



# Decision Support System for Credit Application Eligibility Using the Naïve Bayes Method

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## ARTICLE INFO

### Article history:

Received : February, 2025

Revised : April, 2025

Accepted : Juni, 2025

Available online : July, 2025

E-ISSN: xxxx-xxxx

P-ISSN: 3025-6615

## ABSTRACT

This study aims to build a decision support system for the feasibility of applying for credit at Bank Sumsel Babel Pagar Alam Branch using the Naïve Bayes method. This research is motivated by the high public interest in credit loans, so the submission of credit loan files that make many account officers spend a lot of time looking at the condition of prospective debtors to the field which does not necessarily meet current customer predictions. So many customers also complain because there has been no confirmation from the bank regarding the submission of their credit files. Meanwhile, in addition to surveys to the field, account officers must also prepare disbursement files for debtors who are eligible to receive credit loans. So it is considered necessary to have a system that will assist account officers in improving credit loan services with a decision support system (SPK). In this study, we will use the Naïve Bayes algorithm in predicting the eligibility of prospective debtors. This research will use the Rapid Application Development (RAD) system development method. Testing using the blackbox testing method. The result of this Skripsi is the design of a decision support system for the feasibility of applying for credit at Bank Sumsel Babel Pagar Alam Branch using the Naïve Bayes method.

**Keywords:** Decision Support System, Customer, Naïve Bayes

## 1. Instoduction

The banking and financial industry is a vital sector in the economy that plays an important role in supporting economic growth. One crucial aspect of banking operations is the credit application process. This process involves credit risk evaluation, where banks must ensure that borrowers have the ability and credibility to repay the loan (Asmira, 2019). Credit risk management has become increasingly complex due to various influencing factors, such as economic condition variability, changes in banking policies, and individual factors that can affect a person's ability to repay the loan. Therefore, the use of technology and data analysis methods to support credit decisions has become an urgent need. In the context of decision making, especially in the financial sector such as credit applications, the need for decision support systems is becoming more urgent (Desda, 2019). The use of technology to support the decision-making process can provide significant benefits in improving efficiency, accuracy, and precision in risk assessment. One method that has proven effective in various applications is the Naive Bayes method (Indriani & Tanjung, 2018).

A Decision Support System (DSS) is a system designed to assist decision-making within an organization or specific context. The main purpose of a DSS is to provide relevant information and systematic analysis to decision-makers, enabling them to make better and more informed decisions (Warseno et al., 2021). A DSS is supported by data and information, meaning that the system collects, manages, and analyzes data to present relevant information to decision-makers. Decision Support Systems are often interactive, allowing users to interact with the data and conduct analysis according to their needs. Flexibility is one of the key characteristics (Mubarok et al., 2019). The Naive Bayes method is an approach

in statistics and machine learning based on Bayes' Theorem of Probability. The main goal of this method is to perform classification or prediction based on the probability calculation of an event given previous related events. Despite its simplicity, the Naive Bayes method has proven effective in various applications, especially in the context of classification and decision support systems (Indriani & Tanjung, 2018).

Based on observations and interviews at PT. Bank Pembangunan Daerah Sumatera Selatan dan Bangka Belitung (BPD Sumsel Babel), the problem identified is the increasing number of prospective customers applying for credit with varying economic conditions, demanding careful decision-making in granting credit. This ensures that the decisions made are the best for both the bank and the credit applicants. The credit analysis process at BPD Sumsel Babel is still conducted manually, by checking printed data one by one. This allows for the possibility of errors during analysis or accepting applicants who do not meet the bank's criteria. Therefore, an effective method is needed as a decision support system for credit granting to customers at BPD Sumsel Babel. This system is expected to facilitate and assist the bank in providing alternative credit solutions, reducing the risk of errors due to fraud or mistakes made by the bank. Thus, a computer-based decision support system is needed to quickly provide information related to applicant criteria.

