HR Analytics – Employee Attrition & Performance

Understanding factors that drive attrition and workforce trends

By – Rishav Sinha

Introduction

- **What is Attrition?**
  The process in which employees leave the company due to resignation, retirement, or other reasons.

- **Project Goal:**
  To analyze HR data, identify key factors influencing attrition, and provide actionable insights for reducing employee turnover.

Dataset Overview

- **Source:** IBM HR Analytics dataset

- **Size:** ~1,470 employees, 35 features

- **Key Features:** Age, Gender, Department, Job Role, Education, Marital Status, Salary, Years at Company, Job Satisfaction, Work-life Balance, etc.

- **Target Variable: Attrition** (Yes / No)

Methodology

- **Step 1:** Data collection & exploration

- **Step 2:** Data cleaning & preprocessing

- **Step 3:** Exploratory Data Analysis (EDA)

- **Step 4:** Key insights & visualization

- **Step 5:** Split Data into Test and Train data

- **Step 6:** Logistic Regression

- **Step 7:** Recommendations

Attrition Rate

- **Finding:** % of employees who left the company. Usually around **16% (237 out of 1470 employees)** in this dataset

- **Chart:** Bar Chart (Yes v/s No)

- **Insight:** Company has moderate attrition; needs attention.
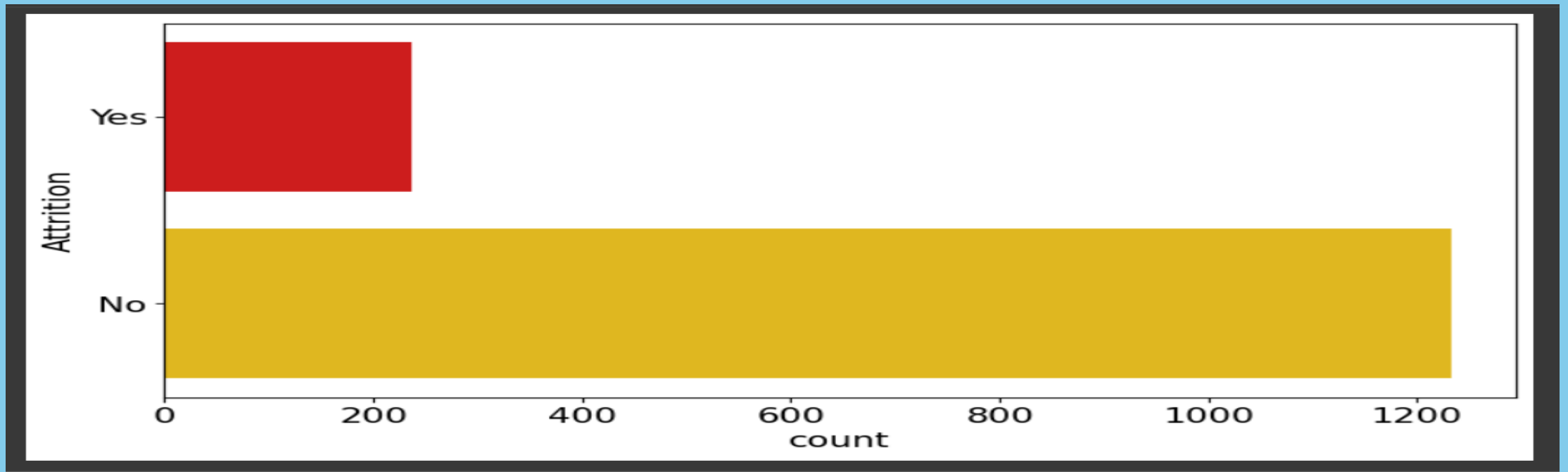
Attrition by Department

- **Finding:** Highest attrition in **Sales & HR**, lower in R&D

- **Chart:** Bar chart (Yes v/s No)

