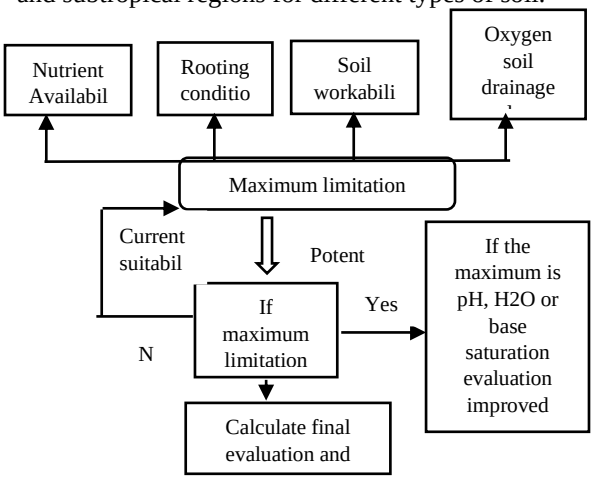


Fig.1 Introduction Diagram

It is important to solve this problem based on an accurate assessment of agricultural land use's overall planning. Land valuation methods vary widely based on specific estimates, due to the increased use of the size. Land valuation is the process of predicting land performance over time based on the specific type used. When used to convert different types of agriculture

loan, land matching assessment refers to the process of land performance assessment. The main purpose of assessing the suitability Predict agricultural land potential and land development limits. Many decision-makers do not appreciate expressing their opinions on information such as language due to the complexity of the scope environment and the lack of accurate decision data. Based on the above research, a direct language evaluation method based on relative operators is recommended. The model related to agricultural informatization assessment is conclusive; finally, according to examples of agricultural information from four regions of the province, evaluation indicators and methods are shown an effect.

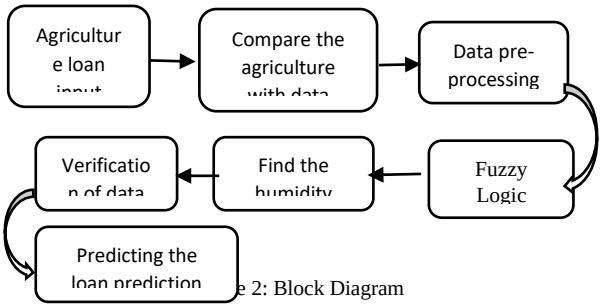
II. RELATED WORK

Agriculture is a process that requires the expertise of computer scientists to explore the suitability of farmland and specialize in geological, environmental information, and interpretation [1]. The Agri-Food Supply Chain (AFSC) has been severely disrupted by the flow of production, capital, and information, which has led to low profits for track farmers. Uncertainties in geological and geographical parameters are inevitable because it is impossible to accurately determine all aspects of ground conditions in a field survey such as a tunnel Conclusion Makers' information address should be uncertain and erroneous, based on the proposed analytical hierarchical process and Fuzzy comprehensive evaluation method. The Agricultural Supply Chain (ASC) includes many aspects, including literature but not limited to scope, scope, consumption, driving, constraints, decision, etc. [2] [3]. Index System data examine the structure of bridge engineering and safety risk assessment codes for making a safety risk assessment. Observations and experiences from these studies based on Food Supply Chain Management (FSCM) systems and processes will be highly effective for academics and professional physicians [4]. Different intermediaries will control the system [5]. This leads to inefficient supply chains that are resilient in terms of time and money [6]. The National Rural informatization demonstration has seen significant progress in the construction of agricultural informatization in the province, but there are still some problems [7] [8]. Strengths, this system includes regulatory security indicators, appropriate indicators, public safety indicators, and utility indicators Most of them use a large number of reciprocal and characteristic indicators, an estimate of whether they can be effectively answered by existing methods, in terms of economic and environmental performance. Weaknesses, Opportunities, and Threats analysis (SWOT) factors are not prioritized based on their importance and can lead to incorrect strategic actions [9]. Adopt such production. The supply chain strategy will meet the expectations of different shareholders in the value chain in the face of increasing internal and external pressure: repository status assignment issues, multi-person multi-modal, and multi-period mathematical models to be systematic integration [10] [11].

The Public Distribution System (PDS), where the supply chain exists and the supply chain, will carry out the same study when the same strategy suggested by Vita arrives to make it more effective and efficient [12]. Supplier selection ranking results can be important, especially when performance is inconsistent or slightly different [13]. Various unforeseen factors can cause great uncertainty due to a practical disassembly process Use the alternative strategy in cluster centers to include different categories and more interpretable lead parameters for the unbalanced dataset. The decision maker's intuitive judgment determines whether the weight of each goal is contractual. Also, uncertain irrigation water is inevitable in the proper allotment of land [14] [15].