## 2. Research Methodology

Rapid Application Development (RAD) is an incremental software development process model particularly suited for short development timeframes. The RAD model is an adaptation of the high-speed version of the waterfall model, utilizing the waterfall model for developing each software component (Rosa A.S, 2018). The following are the development phases in the RAD methodology:

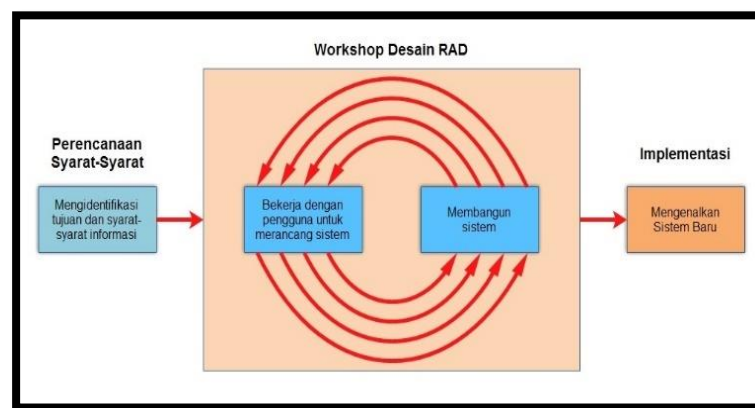


Figure 1. Metode

### 1. Requirements Planning (Perencanaan Persyaratan)

To identify the needs, limitations, and objectives of the system to be developed, data collection from stakeholders is performed. Activities include direct observation and data collection from relevant books and journals. The results obtained are the procedures for data collection and the system requirements specifications.

### 2. RAD Design Workshop

To design all activities within the overall system architecture, involving the identification and description of fundamental software system abstractions and their relationships. Activities include identifying actors, analyzing processes and system performance, identifying object structures and their relationships, modeling object interactions and behavior, and designing the interface. The results obtained are software modeling, database design, and interface design.

### 3. Implementation

To implement the method and program according to the system requirements. Activities include determining the implementation of the Database, Programming, Interface, and Testing. The results obtained are a Decision Support System for Credit Application Eligibility Using the Naïve Bayes Method at Bank Sumsel Babel, Pagar Alam Branch.

### 3. Result and Discussion

This research has resulted in a decision support system (DSS) that can help the bank in determining the eligibility of customers applying for credit. This DSS has been tested using the black box testing method, and the testing results conducted by the account officer showed that all steps could be executed smoothly without any issues during testing. These results indicate that this DSS can be an effective tool for the bank to assist them in the credit decision-making process and improve the efficiency of the credit decision-making process at the bank. To run the system online:

1. Open a browser.
2. Click on [http://SPK\\_SumselBabel\\_PGA.freehost.com](http://SPK_SumselBabel_PGA.freehost.com).

To run the system offline:

1. Open XAMPP, activate Apache and MySQL.
2. Type `localhost/SPK_Sumselbabel`.

A The development of this system is based on the system design created in the previous chapter. The results of the built system are as follows:

#### 1. Home Page

The home page or dashboard is the first page that users see after accessing the system. This page has several important functions designed to provide quick and concise access to information and the main features available in the system. Below is an image of the home page:

