Employee Attrition Analysis Report

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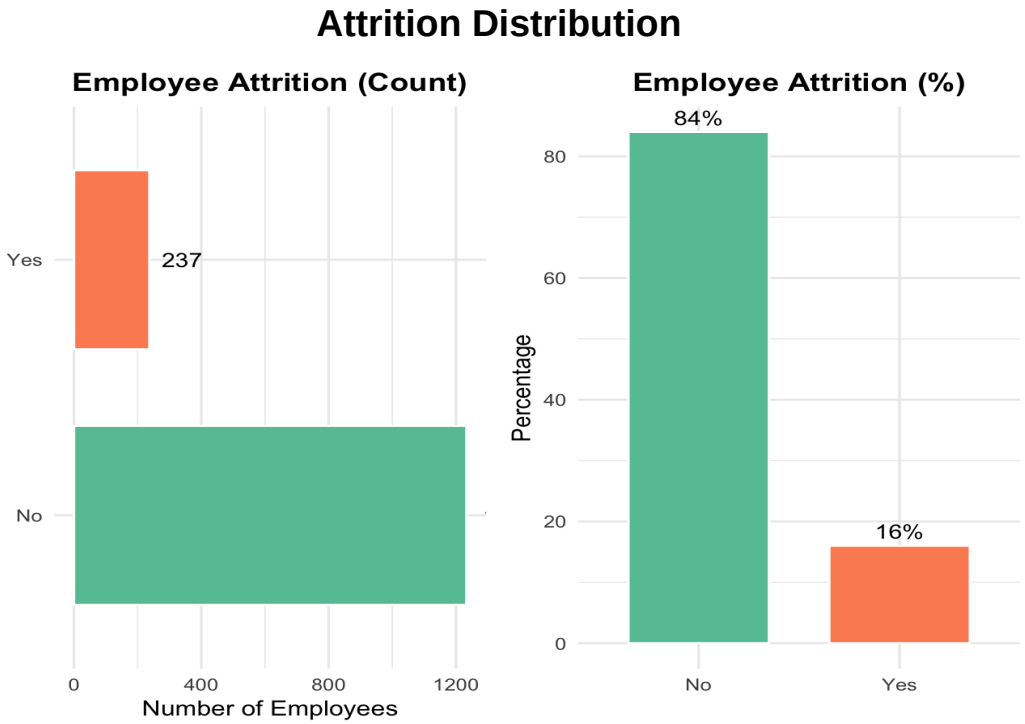
This report provides insights into employee attrition using exploratory data analysis (EDA) and predictive modeling.