- **Insight:** Sales and HR departments may require better engagement strategies.
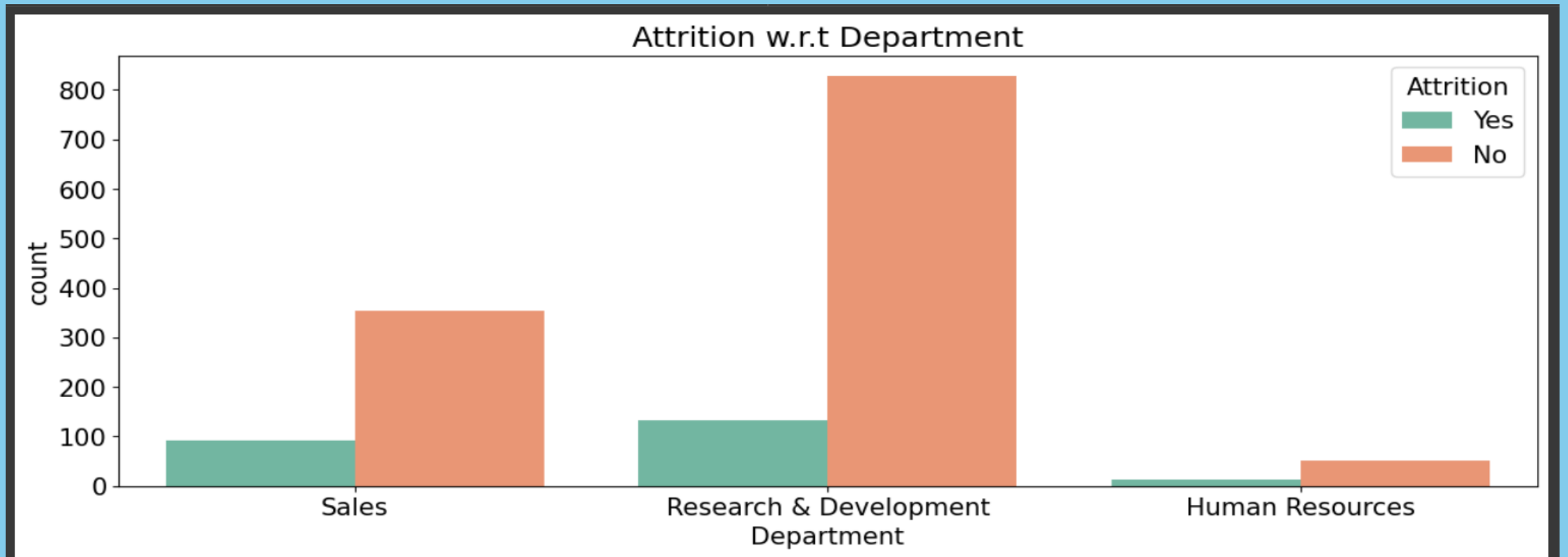
Attrition by Education Field

- **Finding:** Highest attrition in Human resources, marketing and technical degrees. Lowest in others.