III. MATERIALS AND METHOD

Agriculture loan is an important part of many developing countries, but traditional methods are not enough to produce good yields of crops. In the Construction Index Based on Fuzzy Logic (FL) method. Agricultural problems using Fuzzy logic. When the farmer wants to plant the crop: There are some factors as to the input of the sample. Using this information in conjunction with data sets, Agriculture loan Help recommends the minimum or maximum temperature, rainfall, and soil type absorption expected in the designated season, and the most suitable crops for farmers. The model can also be extended by adding these functions.



e 2: Block Diagram

Figure 2 describes the Fuzzy interface agriculture loan procedure constructed, Knowledge-based fuzzy analysis in the structure and unstructured data for the evaluations, and the data finally defuzzification shows the output. Comprehensive Fuzzy sets are important for providing information on issues such as incomplete information and fertilization in agriculture loan. Fuzzy sets have been gaining growing research interest in major agricultural land applications, helping farmers make the right decisions about loan process.

A. Fuzzification Logic Interface Model

Data fuzzification process parameters are performed to determine benefits. It conforms to the horizontal axis's input boundary and can be obtained by projected vertically above the maximum of the membership function. There are many factors responsible for multiplying a product. The components used in the vague logic model for land detection and forecasting are temperature (TR), humidity, precipitation (HP), light (LT), wind (May), and precipitation (radio frequency). These factors are fuzzy logic input variants to create a fuzzy logic model, and the output parameter is agriculture loan. loan data values are evaluated, and absolute values are converted through the ambiguous interface. The fuzzy interface value, as its input is an advanced fuzzy evaluation method.

The Fuzzy set of the universe of Discourse X is represented as an important figure for each participant Enter. It is defined as μR: X → [0, 1], where X is fitted to the middle 0 and 1. Each of these processed inputs with the weight attached indicates the value of the functions attached to the middle, and finally an output response is found.

μ (*x*) = x−R1/R2−R1 ---------- (1)

μ (*x*) = R3-x /R3−R2 ---------- (2)

The Membership Function (MF) block of temperature and the rules for defining the selected input parameters above are as follows:

Example: Temperature (*x*) *x*−10 /5, if x < 5 “Moderate”

20-x/5, if 5 ≤ x < 10 “Easy”

If 10 ≤ x < 15 “severe”

If x ≥ 15 "Very severe."

B. Fuzzy time prediction

In the Time series data, Fuzzy time prediction of the proposed method is a step-by-step process. It is evaluating in the time series prediction of the fuzzy logistics method.

Let X={x1, x2 ….xn} Historical time-series data

Step 1: Determine the values of the sets X

The maximum and minimum values of historical time series data, respectively: U max and U min. Then, it is defined us,

X= [U min-U1+u1 max-u2] ---------- (3)

Step 2: Determine the length of the series

(i) Calculate absolute difference between the values X i+1 and Xi= {i=1, 2….n-1} First the difference, then calculate the average first difference.

(ii)Take half the average length.

(iii)The basic mapping lies in the detectable range and the found length of the base

(iv) According to the allocation basis, the length of the circle is used for the corresponding TL

Table. 1 Analysis of Time length between the range and base

Range P.U	Base P.U
0.1-1.0	0.1
1.0-10	1
11-100	10
101-1000	100

Table 1 shows the range and base values for the fuzzy time prediction methods.

Step3: Partition the set values

Partition the set values of U and m is an equal length of the u1, u1…um, the partitioning calculated as

, M= [(U min+u1)-(Umax-u2)] / TL ------- (4)

Step 4: Construct the fuzzy sets R1, R2…R3 in the suits the values of u1, u2…u3,

If xi= x ∈ RJ ---------- (5)

RJ=Σni=1=μRj-(xi)/xi ---------- (6) {i=1, 2. . . N &j=1, 2, 3…m}

Step5: Fuzzing time-series data

Fuzzy boxes fuzzily time series data, and the data membership is large is the fuzzy set of Rj (1, 2, and 3…n)

Step6: In data on the current state of the Fuzzy Logic Relationship (FLR) organization and the Fuzzy Logic Relationship Group (FLRG) is Rj in the next state is Rs1, Rs2, Rs3….Rsn and fuzzy logic group if Rj Rs1, Rs2,Rs3….Rsn

Step7: Calculate the cultivating time series

If the cultivating time series fuzzy logic group if RJ Rs1, Rs2, Rs3….Rsn, time value of cultivating is,Ms1+Ms2+Ms3…..Msn/N.