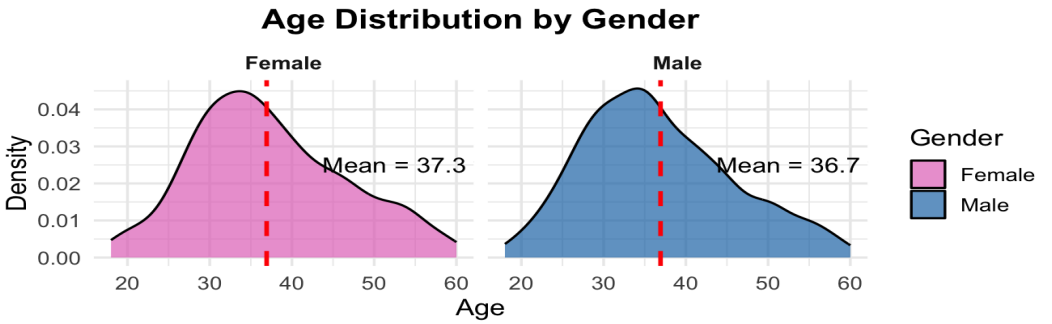
1. Overview

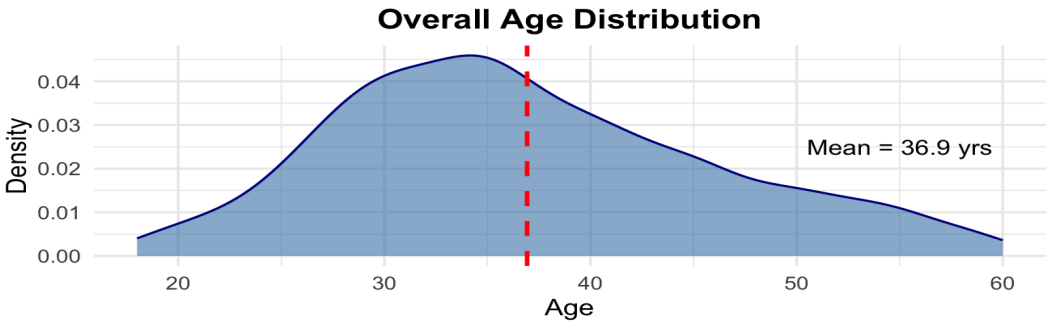
This report examines attrition trends within the workforce, identifying key demographic and organizational factors that influence employee turnover. The analysis combines exploratory visualizations with predictive modeling to extract actionable insights.

