FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

ANALYSIS OF CREDIT FEASIBILITY USING THE DECISION TREE METHOD

(Case Study at CP Rantepao Pawnshop)

Sisilia Tando'[1], Marchelin [2], Olivia Devi Y. Pompeng[3]

[1, 2,3] Management Study Program, Faculty Of Economics, Indonesia Christian University Of Toraja

Article Info

Accepted February, 2025

Revised March, 2025

Published March, 2025

Keywords:

Data mining, C4.5 Algorithm, Confusion Matrix, Decision Tree

Abstract

This study aims to analyze the feasibility of providing credit at Pegadaian CP Rantepao using the decision tree method. Quantitative research is the method used. The population in this study was 413 customer data, 100 of which were used as samples provided by Pegadaian CP Rantepao. The type of data used is secondary data, in the form of customer data registered at Pegadaian CP Rantepao. The data analysis used in this research is using Data Mining Clarification with the C4.5 Algorithm Method. The results showed that by using the Decision Tree method to determine customer status on CP Rantepao Pawnshop Customer data, it was able to classify or predict customer data into categories, namely current and bad using 5 attributes, namely gender, loan time, collateral, product type and installations. Based on tests that have been carried out using Confusion Matrix, the accuracy value is 75.71%.

INTRODUCTION

Financial services are a vital sector in a country's economy. Through financial services, people can gain access to various financial products that can help meet their financial needs. In general, financial services can be defined as all types of financial products or services provided by financial institutions to the public to meet the public's financial needs. The types of Financial Services Industry regulated and supervised by the Financial Services Authority include; banking industry, capital markets industry and non-bank financial industry consisting of Insurance, Pension Funds, Finance Companies and Pawnshops.

Pegadaian in its services does not discriminate, in fact its main target is the lower

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

middle class. Pawnshops themselves are expected to be able to provide the best and excellent service to the community. Apart from the need for procedures for providing product credit and interest rates, this is also a reason why people choose product credit at Pegadaian. However, providing credit is very risky for companies because not all credit disbursed is in a smooth condition where credit problems often occur or the time span for credit repayment creates a very large risk which may be borne by the company due to the uncertainty of repayment of the debtor's loan.

Problematic credit is a situation where the customer is unable to pay part or all of his obligations to the company as agreed, so the company also needs to supervise the provision of credit distributed by the company. Therefore, it is very necessary to have an adequate procedure as one of the necessary efforts and plays a very important role in assessing the feasibility of granting credit to a company.

One method that can be used to improve the quality of credit feasibility analysis is Decision Tree. Decision trees are a very popular and practical approach in machine learning to solve classification problems. The concept of a decision tree is basically to convert data into a decision tree and hierarchical rules (decision rules) which in subsequent developments can be simplified by eliminating unnecessary branches or rules while the attributes that accompany the data state are a parameter that is created as a criterion in forming the tree. One of the attributes is an attribute that states the data completion per data item which is called a classification or class. Attributes have values called instances. For example, the income attribute has instances in the form of low, medium and high (Tahir, 2019).

By using decision trees, Pegadaian CP Rantepao can systematically identify patterns in historical data that can be used to predict the feasibility of providing credit to customers. This process begins by collecting customer data, such as age, employment status, income, collateral value, and so on. The data is then processed through a decision tree algorithm to produce a model that can provide a decision whether the customer is worthy of receiving credit or not.

Overall, implementing decision trees in the credit worthiness analysis process at Pegadaian CP Rantepao can increase efficiency, reduce risk, and provide more appropriate decisions in granting credit to customers. This can ultimately support the more sustainable and profitable growth of the CP Rantepao Pawnshop business.

LITERATURE REVIEW

Financial Services

Financial services is a term used to refer to services provided by the financial industry. Financial services are used to refer to organizations that handle fund management, investment banks, insurance companies, credit card companies, consumer finance companies and securities are examples of companies in this industry that provide various services related to money and investment (Liyas, 2022:14).

Financial services themselves are supervised by the Financial Services Authority

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

(OJK). Where OJK has authority and supervision over financial institutions. OJK carries out regulatory and supervisory duties over: 1) financial services activities in the banking sector; 2) financial services activities in the capital markets sector; and 3) financial services activities in the insurance sector, pension funds, financial institutions, and. other financial service institutions (Sari, 2018). OJK, in the context of consumer protection in the financial services sector, has issued POJK Consumer Protection and POJK LAPS. POJK Consumer Protection and POJK LAPS regulate that the resolution of consumer disputes in the financial services sector in the first stage is through a consumer service and complaints mechanism provided by business actors in the financial services sector (Suwandono, 2016).

