Final Report

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This project comprises two main parts: predicting financial risk and determining loan eligibility. It uses machine learning models to analyze various factors and predict outcomes, which are then integrated into a web application to provide real-time predictions.

Functionality: The application allows users to input their data and receive predictions on financial risk and loan eligibility.
Libraries Used: Streamlit for the web app, Pandas and NumPy for data handling, Matplotlib for visualization, and Pickle for loading models.

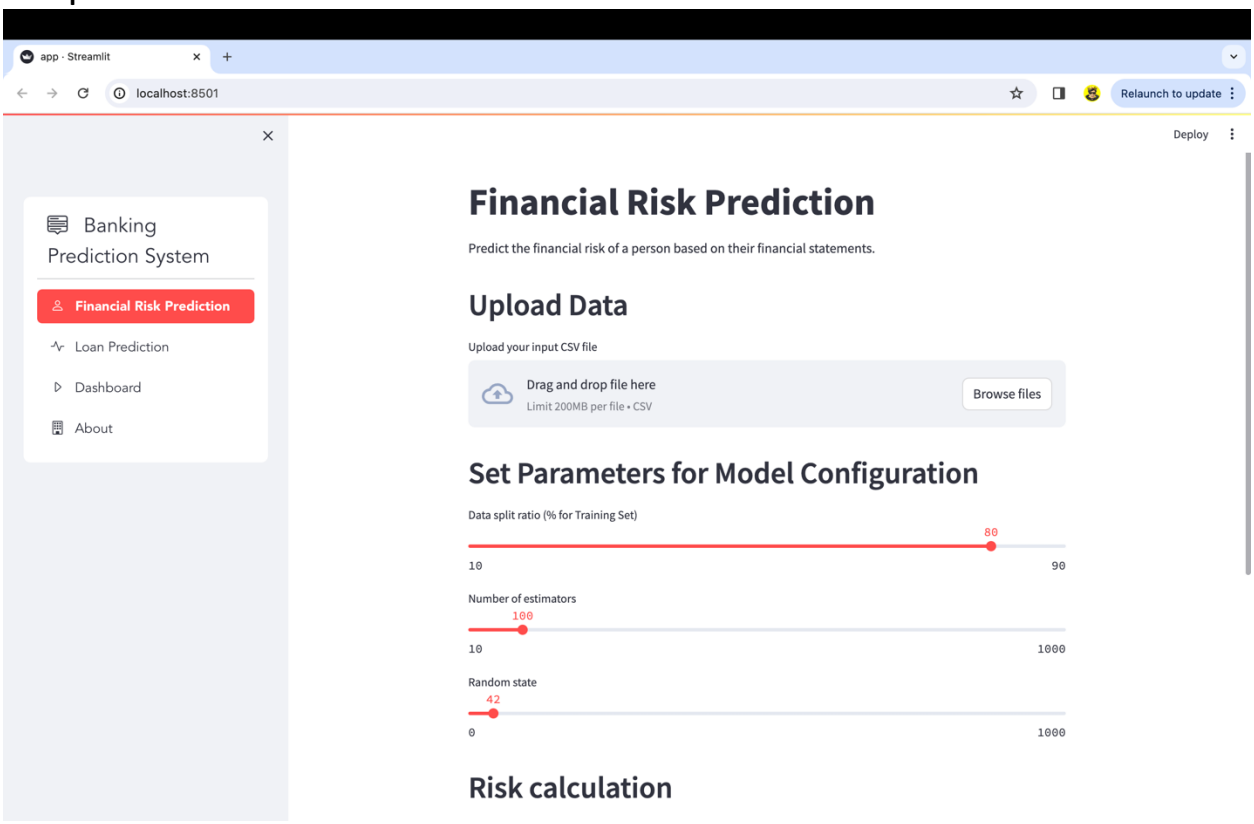
Advanced Data Analysis Techniques

- VIF (Variance Inflation Factor): to detect multicollinearity among features such as location score and audit scores.
- OLS (Ordinary Least Squares) : used for regression analysis to understand relationships between scores if applicable.
- Feature Importance: to Analyze which features most strongly predict financial risk, refining features for better model performance.

