

## **ABSTRACT**

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### **LOAN DEFAULT FORECASTING USING MACHINE LEARNING ALGORITHM IN INDONESIAN REGIONAL BANK**

(XII + 60 pages; 3 figures; 6 tables)

The banking industry in Indonesia plays an important role in the national economy through the provision of effective credit. However, regional banks often face challenges in managing problematic credit risks or loan defaults. This study aims to improve the prediction of loan payment defaults in regional banks to prevent financial losses and increase operational efficiency. This study proposes the implementation and evaluation of Machine Learning algorithms to enhance default prediction accuracy, offering a more efficient solution compared to conventional methods. The data used includes historical customer information from regional development banks in Indonesia for the period from July 2021 to July 2023, obtained from customer data, nominative data, and transaction data. The algorithms used are Decision Tree, Random Forest, Gradient Boosting, and Naïve Bayes. The research process includes data collection, pre-processing, data splitting for training and testing, model development, and model performance evaluation using RapidMiner as the main platform. The evaluation results show that Naïve Bayes provides the best performance with an accuracy of 99.96%, precision of 98.45%, recall of 99.63%, and a perfect AUC score of 1.000. This study also identifies those attributes those such as address (ADDR), product type (KD\_PRODUK), age (UMUR), and gender description (SEX\_DESC) have an influence on the model, although not significant through model sensitivity testing. This indicates the stability of the Naïve Bayes model against variations in input data. Based on these findings, the Naïve Bayes algorithm is recommended to be adopted by regional banks in the prediction system to improve credit risk management. The application of Machine Learning, especially the Naïve Bayes algorithm, can provide significant contributions to improving credit policies and risk management strategies in regional banks in Indonesia.

**Keywords:** Loan default prediction, Machine Learning, Naïve Bayes algorithm, Credit risk management, Indonesia Regional Bank.

**Reference:** 96 (1993 - 2023)

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### **LOAN DEFAULT FORECASTING USING MACHINE LEARNING ALGORITHM IN INDONESIAN REGIONAL BANK**

(XII + 60 halaman; 3 gambar; 6 tabel)

Industri perbankan di Indonesia memainkan peran penting dalam perekonomian nasional melalui penyediaan kredit yang efektif. Namun bank-bank daerah sering menghadapi tantangan dalam mengelola risiko kredit bermasalah atau loan default. Penelitian ini bertujuan untuk meningkatkan prediksi kegagalan pembayaran kredit di bank daerah untuk mencegah kerugian finansial dan meningkatkan efisiensi operasional. Penelitian ini mengusulkan penerapan dan evaluasi algoritma *Machine Learning* untuk meningkatkan akurasi prediksi default, menawarkan solusi yang lebih efisien dibandingkan metode konvensional. Data yang digunakan mencakup informasi historis nasabah dari bank pembangunan daerah di Indonesia selama periode Juli 2021 hingga Juli 2023, yang diperoleh dari data Nasabah, data Nominatif, dan data Transaksi. Algoritma yang digunakan adalah **Decision Tree, Random Forest, Gradient Boosting, dan Naïve Bayes**. Proses penelitian meliputi pengumpulan data, pre-processing, pembagian data untuk training dan testing, pengembangan model, dan evaluasi kinerja model menggunakan RapidMiner sebagai platform utama. Hasil evaluasi menunjukkan bahwa Naïve Bayes memberikan performa terbaik dengan akurasi 99.96%, precision 98.45%, dan recall 99.63%, serta nilai AUC sempurna 1.000. Penelitian ini juga mengidentifikasi bahwa atribut seperti alamat (ADDR), jenis produk (KD\_PRODUK), umur (UMUR), dan deskripsi jenis kelamin (SEX\_DESC) memiliki pengaruh terhadap model meskipun tidak signifikan melalui uji sensitivitas model. Hal ini menunjukkan stabilitas model Naïve Bayes terhadap variasi data input. Berdasarkan temuan ini, algoritma Naïve Bayes direkomendasikan untuk diadopsi oleh bank daerah dalam sistem prediksi untuk memperbaiki pengelolaan risiko kredit. Penerapan Machine Learning, khususnya algoritma Naïve Bayes dapat memberikan kontribusi signifikan dalam peningkatan kebijakan kredit dan strategi manajemen risiko di bank daerah Indonesia.

Kata Kunci: Prediksi *loan default*, *Machine Learning*, Algoritma Naïve Bayes, Manajemen risiko kredit, Bank daerah Indonesia.

Referensi: 96 (1993 – 2023)