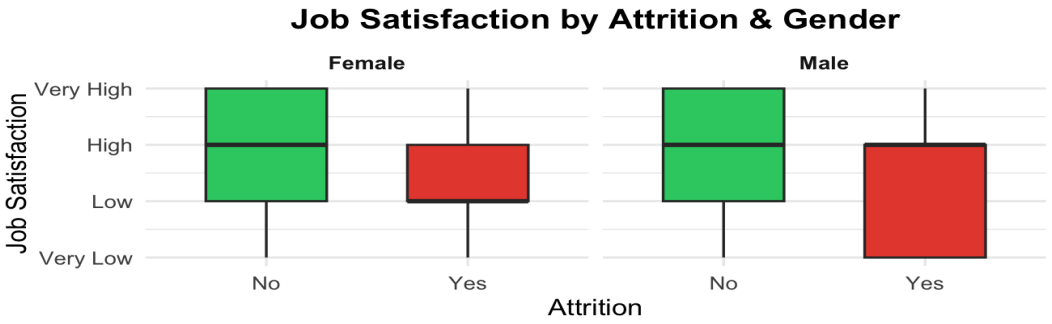


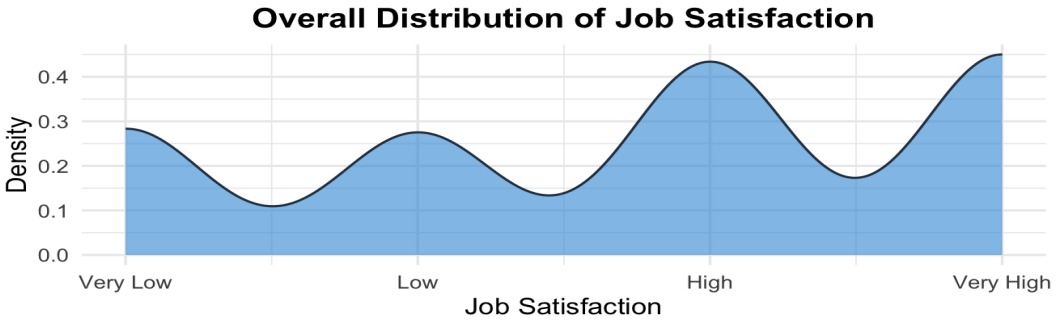
2. Demographics

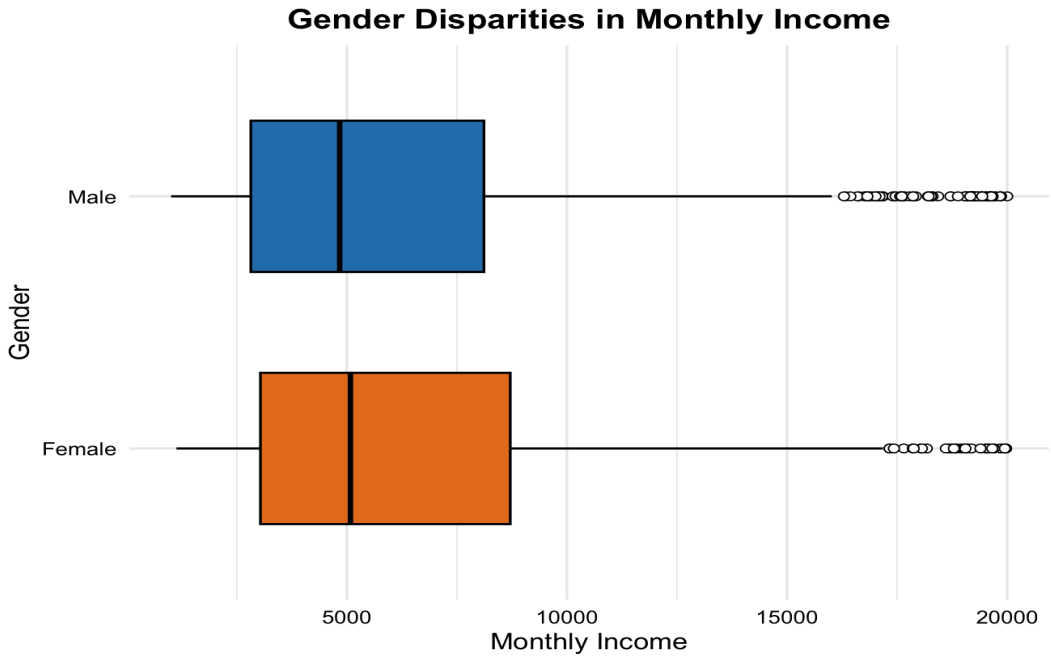
Age, gender, and education are key factors influencing attrition. Younger employees (Millennials) showed higher job mobility, while income disparities were evident across gender groups.

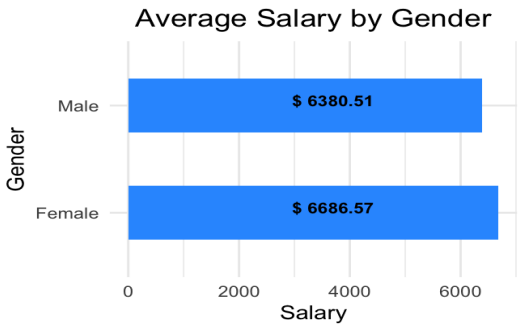

Age Distribution by Gender
Female
Male
Mean = 37.3
Mean = 36.7
Density
0.04
0.03
0.02
0.01
0.00
20
30
40
50
60
Age
Gender
Female
Male

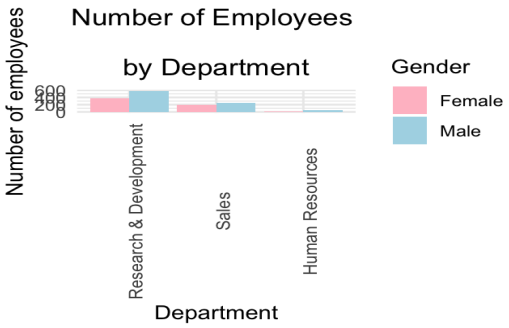

Overall Age Distribution
Mean = 36.9 yrs
Density
0.04
0.03
0.02
0.01
0.00
20
30
40
50
60
Age

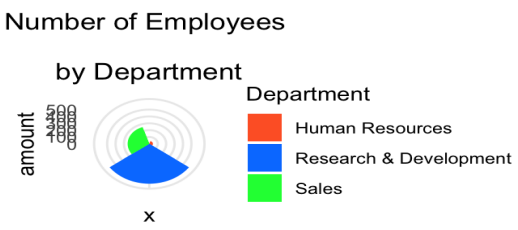

Job Satisfaction by Attrition & Gender
Female
Male
Very High
High
Low
Very Low
Job Satisfaction
No
Yes
No
Yes
Attrition