- **Chart:** Bar chart

- **Insight:** Certain departments like Human resources, marketing and technical degrees may require better engagement strategies.
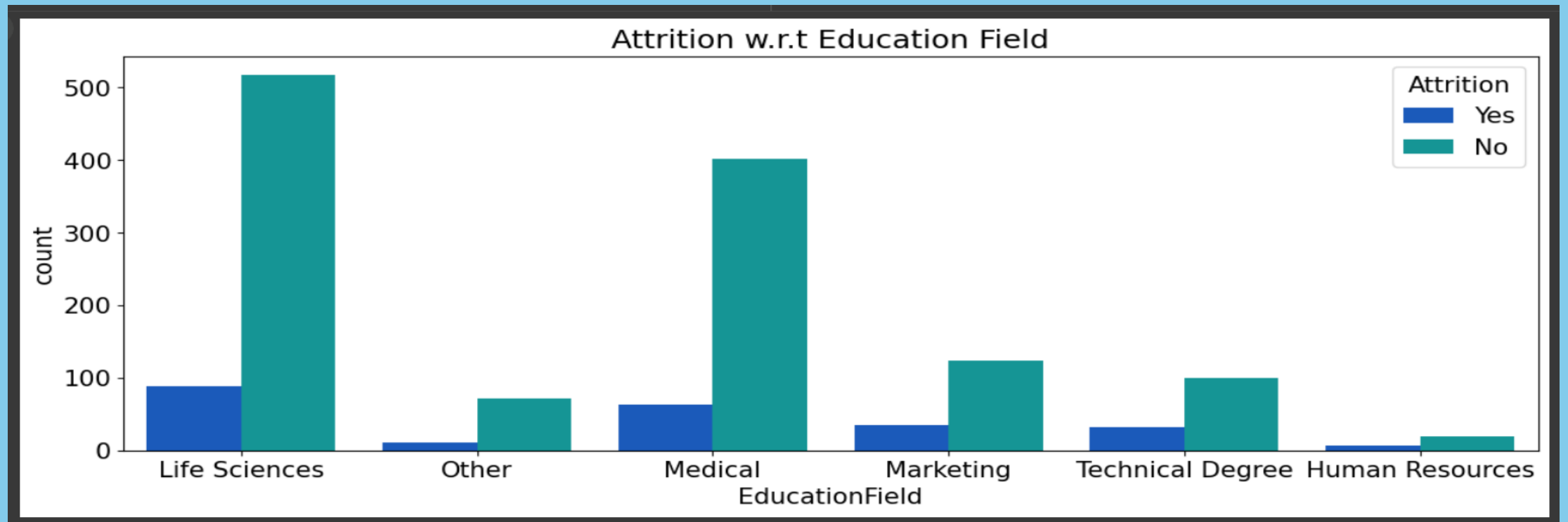
Attrition by Job Role

- **Finding:** Sales Representatives and Lab Technicians have higher attrition.

- **Chart:** Bar chart

- **Insight:** These roles may face workload or growth issues → address through training & benefits.
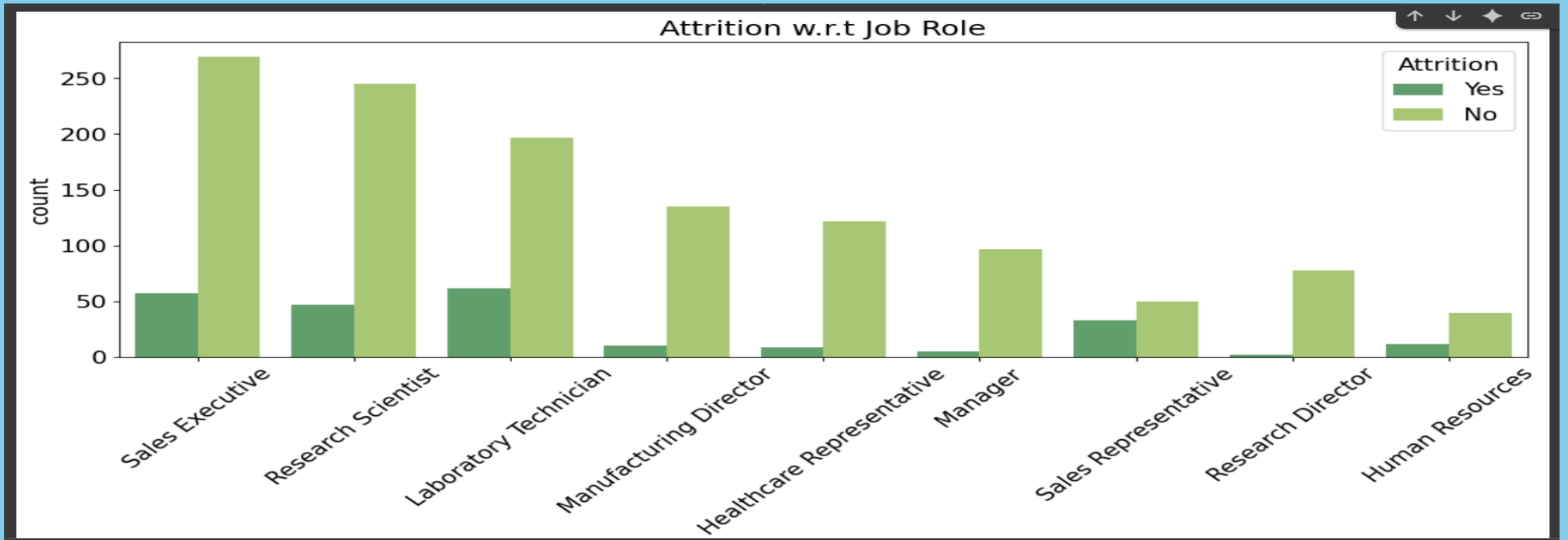
Attrition by Gender

