



AI-POWERED CREDIT CARD DELINQUENCY PREDICTION

DATA OVERVIEW

84%

Non-Delinquent Customers

16%

Delinquent Accounts

500

Customer Records Analyzed

PROJECT OVERVIEW

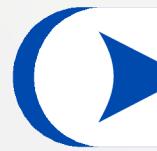
Primary Objective: Reduce Credit Card Delinquency Rates



Role: AI Transformation Consultant at Tata iQ



Client: Geldium Finance - Financial Services Company



Challenge: High credit card delinquency rates impacting profitability



Solution: Data-driven predictive modeling for risk assessment



Goal: Enable proactive intervention strategies



PROJECT WORKFLOW

1

EDA with GenAI

Exploratory Data Analysis
using AI tools

2

EDA with GenAI

Exploratory Data Analysis
using AI tools

3

EDA with GenAI

Exploratory Data Analysis
using AI tools

4

EDA with GenAI

Exploratory Data Analysis
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Key Focus: Ensuring ethical, explainable, and effective AI solutions

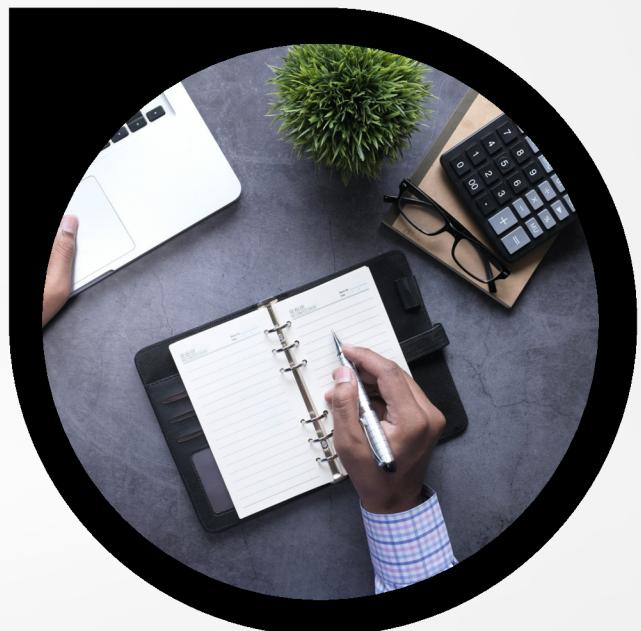
EXPLORATORY DATA ANALYSIS KEY FINDINGS

Data Quality Assessment

- ▶ **Missing Values:** Income (7.8%), Loan Balance (5.8%), Credit Score (0.4%)
- ▶ **Class Imbalance:** Severely imbalanced target variable (84% vs 16%)
- ▶ **Data Inconsistencies:** Employment status required standardization
- ▶ **Outliers:** Credit utilization values above 1.0 detected

Distribution Characteristics

- ▶ Income, Credit Utilization, and Loan Balance showed right-skewed distributions
- ▶ Temporal payment patterns identified across Month_1 to Month_6



TOP RISK INDICATORS FOR DELINQUENCY

Payment History

Missed payments & late payment trends

Credit Utilization

High utilization indicates financial strain

Credit Score

Lower scores correlate with higher risk



Debt-to-Income Ratio: Higher ratios suggest greater financial burden



Recent Payment Trends: Deteriorating patterns (Month_1 to Month_6)



Account Tenure: Relationship duration impacts risk assessment

Key Insight: Recent behavioral changes are stronger predictors than historical scores

DATA PREPROCESSING & QUALITY ENHANCEMENT

Missing Data Treatment Strategy

- ▶ **Credit Score:** Median imputation (minimal missing data)
- ▶ **Income & Loan Balance:** KNN or Regression imputation recommended
- ▶ **Gold Standard:** MICE (Multiple Imputation by Chained Equations)

Data Quality Improvements

- ▶ Standardized categorical variables (Employment Status)
- ▶ Addressed class imbalance using SMOTE techniques
- ▶ Feature engineering from temporal payment data
- ▶ Log transformation for skewed numerical features



PREDICTIVE MODELING APPROACHES

1

Decision Trees

Pros:

- High interpretability
- Clear risk segmentation
- Handles mixed data types

Cons:

- Prone to overfitting
- Limited complexity handling

PREDICTIVE MODELING APPROACHES

2

Logistic Regression

Pros:

- Probability estimation
- Easy interpretation
- Regulatory compliance

Cons:

- Linear assumptions
- Limited pattern detection

PREDICTIVE MODELING APPROACHES

3

Gradient Boosting

Pros:

- Superior accuracy
- Complex pattern detection
- Handles imbalanced data

Cons:

- Black box nature
- Requires more tuning

RECOMMENDED MODEL: GRADIENT BOOSTING MACHINE

Key Justifications

- Superior Predictive Power:** Captures complex non-linear relationships
- Imbalanced Data Handling:** Built-in techniques for class imbalance
- Feature Importance:** Identifies most influential risk factors
- Scalability:** Efficient processing of large datasets
- Business Impact:** Direct reduction in delinquency-related losses

Top 5 Input Features

- Missed Payments
- Credit Utilization
- Credit Score
- Debt-to-Income Ratio
- Loan Balance

MODEL EVALUATION & PERFORMANCE METRICS

F1 Score

Balances precision & recall for imbalanced data

AUC-ROC

Discriminative power across all thresholds

Precision

Accuracy of positive predictions

Recall

Coverage of actual delinquent cases

Fairness & Bias Assessment

- ▶ **Demographic Parity:** Equal prediction rates across groups
- ▶ **Equalized Odds:** Consistent performance across demographics
- ▶ **Disparate Impact Analysis:** Regulatory compliance checks

SMART BUSINESS RECOMMENDATION

Strategic Goal

Implement Gradient Boosting Machine delinquency prediction model by Q4 2025

Target: Reduce new delinquent account values by 10% within 6 months

Implementation Strategy

-  **Proactive Risk Assessment:** Real-time scoring of customer accounts
-  **Targeted Interventions:** Personalized financial counseling
-  **Dynamic Credit Terms:** Adaptive credit limits and payment plans
-  **Resource Optimization:** Prioritized collections efforts

Expected Outcomes

-  Enhanced profitability through loss reduction
-  Improved customer retention and satisfaction
-  Strengthened financial portfolio stability
-  Sustainable competitive advantage

ETHICAL AI & RESPONSIBLE IMPLEMENTATION IMPLEMENTATION

Fairness Risk Mitigation

Disparate Impact Prevention

- Re-weighting training data
- Threshold adjustment by group
- Regular fairness audits

Equalized Performance

- Consistent accuracy across demographics
- Equal opportunity constraints
- Performance monitoring

Explainability Framework

-  SHAP Analysis: Feature contribution breakdown
-  Model Transparency: Clear prediction justifications
-  Stakeholder Communication: Non-technical explanations



Future Success

Ready to drive continued growth through responsible AI innovation

Contact: shivendrachaurasia855@gmail.com

THANK YOU

VISIT US



+91-888-770-8900



shivendrachaurasia855@gmail.com