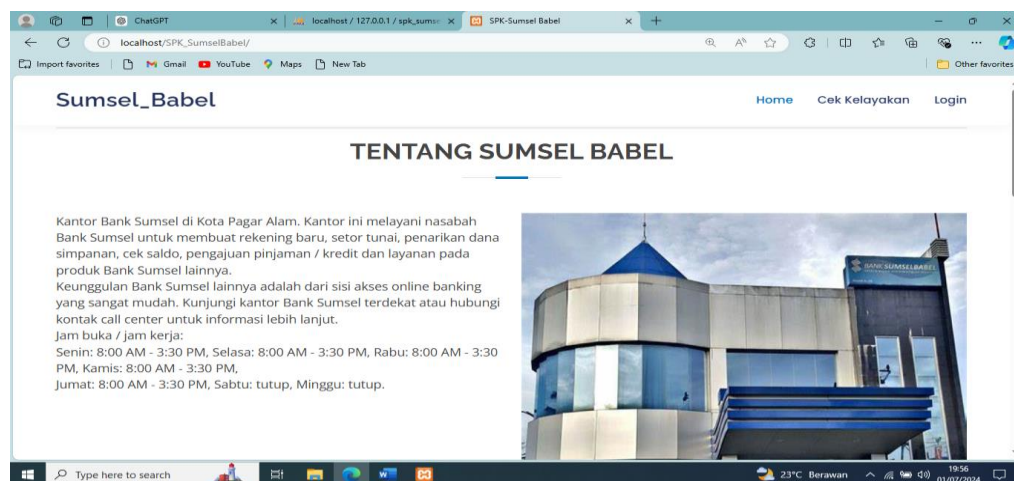
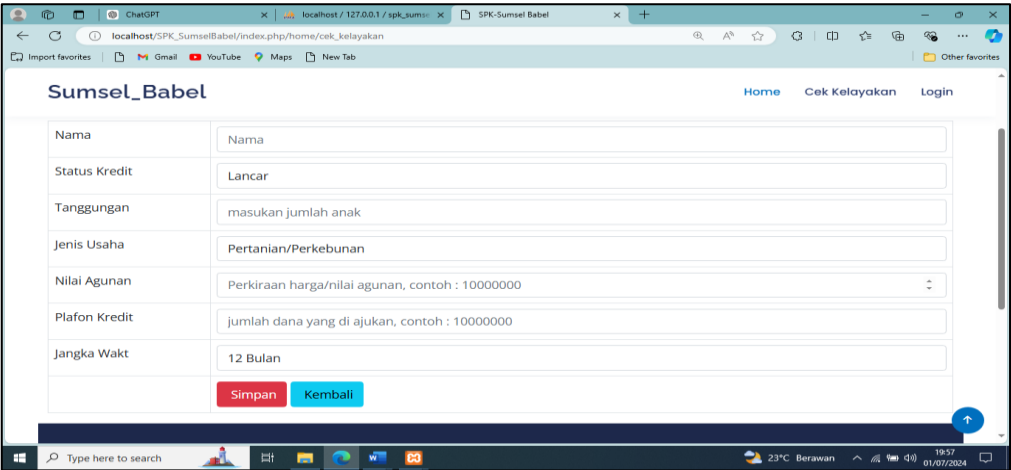


Figure 3. Home Page

#### 2. User Eligibility Check Page

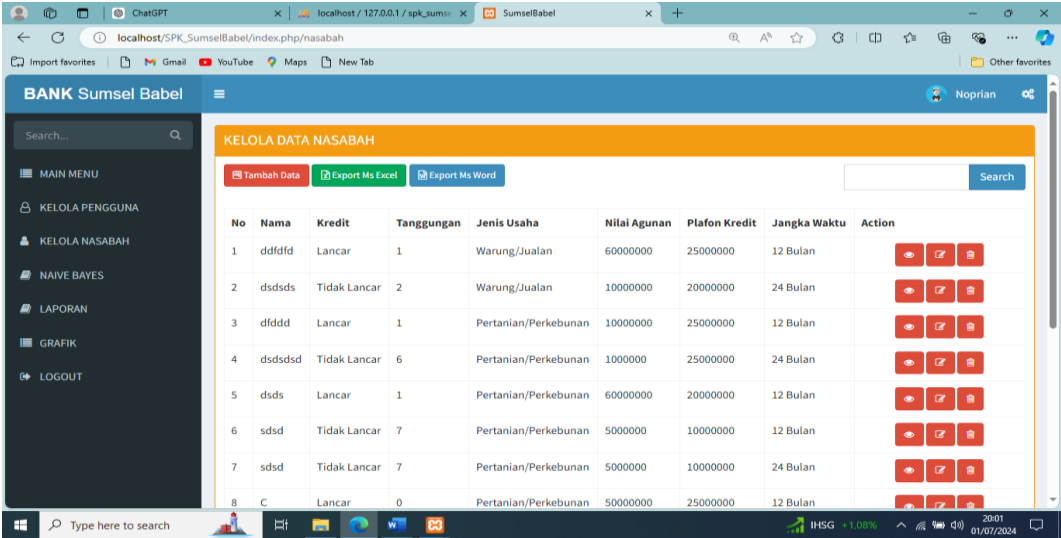
The "User Eligibility Check" page allows users to check the credit eligibility of customers based on the data entered. This page plays a crucial role in the decision support system by providing quick and accurate evaluation results. It provides a form for users to input customer data required for credit eligibility analysis. The data entered includes information such as name, credit status, dependents, type of business, collateral value, credit limit, and loan term.



Gambar 4. User Eligibility Check Page

3. Customer Management Page

The "Customer Management" page allows the admin to manage customer data within the system. This page has several important functions that help the admin organize, monitor, and maintain customer data easily and efficiently. Below is an image of this page.