- **Finding:** Attrition is slightly higher among males than in females.

- **Chart:** Bar chart

- **Insight:** Gender isn't a strong differentiator, but minor imbalance exists.
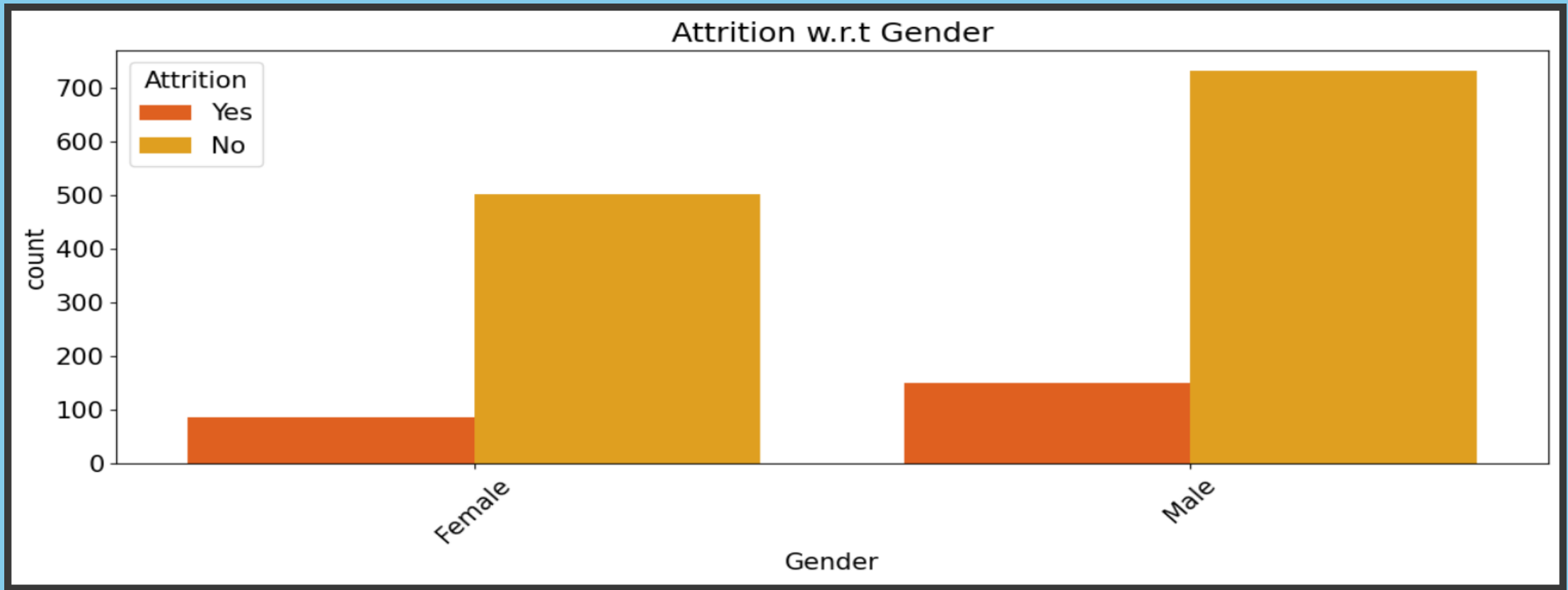
Attrition by Age

