# 📊 HR Attrition Analysis & Prediction

## 📌 Project Overview

This project focuses on analysing employee attrition to identify key factors influencing employee turnover and to predict potential attrition risks. The analysis combines **Exploratory Data Analysis (EDA)**, **machine learning**, and **interactive Power BI dashboards** to support data-driven HR decision-making.

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## 🎯 Objectives

- Analyze overall employee attrition trends
- Identify departments and job roles with high attrition
- Study the impact of salary bands on attrition
- Predict employee attrition risk using machine learning
- Build an interactive HR dashboard for insights and decision-making

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## 🛠️ Tools & Technologies

- **Python**: Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn
- **Power BI**: Interactive dashboards & insights
- **Jupyter Notebook**: Data analysis and modeling
- **CSV Dataset**: HR employee data

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## 🔍 Key Analysis Performed

- Data cleaning and preprocessing
- Missing value analysis
- Attrition distribution analysis
- Department-wise and role-wise attrition
- Salary band vs attrition analysis
- Attrition risk band classification
- Logistic Regression model for attrition prediction

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## 📈 Key Insights

- 📉 Overall attrition rate is **13.27%**, indicating moderate employee turnover

- Certain departments and job roles show **higher attrition concentration**
- Employees in **low and medium salary bands** are more likely to leave
- Predictive analysis reveals a large **medium-risk employee group**
- ⚠️ High-risk employees require **immediate retention strategies**

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## 📊 Power BI Dashboard Highlights

- Total Employees, Attrition Count & Attrition Rate KPIs
- Attrition by Department & Job Role
- Attrition vs Salary Band
- Attrition Probability Distribution
- Risk Band Segmentation (Low / Medium / High)
- Interactive filters for department, role, and risk band

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## 🤖 Machine Learning Model

- **Model Used**: Logistic Regression
- **Target Variable**: Actual Attrition
- **Output**:
  - Predicted Attrition
  - Attrition Probability
  - Risk Band classification

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## ☑️ Conclusion

This project demonstrates how data analytics and machine learning can help HR teams proactively identify attrition risks and implement targeted retention strategies. The combination of Python analysis and Power BI visualization provides both **technical depth and business insights**.

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## 👤 Author

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