# HR Attrition Analysis Report

This report presents an analysis of employee attrition, demographic factors, and predictive modeling results. The objective is to identify key drivers of attrition and evaluate predictive models to support HR decision-making. The analysis is based on a dataset of 1,470 employees and evaluates attrition trends across departments, salary bands, and demographics.

1. Attrition Overview & Dashboard Insights

- Overall Attrition Rate: 16.12% (237 employees out of 1,470). - Highest Attrition by Department: Sales (20.6%), followed by Human Resources (19%). - Lower attrition observed in Research & Development (13.8%). - Employees in lower salary bands show significantly higher attrition (29%).
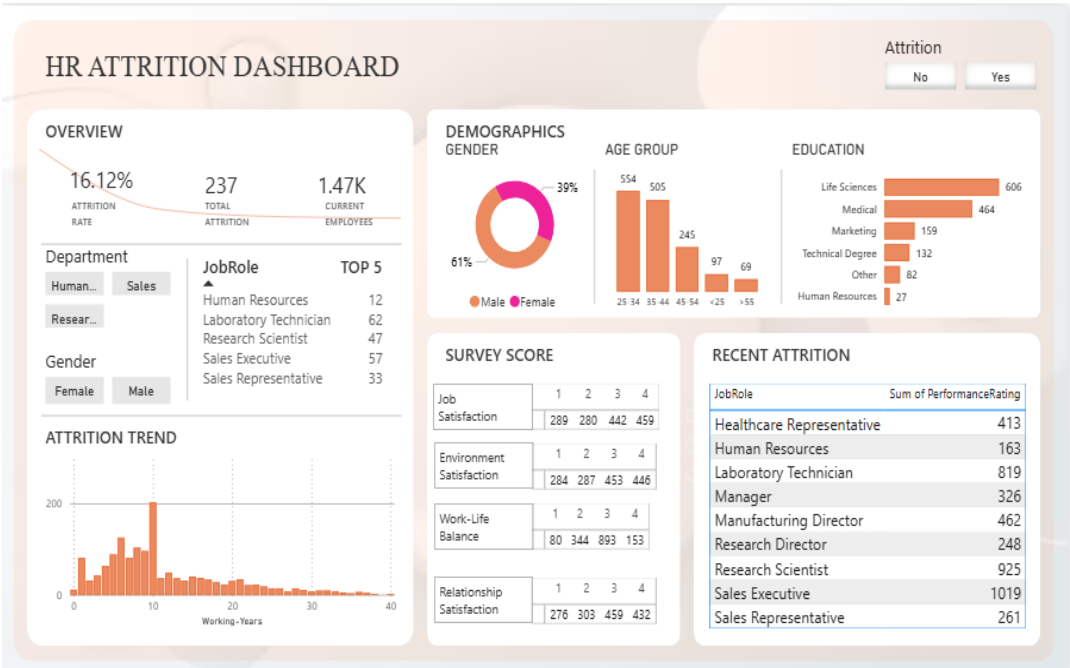

2. Predictive Modeling Results

Two predictive models were evaluated for attrition classification: - Logistic Regression achieved an accuracy of 88% with strong precision (0.89) for non-attrition cases but moderate recall (0.38) for attrition cases. - Decision Tree achieved 83% accuracy but showed weaker performance in identifying attrition cases (recall = 0.17). The confusion matrix indicates that attrition cases are harder to predict, suggesting a need for further feature engineering and advanced models (e.g., Random Forest, XGBoost).

```
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       Age                  0
       Attrition            0
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       DailyRate            0
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       DistanceFromHome     0
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       EmployeeCount        0
       EmployeeNumber       0
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       Attrition by department:
                                count   attritions       rate
       Department
       Sales                    446          92    0.206278
       Human Resources           63          12    0.190476
       Research & Development    961         133    0.138398
       Attrition by salary band:
        _salary_band
       Low          0.292683
       Mid-Low      0.142077
       Mid-High     0.106267
       High         0.103261
       ...
       17                   82    0.170732
       12                  198    0.166667
       13                  209    0.162679
       18                   89    0.146067
```


Confusion matrix (Decision Tree)
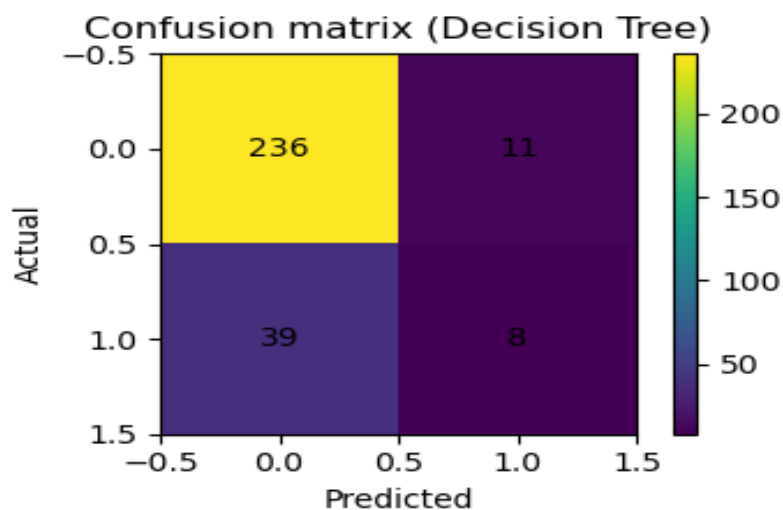
3. Key Recommendations

- Focus retention strategies on Sales and HR departments where attrition is highest. - Improve engagement and career progression for employees in lower salary bands. - Enhance work-life balance and job satisfaction as these are significant drivers of attrition. - Adopt advanced machine learning models to better predict attrition and design targeted interventions.

The analysis highlights that attrition is concentrated in specific departments and salary levels. Predictive models show promise but require refinement for better accuracy in identifying at-risk employees. A focused HR strategy targeting vulnerable groups will help reduce attrition and improve organizational stability.