- **Finding:** Younger employees (30–40 yrs) show higher attrition
- **Chart:** Histogram / bar chart
- **Insight:** Mid-career employees are more likely to leave → need better career growth opportunities.
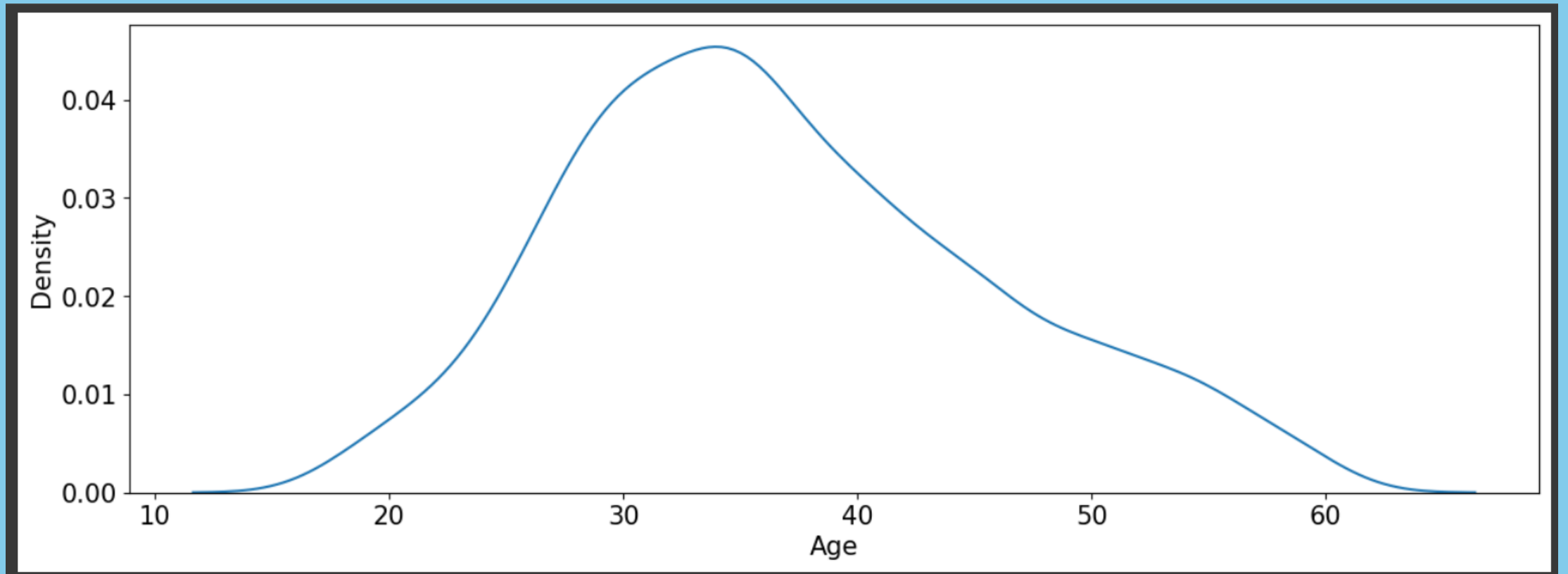
Attrition by Education