- Tree Node Interpretability: tree-based models is used to help understand decision-making at each node.
- SHAP (SHapley Additive exPlanations) Analysis: To show the impact of each feature on the prediction of loan eligibility, enhancing model transparency.
- Feature Importance: Determining which features are most predictive of loan eligibility, informing feature prioritization.

Installation and Setup
- Install required Python libraries using pip. The exact versions and libraries are specified in the `requirements.txt`:
  pip install -r requirements.txt
- Run the notebooks to train the models or review the data analysis.
- Launch the Streamlit application: streamlit run app.py

Outputs :


app · Streamlit
localhost:8501
Relaunch to update
Deploy
Banking Prediction System
Financial Risk Prediction
Loan Prediction
Dashboard
About
Financial Risk Prediction
Predict the financial risk of a person based on their financial statements.
Upload Data
Upload your input CSV file
Drag and drop file here
Limit 200MB per file • CSV
Browse files
Set Parameters for Model Configuration
Data split ratio (% for Training Set)
80
10
90
Number of estimators
100
10
1000
Random state
42
0
1000
Risk calculation

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10 — 90

Number of estimators

100

10 — 1000

Random state

42

0 — 1000

Risk calculation

City Area Code from [0-44]: 1

Internal Audit Score from [0-15]: 1

Financial Score from [0-15]: 1

Location Score from [0-100]: 10.00

External Audit Score from [0-15]: 1

Loss Score from [0-13]: 1

Past Results

1

0 — 10

Risk Prediction

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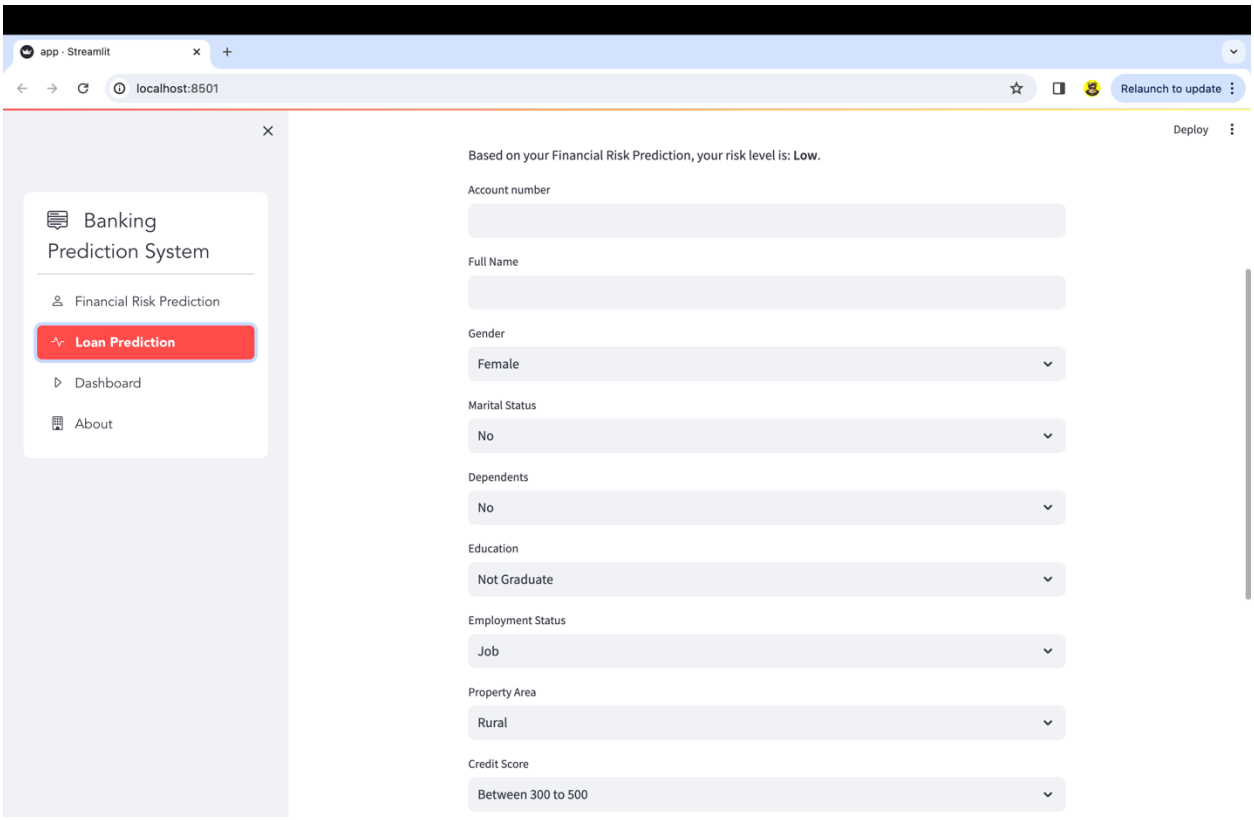
Loan Prediction

