HR Attrition Data Analysis Project

Introduction

The HR Attrition Data Analysis Project focuses on examining employee attrition trends within an organization to identify the key factors contributing to workforce turnover. By integrating Python-based data cleaning with Power BI visual analytics, the project aims to provide HR departments with data-driven insights to enhance employee retention, job satisfaction, and performance management.

Abstract:

The dataset titled "WA_Fn-UseC_-HR-Employee-Attrition.csv" served as the foundation for this analysis. The data was cleaned and transformed using Python in Jupyter Notebook (Untitled7.ipynb), where null values were handled, categorical features were encoded, and derived columns were created. The processed dataset (Cleaned_HR_Attrition.xlsx) was imported into Power BI for visualization. Key performance indicators (KPIs) such as Total Employees, Average Monthly Income, Average Job Satisfaction, and Attrition Rate were computed through DAX measures. Power BI visualizations were designed to highlight patterns in employee demographics, income levels, job satisfaction, and tenure distributions.

Tools Used:

- **Python (Jupyter Notebook)** – Data cleaning, transformation, and feature engineering.
- **Pandas, NumPy** – Data preprocessing and numerical computations.
- **Power BI** – Dashboard creation and visualization of key HR metrics.
- **DAX & Power Query (M code)** – For Calculated measures and data transformation, calculated columns, and data modeling.
- **Excel** – Intermediate data storage and validation

Steps Involved in Building the Project:

1. **Data Collection:** Imported the raw HR dataset containing employee demographics, job profiles, and satisfaction scores.
2. **Data Cleaning:** Processed the dataset in Python to handle missing values, outliers, and standardized column names.
3. **Feature Engineering:** Created new columns such as Age Group, Salary Band, Tenure Band, Risk Score, and Risk Category to enhance analysis.
4. **Data Transformation:** Unnecessary columns (e.g., OverTime_Yes, Department_Sales, JobRole dummies) were dropped in Power BI for optimization.
5. **Dashboard Development:** Designed Power BI visuals showing attrition trends by age, income, tenure, and performance.
6. **Insights Extraction:** Derived actionable insights identifying at-risk employee groups and performance-driven attrition patterns.

Conclusion:

This project successfully integrates Python-based data preprocessing with Power BI visualization to analyze and interpret employee attrition dynamics. The resulting dashboard enables HR departments to pinpoint critical retention challenges, improve engagement strategies, and foster a more data-driven decision-making process. By visualizing metrics such as income distribution, tenure categories, job satisfaction, and attrition risks, the project demonstrates how modern analytics tools can transform raw HR data into meaningful organizational insights.

Sample Output's:

HR Attrition Data Analysis Project

Performance & Compensation Analysis

Satisfaction & Work-Life Insights(Employees with higher work-life balance ratings show better satisfaction and performance alignment)

Tenure, Growth & Promotion Insights

Predictive & Advanced Insights(Employees with potential performance or satisfaction risks)