Credit

The word credit comes from the Latin creditus which is the past participle of the word credere which means to trust or faith. The word trust means trust. The meaning of trust is that he believes in the credit recipient that the credit he disbursed will definitely be returned according to the agreement. Meanwhile, for the recipient of the credit, it is an acceptance of trust so they have an obligation to pay according to the time period (Wahyuni, 2017). According to Law. No. 10 of 1998, the definition of credit is a provision of money or bills that can be equated with it, based on an agreement or loan agreement between the bank and another party which requires the borrower to pay off the debt after a certain period of time with interest.

Credit Feasibility Analysis

Credit feasibility analysis is a process that can be carried out by creditors in order to assess a credit application submitted by a prospective debtor (Sujarweni, 2020). Credit analysis is useful for considering consumer suitability. To consider a customer's suitability, creditors can carry out 5C (Character, Capacity, Capital, Condition, Collateral). Apart from the 5C analysis, creditors can also apply 7P analysis (Personality, Purpose, Party, Payment, Prospect, Profitability Protection) (FS Rahayu et al., 2021). And finally, creditors can analyze using 6A (Legal Aspect Analysis, Marketing Aspect Analysis, Technical Aspect Analysis, Management Aspect Analysis, Financial Aspect Analysis, Socio-Economic Aspect Analysis).

Data Mining

Data mining is the search for trends or patterns that will be searched for in large databases for future decision making (Rita, 2021). The data mining process consists of data collection, data extraction, data analysis, and data statistics. It is also commonly known as knowledge discovery, knowledge extraction, data/pattern analysis, information harvesting, and others (Arhami & Nasri, 2020).

Decision Tree

Decision Trees are the most potential way to determine rules in Data Mining classification. The level of this technique is higher than artificial neural networks, multivariate statistical methods such as being able to analyze data quickly, have high presence and are easy to use to build a model. The basic concept of this decision tree is to convert data into a decision tree with rules (Yusuf et al., 2021). The selected attributes will produce a partition with more uniform data and can produce a simple decision tree

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

with a small number of repetitions. A decision tree consists of a set of rules that aim to divide a heterogeneous population into smaller and more homogeneous ones taking into account the objective variables.

The process in a Decision Tree is changing the form of data (table) into a tree model, changing the tree model into a rule, and simplifying the rule. There are several algorithms that can be used to form a Decision Tree such as ID3, CART, and the C 4.5 algorithm. The C 4.5 algorithm is an algorithm used to build a decision tree as mentioned previously.

RESEARCH METHODS

Population and Samples

The population used in this research is customer data registered in Pegadaian CP Rantepao in 2023 as many as 413 customers and the sample used is 100 customer data in 2023 which can be provided by Pegadaian CP Rantepao.

Operational definition and measurement of variables

The variables and operational definitions of this research are as follows:

Table 1. Operational Definitions and Indicators

No	Variable	Operational Definitions	Indicators
1	decision tree method	Decision tree or decision tree is changing data into a decision tree with rules. The selected attributes will produce a partition with more uniform data and can produce a simple decision tree with a small number of repetitions.	a) Gains $Gain(S,A) = \text{Entropy}(S) - \sum_{i=1}^{n} Entropy(S,i)$ b) Entropy $Entropy(S) = \sum_{i-1}^{n} -Pi * \log_2 Pi$

RESULTS AND DISCUSSION

In this research, there are several stages carried out in managing data, the following stages are as follows:

1. **Collect registered data at Pegadaian CP Rantepao**

   the variables collected are in the form of information and information obtained regarding gender, loan time, collateral, product type, installments, credit date and loan details.

2. **Data Pre-Processing**

   At this stage, data pre-processing is carried out where some data is deleted which

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

is not relevant to future testing, such as deleting the credit date.

3. Data Sharing

Before testing, the dataset is first divided: separating the data into two sets of training data and testing data with the proportion used, namely 70% for training and 30% for testing.