Step 8: Predictive method ambiguous time is calculated by cultivating the Mean Square Error (MSE) and Average forecasting Error (AFE) loan procedure to evaluate the performance. Average square error or average prediction error, minus a good prediction method. The average square error is defined as the average prediction error:

MSN= Σni=1[(actual value) i-(forecasting value) i] 2/N ---------- (7)

Average forecasting Error=sum of forecasting error/number of errors ---------- (8)

Cultivating in % = [forecasting value-actual value]/ actual value *100. ---------- (9)

method is vague change and great application of membership policies. First, obscure boxes are used to express various factors similar to those indicated in the rating objects mentioned above. Next, it is used to calculate the rating factor rating team and weight. Finally, a fuzzy linear transformation is used to obtain fuzzy rating results. This method can be used to solve many multi-factor complex and uncertain problems.

C. Evaluation index set and evaluation set

Given two limited fields, R represents a comprehensive rating index panel, S represents the rating package:

R= {r1, r2, r3…rn} ---------- (10)

S= {s1, s2, s3…sm} ---------- (11)

The membership Evaluation matrix is the degree of membership of an index to a comment. If the membership of the index Ra and the comments Sb is a symbol as Xab, then the Ath index of the membership is expressed as:

Ra= {Ra1, Ra2, Ra3…Raj…..Ram} ------ (12)

Ra1 determines the value of R, Ra2, and Ra3 is a single factor rating vector ... but it is a classic function. Then the membership size is normalized to get the single factor rating vector. And set the rating team R by all single factor types

$\mu(x) = 1/2+1/2 (\sin) \pi/R-S [(x-s+r/2)]$ ----13)

$\mu(x) = 1/2-1/2 (\sin) \pi/R-[S(x+a-b/2)]$ --- (14)

In the evaluation matrix constructing the size variation of the fuzzy logic comprehensive method, this method evaluating the Multiple factors for the function.

IV. RESULT AND DISCUSSION

The results and performance of the proposed implementation effects will be adjusted and tested and trained loan procedure data sets. Classification and reproduction for performance evaluation are conducted to test the accuracy, Accuracy, recall, and time complexity measures obtained during the execution phase. The true and false position calculates test case measurement the error rate at which the text processing process is performed.

Table. 2 simulation parameters

Parameters used	Values processed
Input dataset	Text Value dataset
Simulation tool	Python
Number of data	100
Dataset	loan report data set.

Table 2 describes the compile loan and loan procedure databases that have been processed to test the functions of the proposed system.

A. Analysis of Accuracy

Agricultural loan is done under percentages that can predict agriculture loan data. The beginning of loan procedure vacuums is surrounding and advance notice. Thus, a fuzzy method analysis agriculture loan accuracy detailed will result in the prediction data set.

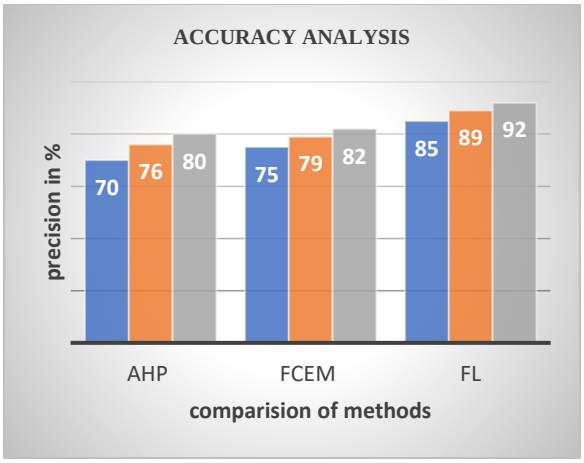


Fig. 3. Analysis of Accuracy

Figure 3 describes the True positive accuracy ratios, once calculated AHP 80%. And FCEM produces 82% higher efficiency than 92% subject matter rating rates other than the FL proposed implementation methods.

B. Analysis of Recall

The incorrect projection set size can be a function of different agriculture loan planting functions. As a function of set size, various factors are expressed. The impact of project deviation exposure intensity on recalled errors. (Positive or negative) the predicted sequence should recall the value.

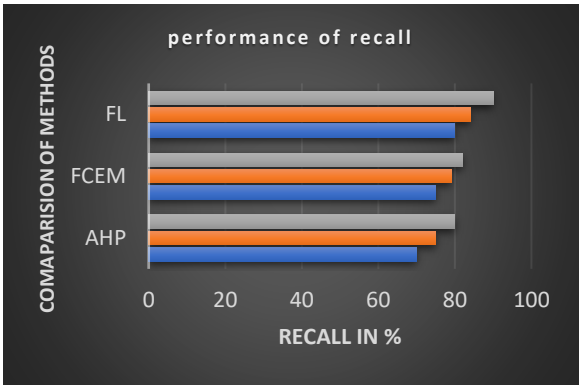


Fig. 4. Analysis of Recall

Recall Analysis Application the above data belong to different datasets. The data blocks produced different test values that were in different ways. AHP is 80% the current method ratio, and FCEM is the calculated 84% of the rate. The proposed system is more reminiscent than other methods if the FL 90% is higher.

