HR ANALYTICS – PREDICT EMPLOYEE ATTRITION

PROJECT REPORT

INTRODUCTION

Employee attrition is a major challenge in modern organizations. Understanding why employees leave and identifying patterns can help HR teams take proactive measures. This project aims to use data analytics and machine learning to analyse historical HR data and predict future attrition risk. The final goal is to support decision-making with data-driven insights and prevent talent loss.

ABSTRACT

The project involves performing exploratory data analysis (EDA), building a machine learning classification model, and interpreting results using SHAP value analysis. Additionally, an interactive dashboard was created in Power BI to visually explore the patterns of attrition across departments, job roles, and salary bands. The model helps predict whether an employee is likely to leave based on key features such as overtime, monthly income, and years at the company. Actionable HR recommendations were also derived based on the insights.

TOOLS USED

- **Python:** Data cleaning, modeling, and SHAP analysis

- **Pandas, Seaborn, Scikit-learn:** EDA and machine learning

- **Power BI:** Dashboard design and interactive visual storytelling

- **SHAP:** Model explainability and feature impact analysis

- **Jupyter Notebook:** Development environment

STEPS INVOLVED IN BUILDING THE PROJECT

1. Data Collection and Cleaning:

Loaded HR dataset, handled missing values, encoded categorical variables, and ensured data quality.

2. EDA and Visualization:

Analysed patterns in attrition using gender, department, job role, overtime, income, etc.

3. Model Building (Logistic Regression):

Built a classification model to predict attrition with 85% accuracy and evaluated it using a confusion matrix.

4. SHAP Value Analysis:

Identified key influencing factors such as Overtime, Monthly Income, and Job Role.

5. Dashboard Design:

Created a professional Power BI dashboard showing attrition KPIs, departmental analysis, and filters for deeper insights.

6. Recommendations:

Based on data and SHAP insights, proposed strategic suggestions to reduce attrition.

CONCLUSION

The project successfully analysed employee attrition data using Python and Power BI. The model helps identify high-risk employees and the reasons behind attrition. The dashboard serves as a valuable HR tool for interactive exploration. By combining machine learning and visual storytelling, this project provides actionable recommendations to improve retention and workforce planning.