- **Finding:** There are more attrition rate in bachelor graduates than any other and least in doctors.
- **Chart:** Histogram / bar chart
- **Insight:** Bachelor graduate employees are more likely to leave → need better career growth alternatives
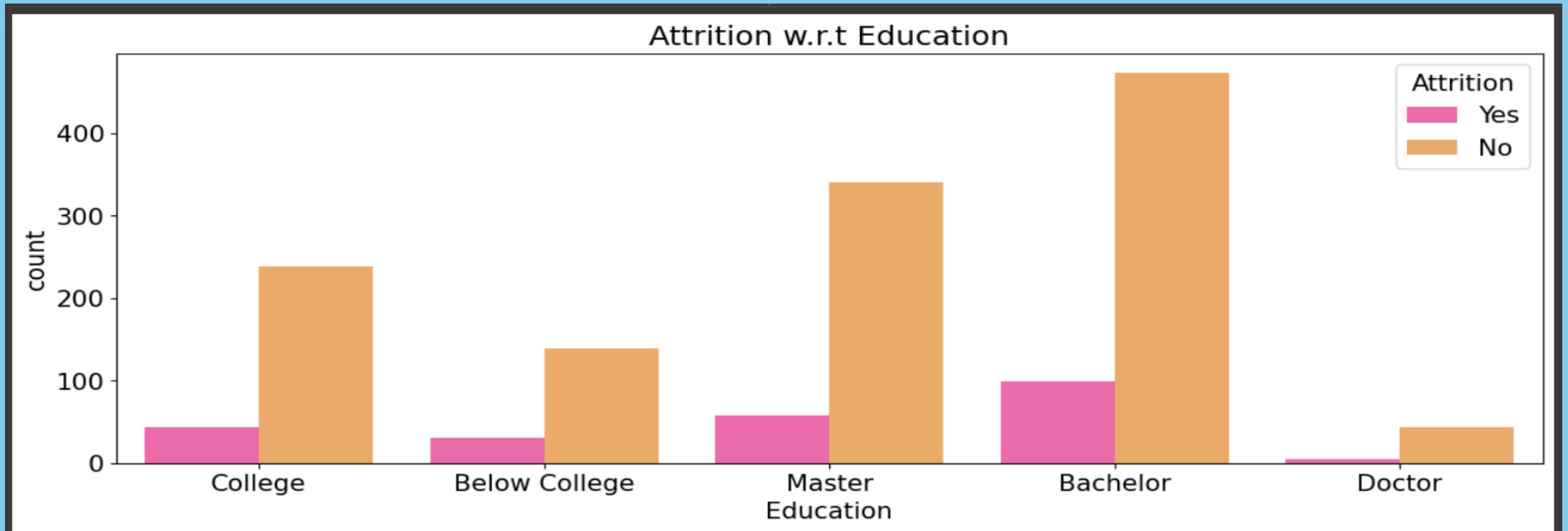
Predictive Modeling (Logistic Regression)

- **Algorithm Used:** Logistic Regression

- **Why Logistic Regression?**

- Works well for binary classification (Attrition: Yes/No)

