#### HR Analytics Project Report

#### ****Objectives:****

#### The primary objective of this project is to conduct an in-depth analysis of the HR dataset to understand employee satisfaction, performance, and attrition. The analysis aims to provide actionable insights into employee satisfaction levels, performance ratings, attrition rates, and department-wise trends. Additionally, the project seeks to implement a predictive model to estimate employee attrition based on historical data and provide recommendations to improve employee retention.

#### ****Introduction****

#### The HR dataset encompasses various attributes related to employee demographics, job satisfaction, performance ratings, and attrition status. This project leverages the dataset to explore trends and metrics related to employee satisfaction, performance, and attrition. By analysing job satisfaction levels, performance ratings, and years at the company, the project aims to uncover patterns and offer recommendations for optimizing employee retention strategies.

#### The project also includes building and evaluating a predictive model to forecast potential employee attrition and improve retention strategies. Insights from this analysis are visualized through various plots and metrics to aid in decision-making.

#### ****Methodology****

The project is divided into several key phases:

* **Data Collection:**
  + **Dataset:** The dataset used includes columns such as **JobSatisfaction, PerformanceRating, TotalWorkingYears, YearsAtCompany, SalarySlab, Department, and Attrition**.
* **Data Cleaning:**
  + **Missing Values:** The dataset was checked for missing values, ensuring data quality.
  + **Duplicates:** Duplicates were checked for and removed to ensure the uniqueness of records.
* **Exploratory Data Analysis (EDA):**
  + **Employee Satisfaction Analysis:**
    - **Distribution of Job Satisfaction:** Analysed and visualized the distribution of job satisfaction levels across the workforce.
    - **Job Satisfaction vs. Employee Attrition:** Examined the relationship between job satisfaction levels and employee attrition.
  + **Employee Performance and Salary Analysis:**
    - **Performance Ratings Distribution:** Analysed the distribution of performance ratings among employees.
    - **Salary Distribution:** Visualized the distribution of salary slabs within the organization.
    - **Salary vs. Employee Attrition:** Examined the relationship between salary levels and attrition rates.
  + **Working Hours and Projects Analysis:**
    - **Distribution of Total Working Years:** Analyzed the tenure of employees to understand how long employees stay with the company.
    - **Years at Company vs. Employee Attrition:** Explored how the number of years at the company influences the likelihood of attrition.
  + **Department-Wise Analysis:**
    - **Employee Distribution by Department:** Analyzed and visualized the distribution of employees across various departments.
    - **Department vs. Employee Attrition:** Examined the attrition rates within different departments.
* **Predictive Modelling:**
  + **Feature Selection:** Selected features such as **JobSatisfaction, PerformanceRating, TotalWorkingYears, YearsAtCompany, and DistanceFromHome** to predict attrition.
  + **Model Building:** Implemented and evaluated a Logistic Regression model to predict employee attrition.
  + **Model Evaluation:** Calculated accuracy, confusion matrix, and classification report to evaluate the model's performance.
  + **Cross-Validation:** Performed cross-validation to assess the robustness of the model.

#### ****Conclusion and Insights****

The analysis of the HR dataset revealed several key insights:

* **Employee Satisfaction:** Job satisfaction levels vary across employees, with a potential impact on attrition rates. Employees with lower job satisfaction are more likely to leave the company.
* **Performance and Salary:** Performance ratings and salary distributions provide insights into employee motivation and financial satisfaction, which influence retention.
* **Attrition Trends:** Certain departments and salary slabs exhibit higher attrition rates, indicating areas where retention strategies may need to be strengthened.
* **Predictive Modelling:** The Logistic Regression model provided a reasonable prediction of employee attrition, with the model evaluation metrics indicating its accuracy and usefulness in predicting which employees are at risk of leaving.

The visualizations and recommendations derived from this analysis can guide strategic decisions regarding employee retention, performance management, and departmental resource allocation.

Overall, this project provides a comprehensive analysis of the HR dataset, offering actionable insights and recommendations for enhancing employee satisfaction and reducing attrition.