Please perform the Financial Risk Prediction first.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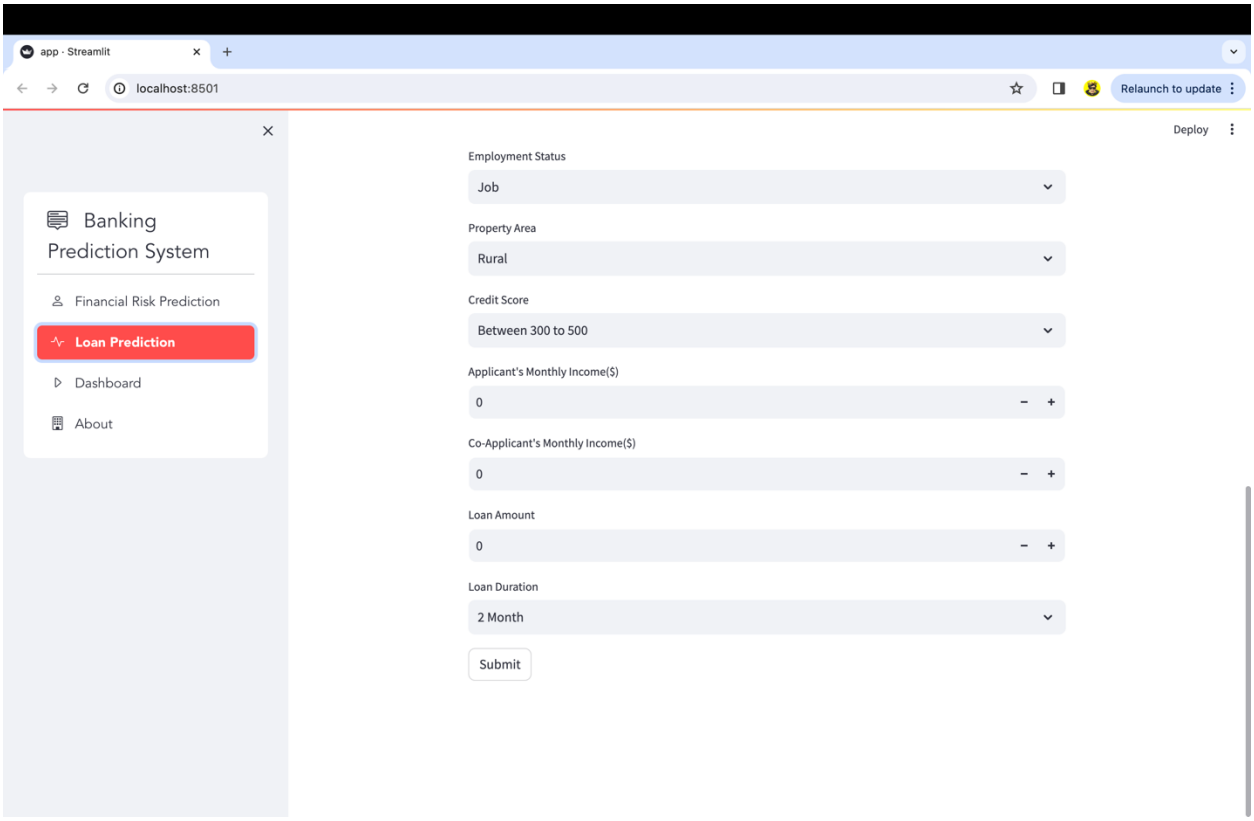
About
Based on your Financial Risk Prediction, your risk level is: Low.
Account number
Full Name
Gender
Female
Marital Status
No
Dependents
No
Education
Not Graduate
Employment Status
Job
Property Area
Rural
Credit Score
Between 300 to 500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Employment Status
Job
Property Area
Rural
Credit Score
Between 300 to 500
Applicant's Monthly Income($)
0
Co-Applicant's Monthly Income($)
0
Loan Amount
0
Loan Duration
2 Month
Submit