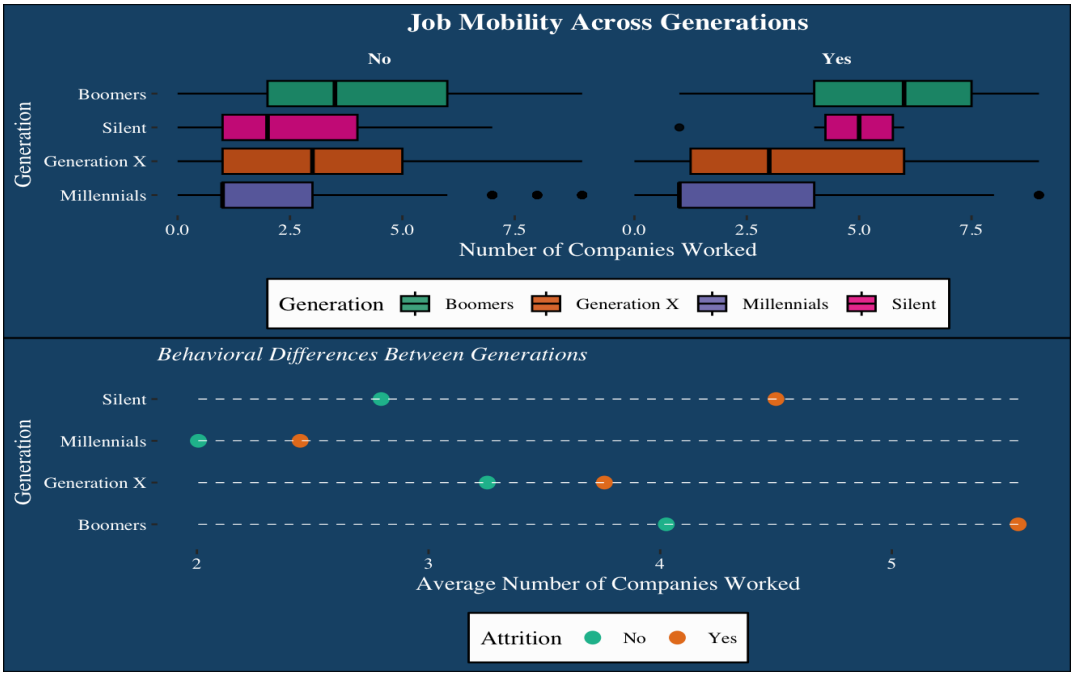

Overall Distribution of Job Satisfaction
Density
0.4
0.3
0.2
0.1
0.0
Very Low
Low
High
Very High
Job Satisfaction

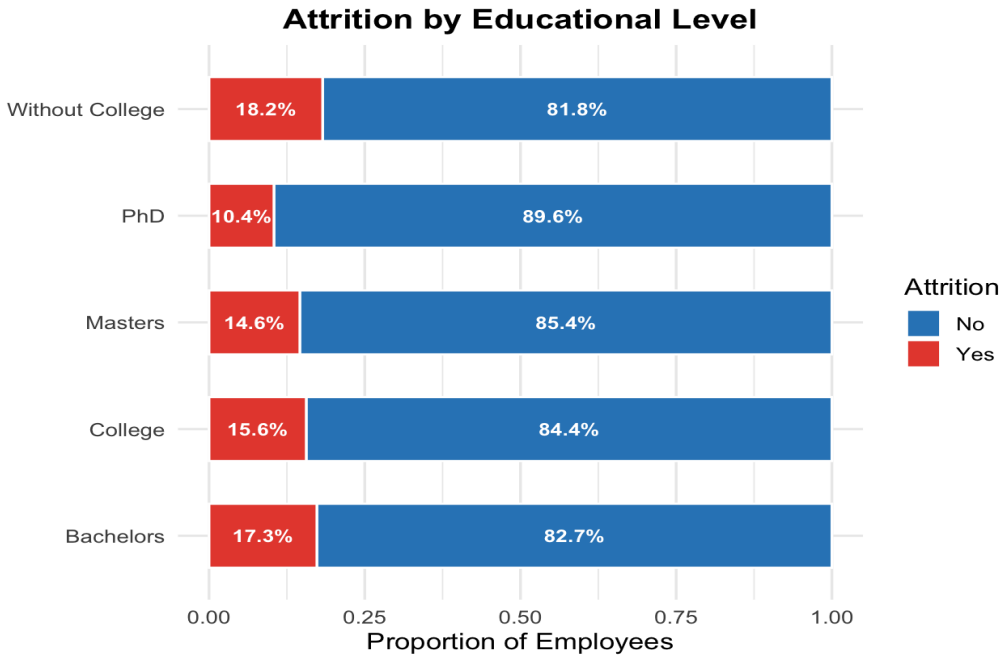

Gender Disparities in Monthly Income
Male
Female
Gender
5000
10000
15000
20000
Monthly Income

