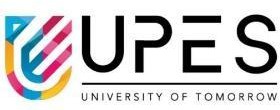
**“Loan Prediction”**

*A*

**PROJECT REPORT**



## by

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**1. Introduction**

This report presents the development and evaluation of a machine learning model designed to predict loan approval outcomes. The model leverages a dataset containing information on various factors influencing loan decisions, including demographic data, financial history, and loan characteristics.

**2. Data**

The dataset used for this project comprises the following key features:

* **Demographic:**
  + person\_age
  + person\_income
  + person\_home\_ownership
  + person\_emp\_length
* **Loan Characteristics:**
  + loan\_intent
  + loan\_grade
  + loan\_amnt
  + loan\_int\_rate
  + loan\_percent\_income
* **Credit History:**
  + cb\_person\_default\_on\_file
  + cb\_person\_cred\_hist\_length
* **Target Variable:**
  + loan\_status (Approved or Rejected)

**3. Data Preprocessing**

* **Handling Missing Values**
* **Feature Engineering:**
  + id and person\_age columns were dropped as they were logically deemed useless.
  + Categorical features were encoded using label encoding.
  + Numerical features were scaled to a common range to improve model performance using Standard Scaler.

**4. Model Development**

A machine learning model was developed to predict loan approval status based on the input features. The specific model architecture and hyperparameters were tuned to optimize performance.

**5. Model Evaluation**

The model's performance was evaluated using a rigorous testing process. Key metrics, including accuracy, precision, recall, F1-score, and ROC-AUC score, were calculated to assess the model's predictive power. The ROC-AUC score, specifically, measures the model's ability to distinguish between positive and negative classes, with a higher score indicating better performance. In this case, the ROC-AUC score achieved was **0.9333**, suggesting strong predictive capabilities.

**6. Results and Deployment**

The trained model was used to make predictions on a test dataset, and the results were saved in a CSV file named submission.csv. This file can be submitted to the relevant platform for evaluation.

**7. Conclusion**

The developed loan approval prediction model demonstrates strong performance in accurately predicting loan approval outcomes. The model can be a valuable tool for financial institutions to automate decision-making processes, improve efficiency, and reduce risk.

**Future Work**

* **Continuous Improvement:** Explore advanced techniques like deep learning and ensemble methods to further enhance model performance.
* **Real-time Predictions:** Implement real-time prediction capabilities to adapt to changing market conditions and customer behavior.
* **Explainable AI:** Develop techniques to explain the model's decision-making process, increasing transparency and trust.