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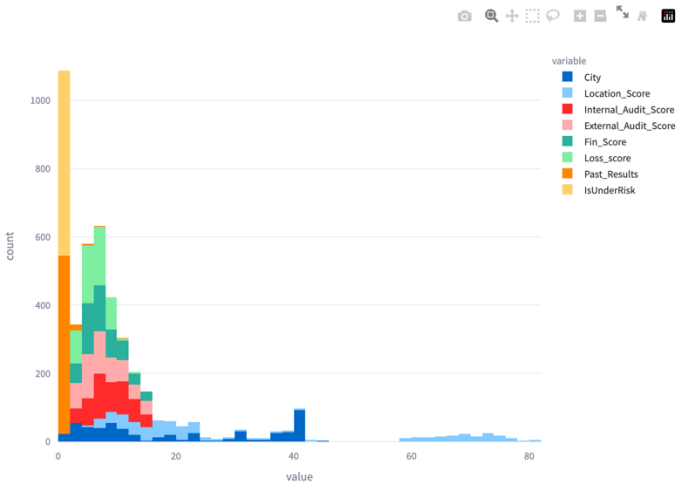
Dashboard

Statistical Analysis of financial statement Data



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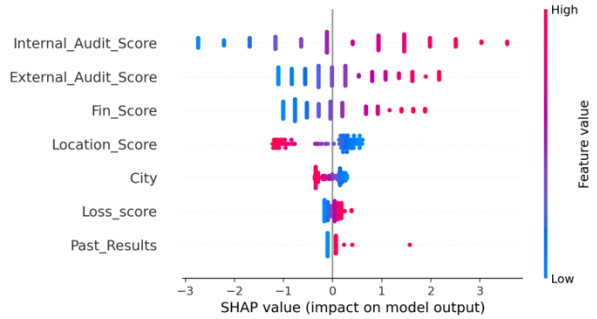
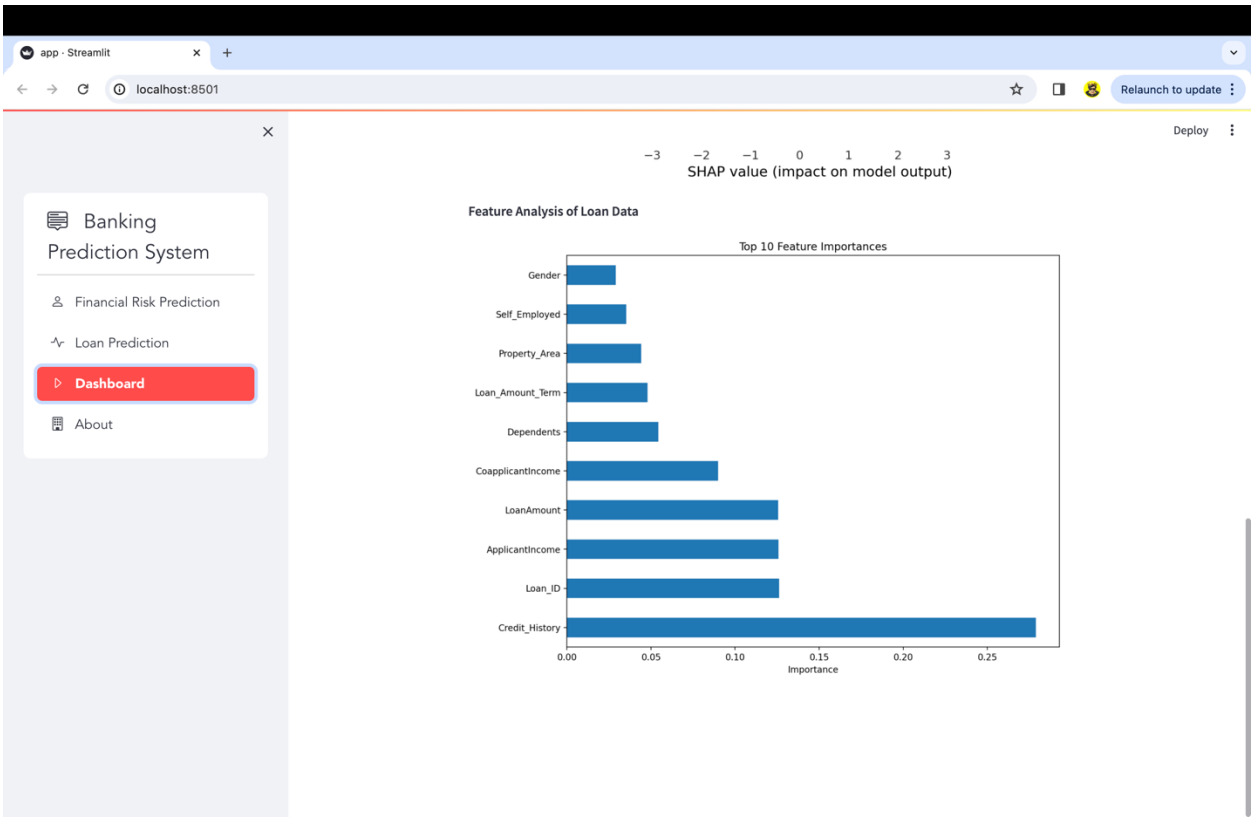