4. Application of the Decision Tree Algorithm

The application of the algorithm in this research uses the C4.5 algorithm in which the entropy value and gain value will be calculated to find nodes from the root of the decision tree or an overview of the results of the decision tree. Determining the entropy value uses the following formula:

$$Entropy(S) = \sum_{i-1}^{n} -Pi * \log_2 Pi$$

Information :
S: Case Set
n : Number of S Partitions
Pi: Number of cases in the ith partition

After calculating the entropy value, the next step is to calculate the gain value for each customer data attribute using the formula:

$$Gain(S,A) = Entropy(S) - \sum_{i=1}^{n} Entropy\,(S,i)$$

information :
S: Case Set
A: Features
n: Number of S partitions
pi: Proportion of Si to S

After calculating the gain value of each attribute. So the following table displays the calculations above, namely as follows:

Table 2. Entropy and Gain Calculation Results

Attributes		Amount	Fluent	Congested	Entropy	Gains
Total		100	65	35	0.934068	
Gender	Woman	81	51	30	0.950956	0.005814
	Man	19	14	5	0.831474	
Borrowed time	Short term	6	3	3	1	0.019544
	Medium term	86	55	31	0.943069	
	Long term	8	7	1	0.543564	
Guarantee	Vehicle Registration Certificate (BPKB)	31	23	8	0.823812	0.088167
	Motorcycle BPKB	37	29	8	0.753198	

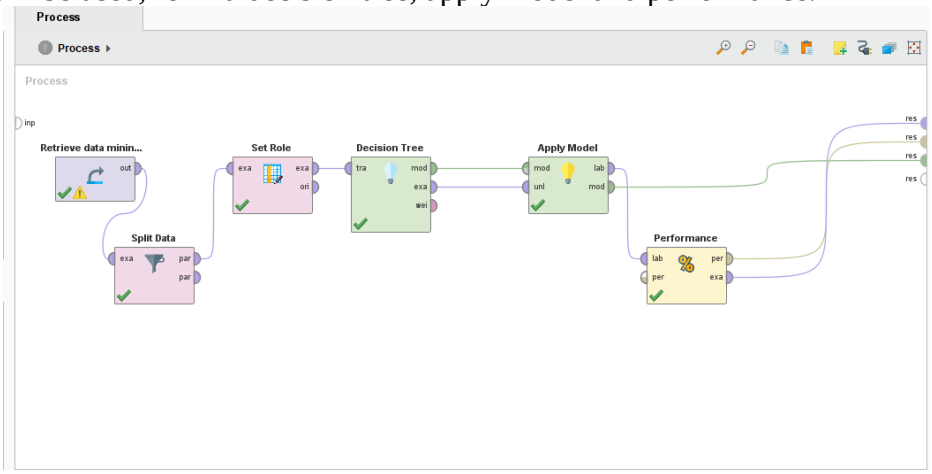
FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

	Without guarantee	32	13	19		
Types of products	Pawnshop Coupons	31	23	8	0.823812	0.096429
	Arrum Express Loan	27	10	17	0.950956	
	Ultra Micro Creations	34	27	7	0.733538	
	Multi Purpose Creation	3	2	1	0.918296	
	Trust	5	3	2	0.970951	
Installments	Low	49	31	18	0.948613	0.006326152
	Currently	35	22	13	0.951763	
	Tall	16	12	4	0.811278	

Source: data is processing, 2025

5. Model testing

After calculating the entropy and gain values, the next stage is to carry out tests to test the accuracy of the model. At this stage, connect all the necessary operators starting from the Excel pawn shop data, split data, divide the data, set role, select all the attributes that will be used, form a decision tree, apply model and performance.

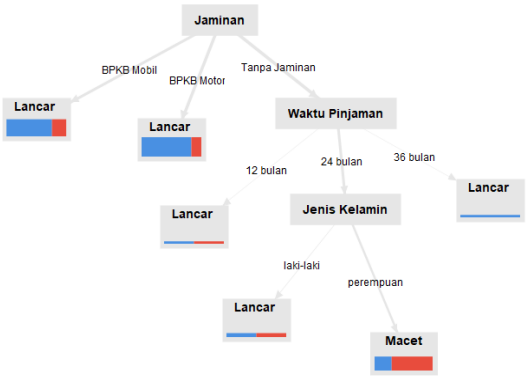


Source: Results of RapidMiner data processing, 2025

6. Visualization of Results

Visualization of results is depicting a decision tree to facilitate understanding of how decisions are made. Whether the customer who wants to apply for a loan is eligible or not. From the decision tree, it can be seen that there are several attributes that influence whether a customer can be given a loan or not. In the picture below you can see that there are 3 attributes that can be predicted, namely collateral, loan time and gender.

