

HR Analytics – Predict Employee Attrition

Objective

This project aims to understand the reasons behind employee attrition and predict which employees are at risk of leaving the organization. By analyzing historical employee data and creating visual dashboards, the goal is to uncover trends and patterns that can help HR teams implement better retention strategies and improve workforce stability.

Tools Used

- **Python** (Pandas, Seaborn, Sklearn)
- **Power BI**
- **Jupyter Notebook**

Dataset Description

The dataset used is a cleaned HR dataset that includes information about employee demographics, job roles, salary, performance, work-life balance, and whether they left the company (Attrition). It contains both numerical and encoded categorical features.

Project Steps

1. Data Preprocessing (Python)

- Dropped unnecessary columns: EmployeeCount, StandardHours, Over18, EmployeeNumber
- Encoded target column Attrition: Yes → 1, No → 0
- One-hot encoded categorical variables
- Train-test split (80-20%)
- Feature scaling (StandardScaler)

2. Classification Models

- Trained and evaluated the following models:
 - **Logistic Regression**
 - **Decision Tree Classifier**
 - **Random Forest Classifier**
- Evaluated models using:
 - Accuracy
 - Confusion Matrix
 - Precision, Recall, F1-score

3. Power BI Dashboard

- Imported the cleaned dataset
- Designed visuals for:
 - Attrition by Department
 - Attrition by Gender
 - Attrition by Job Role
 - Attrition by Education and Job Level (with slicers)
 - Attrition by Marital Status
 - Attrition vs. Years at Company (Line Chart)
 - Overtime vs. Attrition
 - Monthly Income Distribution
- Created custom calculated columns using DAX to simplify grouped fields

Insights from Visualizations

- **Gender:** Higher attrition rate among males
- **Overtime:** Employees working overtime are more likely to leave
- **Marital Status:** Single employees show higher attrition
- **Job Roles:** Sales Executives and Research Scientists are at higher risk
- **Years at Company:** Employees with <5 years are more likely to leave

Recommendations

- Focus on improving retention strategies for male employees, as they are leaving the company at a higher rate.
- Provide better engagement and support programs for single employees, who show the highest attrition among marital status groups.
- Evaluate overtime policies, as a significant number of employees working overtime are more likely to leave—suggesting potential burnout.
- Offer stronger onboarding and mentorship programs for new employees, especially those with less than 5 years at the company.
- Target specific high-attrition job roles (like Sales Executive and Research Scientist) and departments (like Research & Development) with feedback surveys and job satisfaction programs.
- Create clear career growth opportunities and invest in regular training to motivate and retain talent.

Conclusion

The HR analytics project successfully identified key drivers of employee attrition through the combination of machine learning models and interactive visualizations. The findings reveal that gender, marital status, overtime work, and early years at the company play significant roles in employee turnover. By addressing these areas with targeted strategies, organizations can proactively reduce attrition rates, improve employee satisfaction, and build a more stable workforce.