Feature Analysis of Loan Data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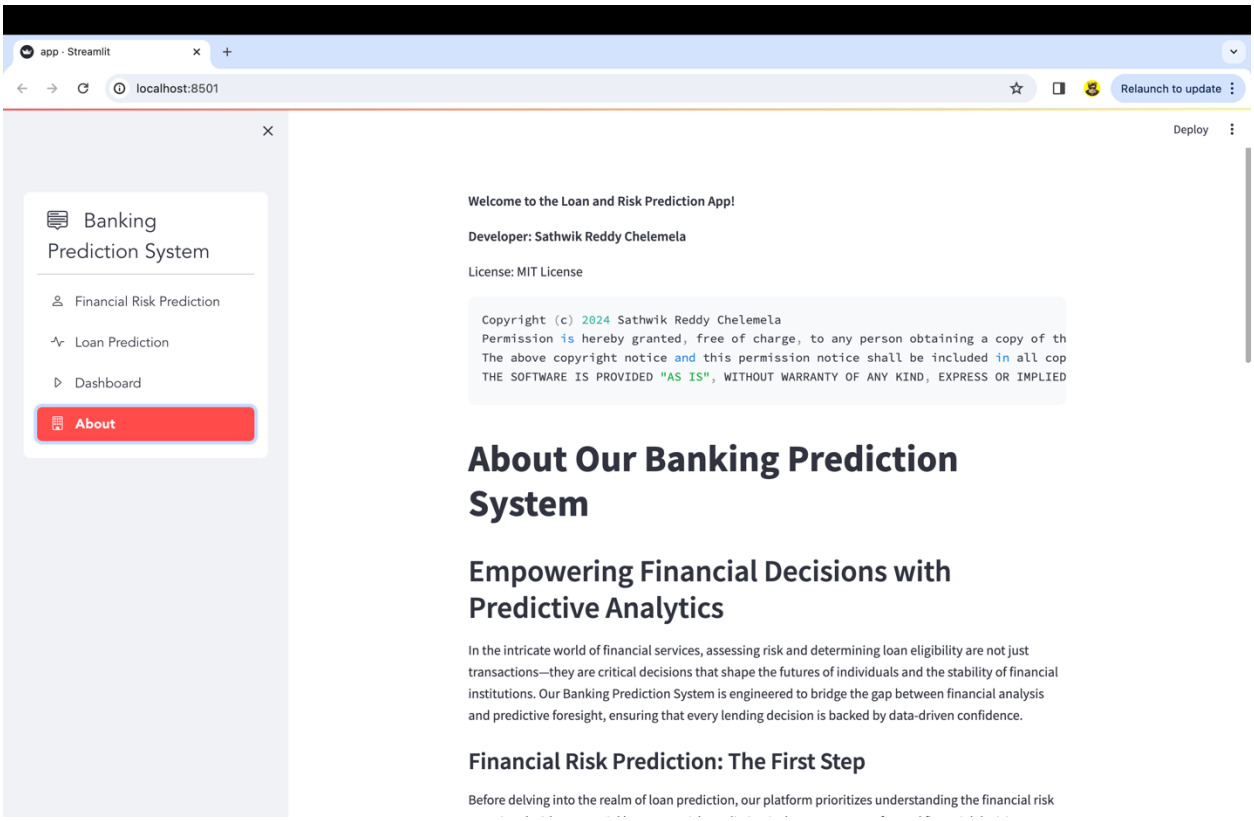
−3 −2 −1 0 1 2 3
SHAP value (impact on model output)
Feature Analysis of Loan Data
Top 10 Feature Importances
Gender
Self_Employed
Property_Area
Loan_Amount_Term
Dependents
CoapplicantIncome
LoanAmount
ApplicantIncome
Loan_ID
Credit_History
0.00 0.05 0.10 0.15 0.20 0.25
Importance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Welcome to the Loan and Risk Prediction App!
Developer: Sathwik Reddy Chelemela
License: MIT License
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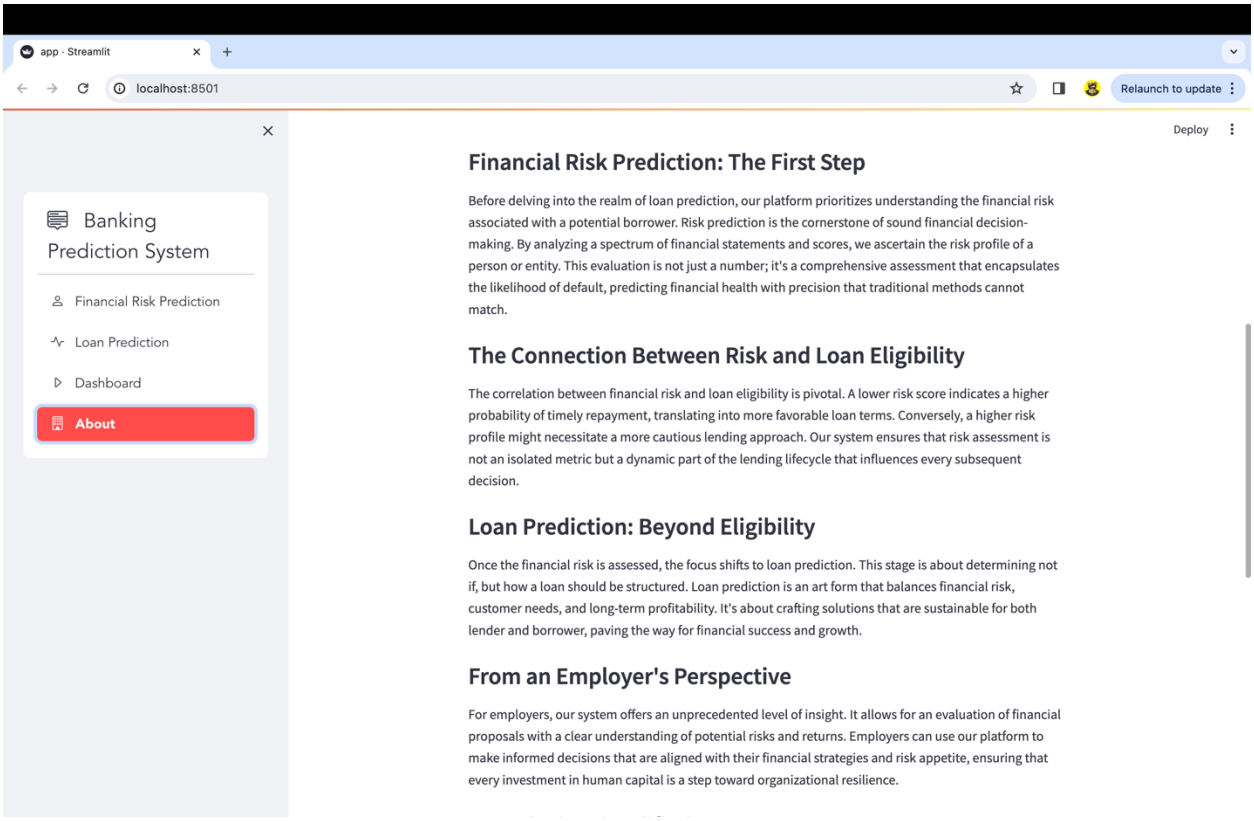
Permission is hereby granted, free of charge, to any person obtaining a copy of th
The above copyright notice and this permission notice shall be included in all cop
THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED
About Our Banking Prediction System
Empowering Financial Decisions with Predictive Analytics
In the intricate world of financial services, assessing risk and determining loan eligibility are not just transactions—they are critical decisions that shape the futures of individuals and the stability of financial