# HR Employee Attrition Analysis Report

### 1. Project Overview

This project uses the **HR Attrition dataset from Kaggle**, containing **1,470 rows and 34 columns**. The goal is to analyze **employee attrition trends across departments, gender, job roles, salaries, and other key factors**, identifying drivers of attrition and key factors contributing to employee retention.

### 2. Data Cleaning & Preprocessing

* **Tools:** Python (pandas), Jupyter Notebook
* **Steps:**
  1. Dropped irrelevant columns (*EnvironmentSatisfaction, JobInvolvement, YearsWithCurrentManager, EmployeeCount, StandardOats, StockOptionLevel*).
  2. Converted categorical columns like *Attrition* to binary (0/1).
  3. Converted numeric columns to categorical where necessary (*Education, JobSatisfaction, PerformanceRating, RelationshipSatisfaction*).
  4. Adjusted column values (e.g., >18), and modified data types (*Attrition → int, others → object*).
  5. Exported cleaned data as CSV for SQL, Power BI, and further analysis.

### 3. SQL Insights & Observations

1. **Overall Attrition Rate:** Left – 237, Stayed – 1,233
2. **Age Group:** Middle-aged employees show highest attrition; older employees demonstrate higher loyalty.
3. **Department:** R&D has the highest attrition; HR has the lowest.
4. **Gender:** Male employees leave more frequently than female employees.
5. **Income Group:** Low-income (<$5,000) employees have the highest attrition (18%); medium and high-income groups show lower attrition.
6. **Job Role vs. Average Salary:**
   * Manager: $17,000 – highest
   * Research Director: $16,033 – second highest
   * Sales Representative: $2,626 – lowest
   * Observation: Higher-paying roles correlate with lower attrition rates.
7. **Job Satisfaction:** Sales Executives & Research Scientists display wide satisfaction variation; Managers are highly satisfied.
8. **Tenure:** Sales Representatives have shortest tenure; Managers and Directors have longest.
9. **Training vs. Salary Hike:** Training frequency shows minimal impact on salary increase.

### 4. Power BI Key Insights

1. **Department-Wise Attrition:** R&D – 14%, Sales – 21%, HR – 19%
2. **Attrition by Gender:** Male – 150, Female – 87
3. **Average Salary by Job Role:** Highest – Manager ($17,000), Lowest – Sales Representative ($2,626)
4. **Education Level Distribution:** Bachelor’s – 39.46%, Master’s – 27.85%
5. **Attrition by Job Role:** Highest – Lab Technician and Sales Executive
6. **Job Satisfaction by Role:** High satisfaction does not always prevent attrition
7. **Average Tenure by Role:** Managers – 14 yrs, Sales Representatives – shortest tenure

### 5. Limitations

* Job satisfaction scores may not capture hidden stressors or qualitative issues.
* Training and salary data may not fully explain retention patterns.

### 6. Recommendations

* Investigate causes of attrition in **Sales and R&D**.
* Review **salary and benefits** for low-income employees.
* Collect qualitative feedback to monitor **job satisfaction** beyond survey scores.
* Develop targeted **retention strategies** for middle-aged and high-turnover groups.
* Ensure **training programs** lead to measurable career growth.

### 7. Conclusion

This analysis identifies **key drivers of employee attrition**, highlighting departments, roles, income levels, and demographics. Insights from SQL and Power BI provide actionable strategies to **enhance retention, improve satisfaction, and optimize compensation structures**.