**Delinquency Risk Prediction Report**

**1. Summary of Predictive Insights**

**High-Risk Customer Segments:**

* **Missed Payments**: Customers with a history of late or missed payments are more likely to default again.
* **High Credit Utilization (>70%)**: Customers heavily using their available credit are at increased risk.
* **Low-Income & High Debt-to-Income Ratio**: This combination reduces repayment capacity and increases delinquency risk.

**Top Predictors of Delinquency:**

1. **Missed\_Payments** – Historical default behavior is the strongest predictor.
2. **Credit\_Utilization** – High usage reflects financial stress.
3. **Income** – Lower income levels correlate with increased delinquency.
4. **Debt\_to\_Income\_Ratio** – High ratios indicate repayment pressure.
5. **Account\_Tenure** – Shorter tenure may reflect instability or lack of credit history.

**Top 3 Risk Factors:**

* Missed Payments
* High Credit Utilization
* Low Income with High DTI

**2. Recommendation Framework**

**SMART Recommendation:**  
Geldium should launch a targeted outreach and financial counseling program for customers with **credit utilization above 75%** to reduce delinquency rates by **15% within 6 months**.

**Rationale:**  
This segment shows a high correlation with default risk. Proactive interventions such as repayment plans or educational nudges are low-cost and support long-term financial wellness, aligning with Geldium's responsible credit mission.

**3. Model Overview and Justification**

**Chosen Model:** Logistic Regression

* Logistic regression was selected for its interpretability, ease of implementation, and strong baseline performance for binary classification.
* It provides clear insight into how each input variable contributes to the risk prediction.

**Top Input Features:**

* Credit\_Utilization
* Missed\_Payments
* Income
* Debt\_to\_Income\_Ratio
* Account\_Tenure

**4. Evaluation Strategy**

**Key Metrics:**

* **Accuracy, Precision, Recall, F1 Score, AUC** – to measure overall performance.
* **Fairness Audits** – to check for disparities across groups (e.g., income, location).

**Interpretation:**

* High precision avoids unnecessary alerts for low-risk customers.
* High recall ensures most at-risk accounts are flagged.
* A balanced F1 score and AUC > 0.75 indicate strong class separation.

**5. Ethical and Responsible AI Considerations**

**Fairness Risks:**

* Bias against low-income or minority groups.
* Proxy bias from correlated non-sensitive fields (e.g., education or geography).

**Mitigation Strategies:**

* Fairness-aware modeling (e.g., group-based evaluation, re-weighting).
* Transparency in how features affect predictions.
* Explanations in plain language to customers and stakeholders.

**Responsible Use:**

* Regular monitoring and retraining.
* Human oversight for high-stakes decisions.
* Clearly defined escalation protocols when risk thresholds are met.

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