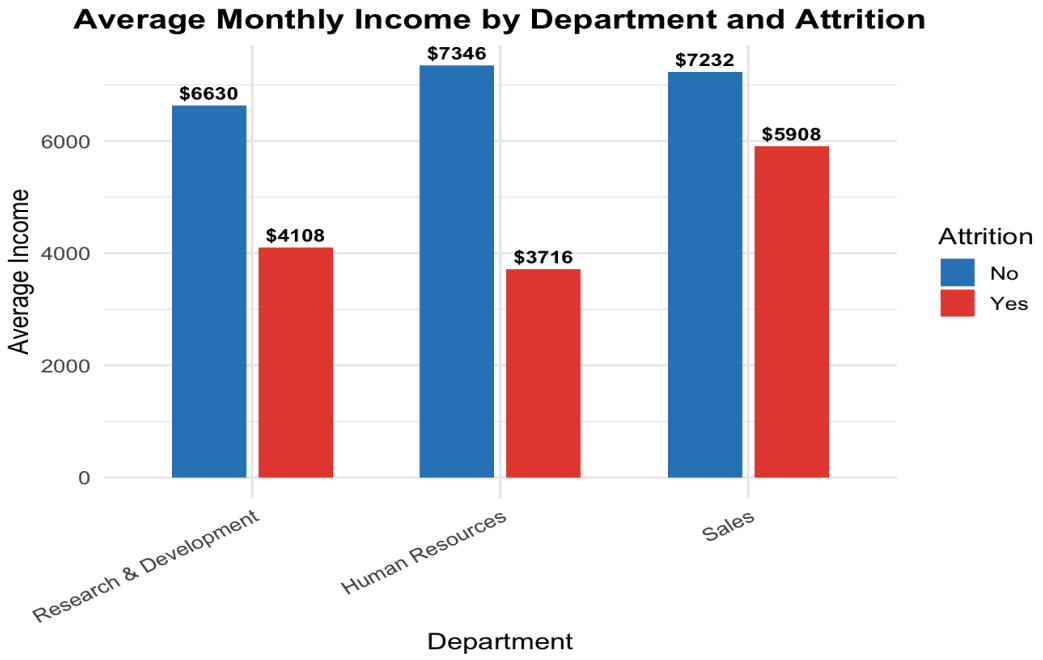

Average Salary by Gender
Male
Female
Gender
$ 6380.51
$ 6686.57
0
2000
4000
6000
Salary


Number of Employees
by Department
Number of employees
600
400
200
0
Research & Development
Sales
Human Resources
Department
Gender
Female
Male


Number of Employees
by Department
amount
500
400
300
200
100
0
x
Department
Human Resources
Research & Development
Sales

