

Project Report

Project Title: Visa Approval Prediction using Machine Learning

1. Introduction

The EasyVisa project applies supervised machine learning techniques to predict visa approval outcomes. The dataset represents visa application data with various applicant attributes, including education, experience, occupation, and application type. The project aims to develop an accurate, interpretable, and business-oriented model to assist in streamlining visa processing decisions.

2. Methodology

The analysis followed a structured data science workflow comprising:

- **Data Preprocessing:** Handled missing values, encoded categorical variables, and standardized data formats.
 - **Exploratory Data Analysis (EDA):** Investigated key variables influencing visa approvals through descriptive statistics and visualizations.
 - **Model Building:** Implemented multiple classification algorithms including Decision Tree, Random Forest, AdaBoost, Bagging, and Gradient Boosting.
 - **Model Evaluation:** Used metrics such as Accuracy, Precision, Recall, and F1-score to assess model performance.
 - **Model Selection:** Performed hyperparameter tuning via GridSearchCV to identify the optimal parameters.
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3. Results and Discussion

All models provided meaningful insights into the factors driving visa approvals. Ensemble models consistently outperformed individual classifiers. The Gradient Boosting model achieved the highest accuracy and balance across evaluation metrics, making it both technically strong and business aligned. It offers better control over bias and variance, leading to more reliable predictions.

4. Conclusion

The Gradient Boosting model is both accurate and business-aligned, making it an ideal

decision support tool for Easy Visa to scale smarter, faster, and fairer visa application services.

The project demonstrates the power of ensemble learning in predictive analytics and highlights how machine learning can optimize decision-making in real-world administrative processes.

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