Gambar 6. Customer Management Page

4. Naive Bayes Page

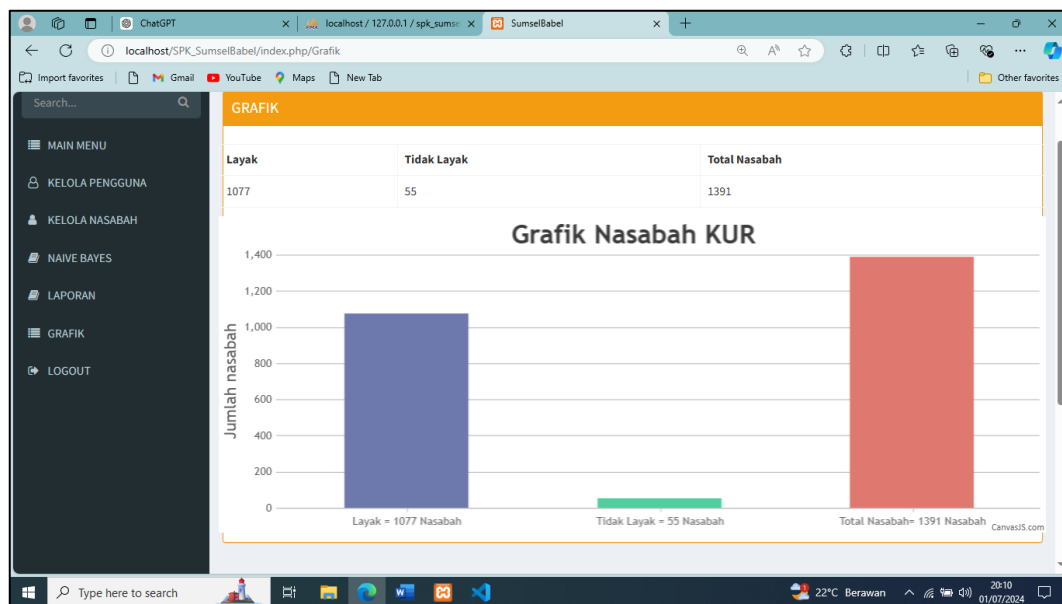
The "Naive Bayes Process" page has a specific function for evaluating or predicting customer credit eligibility using the Naive Bayes algorithm. Below is an image of this page:

No	Nama	Kredit	Tanggungan	Jenis Usaha	Nilai Agunan	Plafon Kredit	Jangka Waktu	Keterangan	Action
1	ddfd	Lancar	1	Warung/Jualan	60000000	25000000	12 Bulan	Layak $P(X Layak)=0.9573989019$ , $P(X Tidak)=0.586051159$	[Edit] [Delete] [Add]
2	dsds	Tidak Lancar	2	Warung/Jualan	10000000	20000000	24 Bulan	Tidak Layak $P(X Layak)=0.6769903618$ , $P(X Tidak)=1.854707871$	[Edit] [Delete] [Add]
3	dfdd	Lancar	1	Pertanian/Perkebunan	10000000	25000000	12 Bulan	Tidak Layak $P(X Layak)=0.6769903618$ , $P(X Tidak)=1.854707871$	[Edit] [Delete] [Add]
4	dsdsd	Tidak Lancar	6	Pertanian/Perkebunan	1000000	25000000	24 Bulan	Tidak Layak $0.6769903618$ , $1.854707871$ , $-1.854707871$	[Edit] [Delete] [Add]

Gambar 7. Naive Bayes Page

## 5. Graph Page

The "Management Results Graph" page functions to display information that has been analyzed or processed in the system in the form of graphs or other visualizations. Its main purpose is to provide a clear and easily understandable overview of the results produced by the system. This page presents data in the form of graphs, charts, or other visualizations that help the admin to see trends, patterns, or comparisons of the results generated by the system. Below is an image of this page:



Gambar 8. Graph Page

## 4. Conclusion

Based on the research and development results of the decision support system for determining customer eligibility using the Naive Bayes algorithm, several conclusions can be drawn as follows:

1. This research successfully developed a Decision Support System for Credit Application Eligibility Using the Naïve Bayes Method.
2. The testing results show that the system can run smoothly without any issues or errors.
3. The developed system can identify customer eligibility from the customer data entered into the system, providing eligible and ineligible results. This can facilitate the work of account officers in analyzing customer data eligibility.



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