CI PROJECT

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Project Proposal — Employee Attrition Prediction using Machine Learning

1. Introduction / Problem Statement

Employee attrition is one of the main issues that HR departments deal with. The goal of this project is to predict an employee's likelihood of quitting the company using machine learning techniques. Early detection reduces hiring costs and increases retention.

2. Dataset Description

The project uses the HR Attrition Dataset and a synthetically expanded version with 14,000 rows. Key feature groups include:

• Demographics (Age, Gender, Education)

• Job attributes (JobRole, JobLevel, Department)

• Performance & satisfaction metrics

• Salary, working conditions, HR history

Target variable: Attrition (Yes/No)

3. **Objective / Expected Outcome**

• Build a predictive ML model for attrition

• Identify key factors influencing attrition

• Deploy a Streamlit-based interactive prediction app

4. **Machine Learning Approach**

Models used: Logistic Regression, Decision Tree, Random Forest, Gradient Boosting.

SMOTE used for imbalance, StandardScaler for scaling, and one-hot encoding for categorical features.

Best-performing model: Random Forest (tuned).

5. **Expected Results**

• Prediction accuracy ~ 80–90%

• Real-time prediction app

• Feature importance & SHAP explainability

• Insights for HR retention strategies

6. **Conclusion**

This ML-based system helps organizations reduce attrition, improve retention, and make data-driven HR decisions.