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X



Source: Results of RapidMiner data processing, 2025

7. Interpretation and Analysis of Results

In the decision tree model above, it can be seen that the factors that influence whether or not a customer is eligible for credit can be seen from the type of collateral, loan term and gender. These three attributes are the most important and necessary in assessing whether a customer deserves credit or not. It is easier for pawnshops to consider the three attributes above before providing credit to customers.

8. Model validation

At this stage, a model validation test is carried out to see whether the model used has good accuracy or not. To calculate this accuracy, a confusion matrix is used in the form of a table, where the confusion matrix describes the performance of the classification model on a series of test data whose actual values can be known.

Table View Plot View

accuracy: 75.71%

	true Lancar	true Macet	class precision
pred. Lancar	41	12	77.36%
pred. Macet	5	12	70.59%
class recall	89.13%	50.00%	

Source: Results of RapidMiner data processing, 2025

The results of testing the model using a decision tree using data mining and the confusion matrix method with 100 customer data processed, the resulting model shows an accuracy of 75.71%, which means the model used is quite good. The following is a manual calculation of the confusion matrix to retest whether the accuracy value from using data mining really has an accuracy of 75.71%, the following is the manual

FAKULTAS EKONOMI
UNIVERSITAS ISLAM LAMONGAN
JURNAL EKBIS
ANALISIS, PREDIKSI, DAN INFORMASI
https://jurnalekonomi.unisla.ac.id
E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

calculation:

Accuracy = $Accuracy = \frac{41+12}{41+12+12+5} X\ 100$

$= 75.71\%$

Based on the manual calculation results above, it is proven to have the same accuracy both using data mining and using manual testing, namely 75.71%, which is stated as a fairly good model classification.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the research that has been carried out, it can be concluded that the credit feasibility analysis using the case study decision tree method at Pegadaian CP Rantepao, is able to predict customer data quite well into the current and non-performing categories. The 5 attributes used are gender, loan time, product type, collateral and installments. Based on testing using a confusion matrix to determine the accuracy value of the model used, it produces an accuracy value of 75.71%, which means the model used is quite good.

For future researchers, it is hoped that they will use data with a greater number and use of attributes to determine eligibility more accurately in forming a decision tree model and the resulting accuracy will be greater. They can use other methods to see comparisons of data processing results from other methods and algorithms in predicting the feasibility of granting credit.

REFERENCE

Adrianto. (2019). Credit Management Theory and Concept for Commercial Banks. IKAPI

Ahadiyah, O. :, & Kholifah, N. (2012). Classification Analysis of Credit Customers X Cooperatives Using Decision Tree C4.5 and Naïve Bayes. 1–8.

Arifah, H., Fauzan Meidy, MH, Surgawati, I., Rusliana, N., Nasution, FZ, Siliwangi, U., Tasikmalaya, K., & Barat, J. (2023). The Role of the Financial Services Industry in Indonesia's Economic Development. Journal of Economics, 4(1), 60–61. http://jurnal.unsil.ac.id/index.php/welfare

Arnomo, SA, Fajrin, AA, Siyamto, Y., & Sadikin, SFN (2023). Evaluation of Decision Tree Model on Credit Eligibility Decision. Journal of Technology Design and Analysis, 2(2), 200–206. https://doi.org/10.58520/jddat.v2i2.39

BaRiansori, O., & Wahyuningsih, SD (2018). Analysis of the 5C Principle Assessment in Credit Granting to Non-Performing Loans to Assess the Health Level of Banks at PT BPR Harta Swadiri Pandaan. Applied Management Research

E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

(PENATARAN), 3(1), 54–63.