institutions. Our Banking Prediction System is engineered to bridge the gap between financial analysis and predictive foresight, ensuring that every lending decision is backed by data-driven confidence.
Financial Risk Prediction: The First Step
Before delving into the realm of loan prediction, our platform prioritizes understanding the financial risk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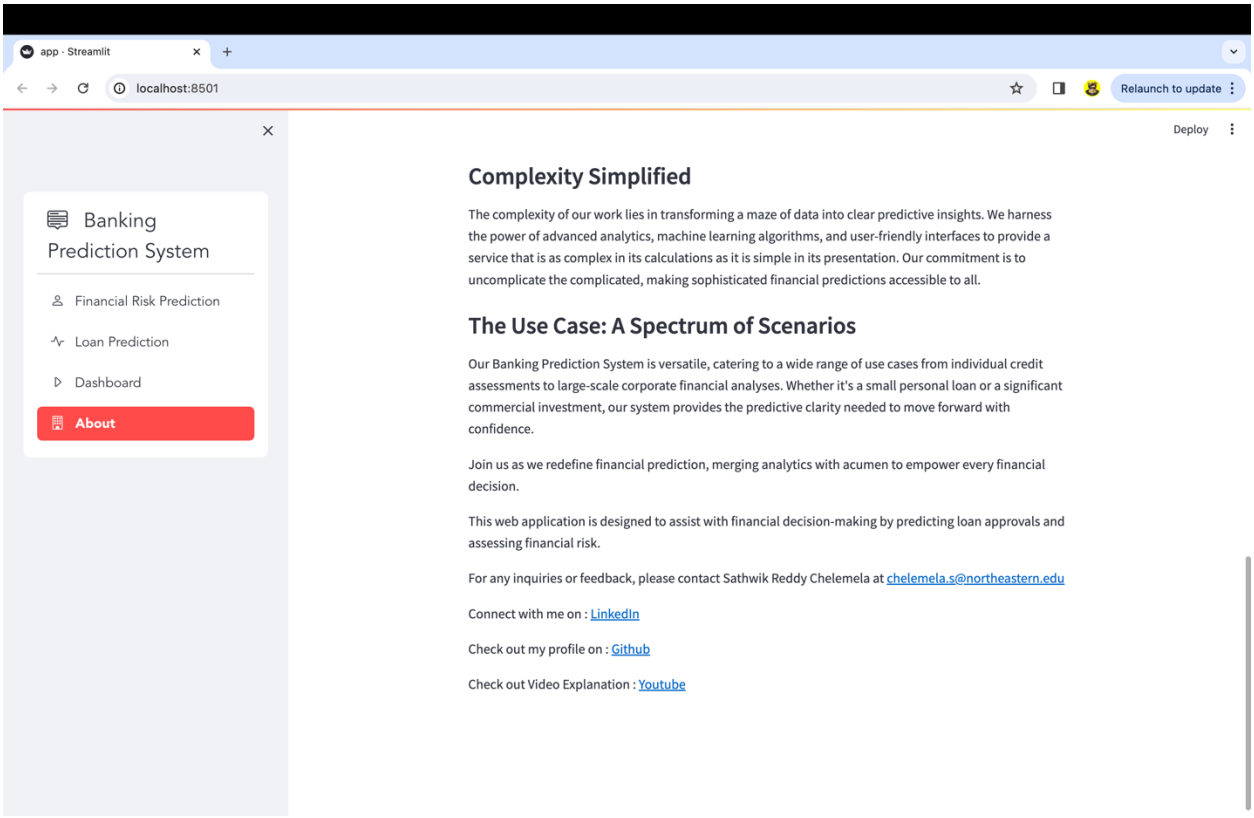
Financial Risk Prediction: The First Step
Before delving into the realm of loan prediction, our platform prioritizes understanding the financial risk associated with a potential borrower. Risk prediction is the cornerstone of sound financial decision-making. By analyzing a spectrum of financial statements and scores, we ascertain the risk profile of a person or entity. This evaluation is not just a number; it's a comprehensive assessment that encapsulates the likelihood of default, predicting financial health with precision that traditional methods cannot match.
The Connection Between Risk and Loan Eligibility
