

LoanTap Personal Loan Underwriting Analysis

1. Context

LoanTap, a financial platform catering to millennials, seeks to revolutionize loan products by offering instant, flexible loans with attractive terms. Their data science team is building an underwriting layer to assess the creditworthiness of individuals applying for personal loans.

2. Problem Statement

Given an applicant's information, the model aims to:

- **Predict:** Whether a loan should be approved (creditworthiness).
- **Recommend:** Repayment terms based on the risk assessment.

3. Data

- **Source:** LoanTapData.csv
- **Features:**
 - Loan characteristics (amount, term, interest rate)
 - Borrower demographics (employment, income, homeownership)
 - Credit history (credit line age, number of accounts, public records)
 - Loan application details (purpose, title)
 - Debt-to-income ratio (dti)
 - Target variable: Loan status (approved/not approved)

4. Methodology

- **Exploratory Data Analysis:** Understand data structure, relationships between variables, and target variable distribution.
- **Feature Engineering:** Create new features (e.g., flags for high public records, mortgage accounts, bankruptcies) to improve model performance.
- **Data Cleaning:** Handle missing values and outliers.
- **Scaling:** Standardize data for better model training.
- **Modeling:** Train a Logistic Regression model to predict loan status.
- **Evaluation:** Assess performance using classification report, ROC AUC curve, and precision-recall curve.

5. Key Considerations

- **Balance Precision and Recall:**

- **Precision:** Minimize approving risky borrowers (false positives) but might reject good borrowers.
- **Recall:** Minimize rejecting good borrowers (false negatives) but increases risk of defaults.
- The model needs to be fine-tuned to strike a balance based on LoanTap's risk tolerance.

6. Recommendations

- **Refine Model:** Further refine the model to optimize the precision-recall tradeoff.
- **Additional Data Sources:** Consider incorporating data from credit bureaus for a more comprehensive risk assessment.
- **Model Monitoring:** Develop strategies to monitor and improve model performance over time.

7. Conclusion

This analysis demonstrates the feasibility of building a creditworthiness model for LoanTap's personal loan underwriting process. By leveraging data and machine learning, LoanTap can make informed loan approval decisions and manage risk effectively.