- Interpretable model with coefficients showing factor importance

- **Model Training:**

- Data split into training & test sets

- Logistic Regression applied on employee features

- **Result:** Accuracy Score = ~64%
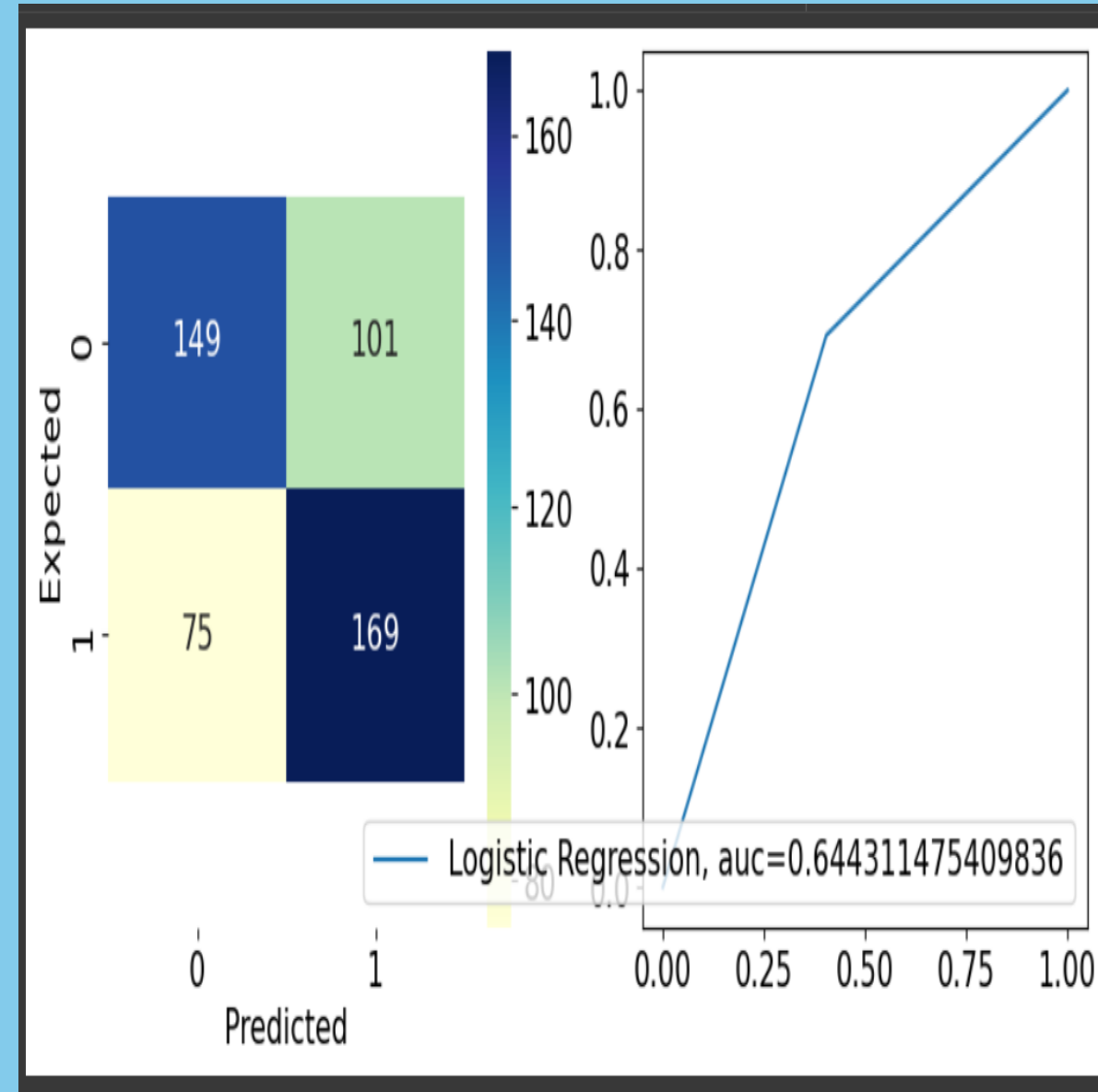
Model Evaluation

- **Confusion Matrix & Accuracy**

- Model correctly predicts majority of cases but struggles with imbalance in data

- **Insights:** Logistic Regression gives a baseline predictive model

- **Could be improved with:**
  - Feature engineering
  - Balancing dataset (SMOTE, oversampling)
  - Trying advanced models (Random Forest, XGBoost)

Practical Implications

- Predictive models like Logistic Regression can help **HR teams identify employees at high risk of attrition**

- Early intervention strategies (mentoring, salary review, engagement activities) can be applied to reduce turnover.

- Though **64% accuracy is moderate**, it provides a starting point for predictive HR analytics

Key Insights Summary

- Mid-aged employees **(30–40 yrs)** leave more often.
- **Sales & HR** departments face higher attrition.

- **Low salary** is a major driver.

- **Poor work-life balance** and **low satisfaction** increase attrition.

- **Education Field, Educational background** and **Job role** are the most important factors driving attrition rate in the company.

Conclusion

- Employee attrition is influenced by **multiple factors** (age, salary, department, job satisfaction, work-life balance, education field, education background, and job role etc).

- By implementing targeted strategies, the company can significantly **reduce turnover** and **improve employee performance**.

THANK YOU