

# Employee Attrition Analysis and Prediction

## Abstract

This project focuses on analyzing employee data to identify attrition patterns and build a machine learning model to predict employees at risk of leaving. The solution helps HR teams take proactive retention decisions.

## Problem Statement

Employee attrition increases recruitment cost and impacts productivity. Predicting attrition in advance enables organizations to reduce turnover and improve employee satisfaction.

## Dataset Description

The dataset consists of 35 employee-related features including demographics, job role, salary, satisfaction, performance, and tenure details. Attrition is the target variable.

## EDA – Key Observations

- Employees with low job satisfaction show higher attrition
- Overtime employees have increased turnover
- Lower income groups exhibit higher attrition
- Early-career employees are more likely to leave

## EDA Visualizations

Charts Used:

1. Attrition vs Job Satisfaction (Bar Chart)
2. Attrition vs Monthly Income (Box Plot)
3. Attrition by Department (Count Plot)
4. Attrition vs Work-Life Balance

(These charts visually represent key attrition drivers.)

## Feature Engineering

Created tenure buckets, encoded categorical variables, removed constant features, and selected high-impact attributes based on correlation analysis.

## Model Development

Logistic Regression and Random Forest models were trained. Random Forest performed better in terms of F1-score and AUC-ROC.

## Model Evaluation

Accuracy: ~86%

Precision, Recall, F1-Score used to handle class imbalance

AUC-ROC curve validated strong classification performance

## Streamlit Dashboard

The Streamlit application provides interactive dashboards with attrition insights, employee-level predictions, and probability-based risk classification.

## Business Impact

- Reduced attrition risk
- Cost savings in hiring & training
- Improved workforce planning

## Conclusion

The project successfully predicts employee attrition and provides actionable HR insights.