Chosyali, A., & Sartono, T. (2019). Optimizing Credit Quality Improvement in the Framework of Overcoming Problematic Credit. Law Reform: Journal of Legal Reform, 15(1), 98–112. https://doi.org/10.14710/lr.v15i1.23357

Cynthia, EP, & Ismanto, E. (2018). Decision Tree Method Algorithm C.45 In Classifying Sales Data of Fast Food Outlet Business. Jurasik (Journal of Information Systems Research and Informatics Engineering), 3(July), 1. https://doi.org/10.30645/jurasik.v3i0.60

Lestari, NP, Jihadi, M., & Fahruddin, A. (2018). Analysis of the Feasibility of Providing SME Credit at BPR Artha Panggung Perkasa in Trenggalek. JBMP (Journal of Business, Management and Banking), 4(2), 136–153. https://doi.org/10.21070/jbmp.v4i2.1987

Mardi, Y. (2017). Data Mining: Classification Using C4.5 Algorithm. Edik Informatika, 2(2), 213–219. https://doi.org/10.22202/ei.2016.v2i2.1465

Rahayu, FS, Samsiah, S., & Hinggo, HT (2021). Analysis of 5C and 7P Principles Analysis of 5C and 7P Principles in Credit Provision to Minimize Non-Performing Loans and Increase Profitability: Case Study on Swamitra Pekanbaru. Proceedings of the National Seminar on Economics, Business & Accounting, 1(2), 20–27.

Rahayu, WI, Prianto, C., & Novia, EA (2021). Comparison of K-Means and Naive Bayes Algorithms to Predict Hospital Bill Payment Priorities Based on Level of Importance at PT. Pertamina (Persero). Journal of Informatics Engineering, 13(2), 1–8.

Rita Retnosari. (2021). Analysis of the feasibility of micro-business credit running in banking using the naive bayes method. PROSISKO: Journal of Research Development and Observation of Computer Systems, 8(1), 53–59. https://doi.org/10.30656/prosisko.v8i1.2848

Sari, AA (2018). The Role of the Financial Services Authority in Supervising Financial Services in Indonesia. SUPREMASI Journal of Law, 1(1), 23–33. https://doi.org/10.36441/supremasi.v1i1.154

Suwandono, A. (2016). Implications of the Implementation of the Financial Services Authority Law on the Protection of Financial Services Consumers Linked to the Consumer Protection Law. Perspective, 21(1), 1. https://doi.org/10.30742/perspektif.v21i1.175

E-ISNN : 2621- 4210
P-ISNN : 1979- 746X

Tahir, MA (2019). Design of Data Mining Application Using Decision Tree Method for Credit Granting Analysis at Bri LalabataRilau Unit. Scientific Journal of Information Systems and Informatics Engineering, 2(1), 1–10.

Tangkuman, S., Sabijono, H., & Jacob, R. (2014). Analysis of Company Financial Report Performance and Collateral Assessment in the Decision to Grant Working Capital Credit at PT Bank Rakyat Indonesia (Persero) Tbk Manado Branch. Journal of Economic, Management, Business and Accounting Research, 2(3), 1089–1100.

Wahyuni, N. (2017). Application of the 5C Principle in Credit Provision as Bank Protection. Lex Journal: Legal & Justice Studies, 1(1). https://doi.org/10.25139/lex.v1i1.236

Wahyuningsih, S., & Retno Utari, D. (2018). Comparison of K-Nearest Neighbor, Naïve Bayes and Decision Tree Methods for Predicting Credit Eligibility. 2018 National Conference on Information Systems STMIK Atma Luhur Pangkalpinang, 8–9. http://jurnal.atmaluhur.ac.id/index.php/knsi2018/article/view/424

Widayati, R., & Herman, U. (2019). Settlement of Problematic Credit at PT. Bank Perkreditan Rakyat (BPR) Nagari Kasang. OSF Preprint, 1–14.

Wulandari, D., Lutfiyana, N., & Sumarno, H. (2019). Decision Tree C4.5 Algorithm Method for Customer Creditworthiness Analysis at Bsm Kcp Kemang Pratama. EVOLUTION: Journal of Science and Management, 7(2), 36–42. https://doi.org/10.31294/evolusi.v7i2.6757

Yusuf, D., Bahri, S., & Larasati, A. (2021). Decision Tree Using C4.5 Algorithm for Credit Feasibility Analysis. Journal of Information Technology (JUTECH), 2(2), 97–106. https://doi.org/10.32546/jutech.v2i2.1660

Zamrodah, Y. (2016). Understanding Pawnshops. Banking, 15(2), 1–23.