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Prediction of Credit Card Payment Default using AI

**Project Group 5**

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# 1. Project Overview

# This project aims to predict whether a customer will default on their credit card payment in the upcoming month using historical data and AI techniques.

# 2. Dataset Description

# Source: Provided credit\_card\_default\_raw.csv Size: 30,000 records with 24 features Key Variables: - Demographics: Age, Gender, Education, Marital Status - Financials: Limit Balance, Payment History, Bill Amounts, Pay Amounts - Target: default.payment.next.month (binary: 0 = No default, 1 = Default)

# 3. Data Preparation & Cleaning

# Missing values handled Outliers visualized and mitigated Variables transformed (e.g., grouped age bins, one-hot encoding for models)

# 4. Exploratory Data Analysis (EDA)

# Distributions: Age, Limit Balance, Education, etc. Insights: - Younger age groups showed higher default rates. - Higher limit balances were associated with lower default probabilities. - Past payment behavior is a strong indicator of future default.

# Age Distribution

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# Limit Bal Distribution

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# Correlation Matrix

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# Target Value Distribution

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# 5. Inferential Techniques

# Logistic Regression: Used for estimating probabilities of default. - Significant predictors: PAY\_0, PAY\_2, LIMIT\_BAL (p-values < 0.05) - Odds Interpretation: Delay in payment (PAY\_X) significantly increases odds of default. Random Forest: - Used for both prediction and feature importance inference. - Top predictors: PAY\_0, LIMIT\_BAL, BILL\_AMT1, AGE

# 6. Model Evaluation

# Logistic Regression Accuracy: ~81% Random Forest Accuracy: ~83% ROC-AUC: Random Forest slightly better (AUC ≈ 0.85) Conclusion: AI models can reliably predict credit card default risk, with payment history being the strongest signal.

# 7. Recommendations

# Financial institutions should integrate predictive analytics in credit risk assessment. Periodic model retraining is necessary to reflect changing financial behavior.