C. Analysis of F-Measure in Accuracy and recall

The F score also gives a score of F1, which is called the F measure and is a measure of the accuracy of the experiment. The F-score reaches the best value for the correct accuracy and recalls values, and the worst F value, which means the lower the accuracy and the lower the recall value.

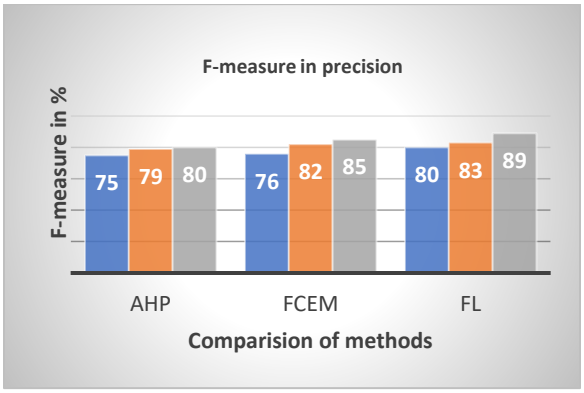


Fig. 5(a). Analysis of F-measure Accuracy

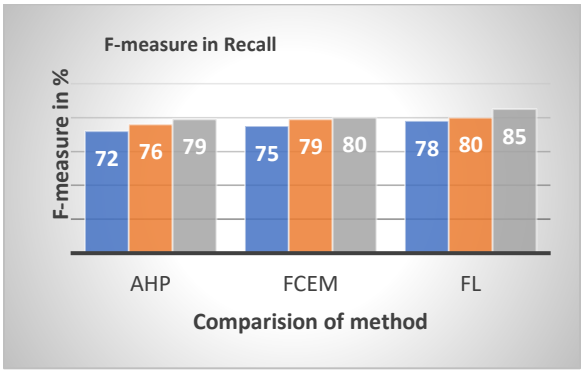


Fig. 5(b). Analysis of F-measure Recall

Figure (a) (b) describes the values of frequent measurement for Accuracy and recall. In the proposed method, FL of Accuracy is 89%, and the recall rate is 85%.

D. Analysis of the Time complexity

Cultivating is a complex time that comes with two factors that come and predict time change. When FL minimizes accurate detection results, the analysis time of seasonal changes is an excellent method for predicting the crop's warming temperature. Complete the task processing time according to the introduction of the action to it.

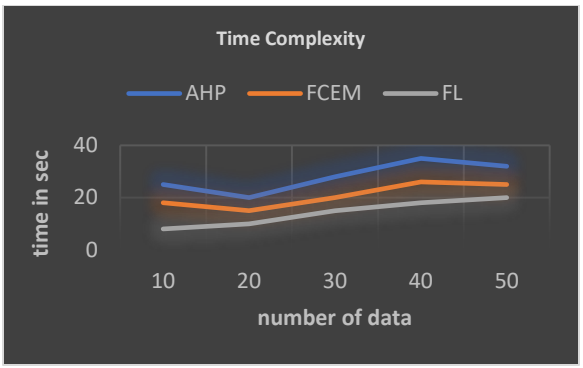


Fig. 6. Analysis of the Time Complexity

Figure 6 describes the time complexity of the number of records calculates the sec, calculating the timeline is evaluating the minimum of 50 records AHP is 32sec, FCEM 25 sec, and FL in 20sec.In the proposed method reduces the time complexity.

CONCLUSION

Agriculture loan Management in seasonal loan procedure modeling and farming methods is a relatively complex industry. Many of the variables and factors are seasonal, environment and rain fall analysis taken into account for decision making and systematic parsing. Agricultural production requires a lot of uncertainty, ambiguity, imperfections, and human intuition. Using fuzzy logic in agriculture loan is important and desirable. Agricultural production can manage fuzzy modeling and represent certainty. As it is complete, the value of information is guaranteed. In the proposed method fuzzy logic analysis, the Solution for important agricultural issues such as breeding, loan dataset, fertilization, soil erosion, land degradation, and climate change. fuzzy logic shows the results based on Accuracy, recall, F-measure and Time complexity. The fuzzy model has gradually increased research interest over the parameters and has established a greater relevance to agricultural land. Helps to make more accurate decisions about the loan procedure of the service partners.

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