The correlation between financial risk and loan eligibility is pivotal. A lower risk score indicates a higher probability of timely repayment, translating into more favorable loan terms. Conversely, a higher risk profile might necessitate a more cautious lending approach. Our system ensures that risk assessment is not an isolated metric but a dynamic part of the lending lifecycle that influences every subsequent decision.
Loan Prediction: Beyond Eligibility
Once the financial risk is assessed, the focus shifts to loan prediction. This stage is about determining not if, but how a loan should be structured. Loan prediction is an art form that balances financial risk, customer needs, and long-term profitability. It's about crafting solutions that are sustainable for both lender and borrower, paving the way for financial success and growth.
From an Employer's Perspective
For employers, our system offers an unprecedented level of insight. It allows for an evaluation of financial proposals with a clear understanding of potential risks and returns. Employers can use our platform to make informed decisions that are aligned with their financial strategies and risk appetite, ensuring that every investment in human capital is a step toward organizational resilience.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Complexity Simplified
The complexity of our work lies in transforming a maze of data into clear predictive insights. We harness the power of advanced analytics, machine learning algorithms, and user-friendly interfaces to provide a service that is as complex in its calculations as it is simple in its presentation. Our commitment is to uncomplicate the complicated, making sophisticated financial predictions accessible to all.
The Use Case: A Spectrum of Scenarios
Our Banking Prediction System is versatile, catering to a wide range of use cases from individual credit assessments to large-scale corporate financial analyses. Whether it's a small personal loan or a significant commercial investment, our system provides the predictive clarity needed to move forward with confidence.
Join us as we redefine financial prediction, merging analytics with acumen to empower every financial decision.
This web application is designed to assist with financial decision-making by predicting loan approvals and assessing financial risk.
For any inquiries or feedback, please contact Sathwik Reddy Chelemela at chelemela.s@northeastern.edu
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