HR Analytics Project Report - Predicting Employee Attrition

1. Introduction

Employee attrition—the loss of employees over time—is a significant challenge HR teams face globally. This project aims to analyze patterns in employee attrition using historical HR data. We applied data analytics and machine learning to gain insights into which employees are more likely to leave and why.

2. Abstract

We analyzed the IBM HR Employee Attrition dataset to identify key drivers of attrition. The project involved data cleaning, feature selection, model training, evaluation, and dashboard visualization. Logistic Regression and Decision Tree models were used, achieving good accuracy. A Power BI dashboard was developed to visually communicate findings to HR decision-makers.

3. Tools Used

- **Python** (Pandas, Seaborn, Scikit-learn, SHAP)
- **Power BI** for interactive dashboards
- **Jupyter Notebook** for analysis
- **CSV dataset**: WA_Fn-UseC_-HR-Employee-Attrition.csv

4. Steps Involved in Building the Project

1. **Data Loading & Cleaning**:
   - Loaded and cleaned the dataset (Clean_HR_Attrition.csv).
   - Removed duplicates, handled missing values, and encoded categorical columns.
2. **Exploratory Data Analysis (EDA)**:
   - Analyzed attrition based on factors like Age, OverTime, Department, Job Role.
   - Used Seaborn to generate insightful plots.
3. **Model Training & Evaluation**:
   - Applied Logistic Regression and Decision Tree models.
   - Evaluated using accuracy score and confusion matrix.
   - Interpreted the model using SHAP values to identify top features.
4. **Dashboard Creation**:
   - Built Power BI dashboard (DashboardHr.Data.pbix).
   - Visualized attrition trends, feature impact, and department-wise analysis.

5. Conclusion

The analysis revealed that features like OverTime, Age, Monthly Income, and Job Role have a strong influence on attrition. The Decision Tree model provided transparent prediction logic, while the Power BI dashboard made the insights interactive and easy to communicate. These tools can support HR teams in making data-driven decisions to retain employees.

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