# ****HR Analytics – Predict Employee Attrition****

## ****Introduction****

Employee attrition has become a critical challenge for organizations as it impacts workforce stability, increases recruitment costs, and reduces overall productivity. By analyzing employee data, HR managers can identify key factors influencing resignation and take preventive measures to retain talent. This project aims to analyze HR data to understand attrition patterns and predict future resignations using machine learning techniques.

## ****Abstract****

This project focuses on predicting employee attrition through data analytics and visualization. Using Python for data processing and machine learning, the project identifies patterns in employee behavior such as overtime, salary bands, and job satisfaction. A classification model is developed to predict attrition, and a Power BI/Tableau dashboard is created to visually represent the findings. Furthermore, explainable AI techniques such as SHAP values are applied to interpret model results. Finally, actionable HR strategies are proposed to reduce attrition.

## ****Tools Used****

**Python (Pandas, Scikit-learn, Matplotlib, Seaborn)** → For data cleaning, EDA, and building prediction models

**Power BI / Tableau** → For creating interactive dashboards and visualizations

**ReportLab / PDF tools** → For generating the final report and prevention suggestions

**SHAP** → To explain machine learning predictions

## ****Steps Involved in Building the Project****

**Data Collection** – Gathered HR dataset with features such as Age, Department, Salary, Job Satisfaction, Overtime, and Attrition.

**Exploratory Data Analysis (EDA)** – Analyzed attrition trends by department, salary bands, promotions, and overtime using visualizations.

**Model Development** – Built classification models (Logistic Regression, Decision Tree) to predict employee attrition.

**Evaluation** – Generated confusion matrix and accuracy report to evaluate performance of models

**Visualization** – Designed a dashboard in Power BI/Tableau with KPIs and charts to present attrition insights.

**Interpretation with SHAP** – Used SHAP values to explain model predictions and highlight most important features.

**Attrition Prevention Suggestions** – Compiled recommendations (salary adjustments, promotion policies, work-life balance improvements) in a PDF report.

## ****Conclusion****

The HR Analytics project successfully demonstrated how data-driven techniques can predict employee attrition and assist HR departments in strategic decision-making. Key findings reveal that low salary, lack of promotions, and excessive overtime are major contributors to attrition. By implementing targeted strategies, organizations can improve retention, reduce costs, and maintain workforce stability. The combination of predictive modeling and interactive dashboards empowers HR professionals to make evidence-based decisions for employee engagement and satisfaction.