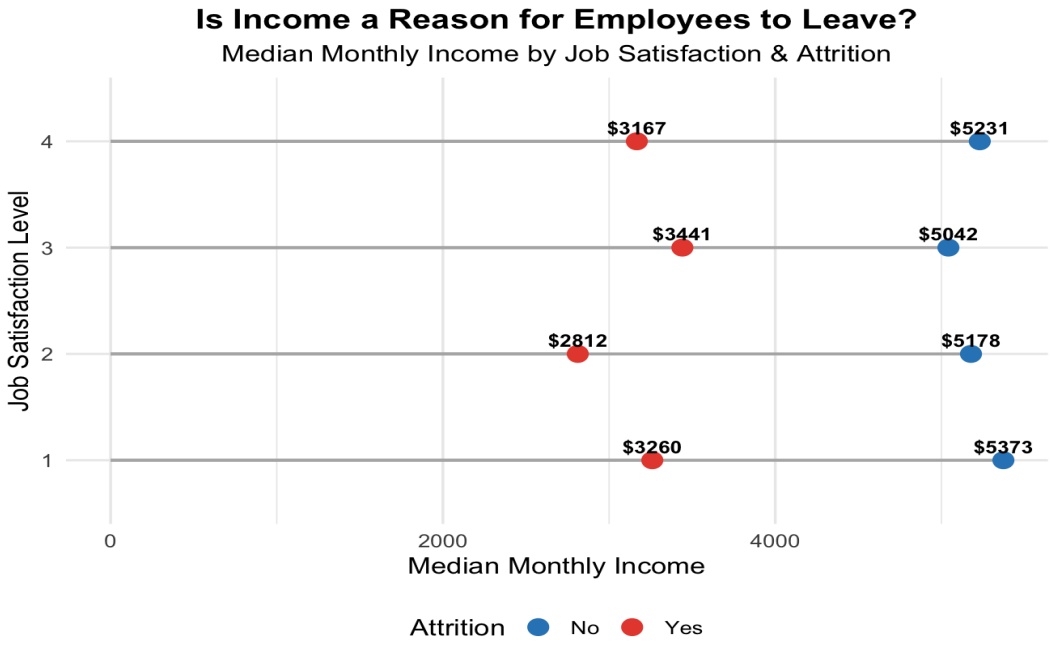

Job Mobility Across Generations
No
Yes
Boomers
Silent
Generation X
Millennials
Generation
0.0
2.5
5.0
7.5
Number of Companies Worked
Generation
Boomers
Generation X
Millennials
Silent
Behavioral Differences Between Generations
Average Number of Companies Worked
Attrition
No
Yes

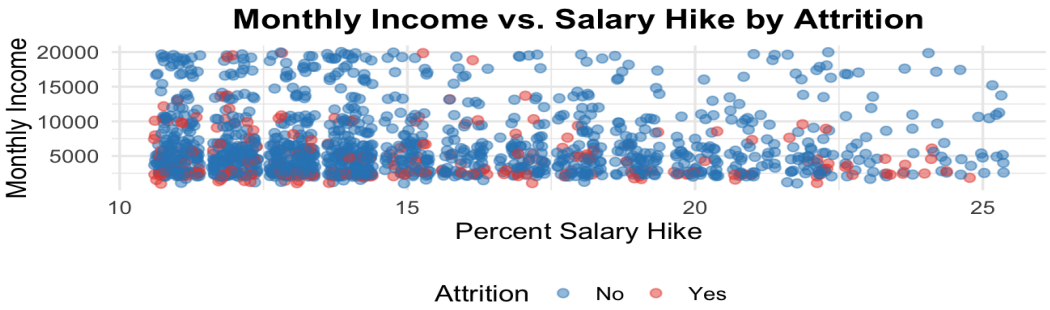

Attrition by Educational Level
Without College
PhD
Masters
College
Bachelors
18.2%
81.8%
10.4%
89.6%
14.6%
85.4%
15.6%
84.4%
17.3%
82.7%
0.00
0.25
0.50
0.75
1.00
Proportion of Employees
Attrition
No
Yes

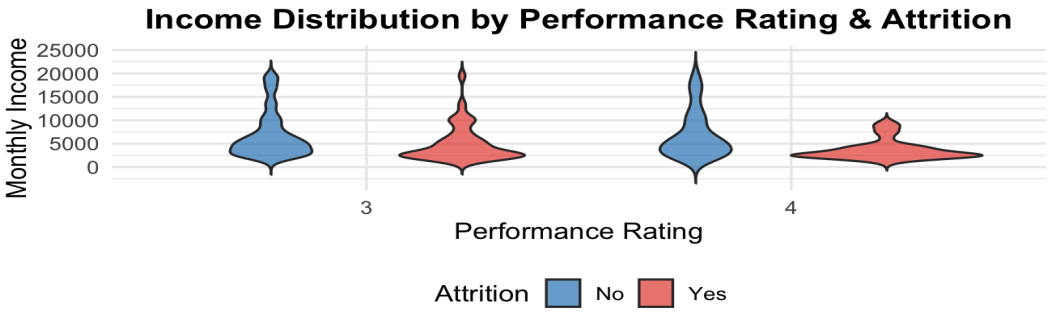


3. Compensation & Work Conditions

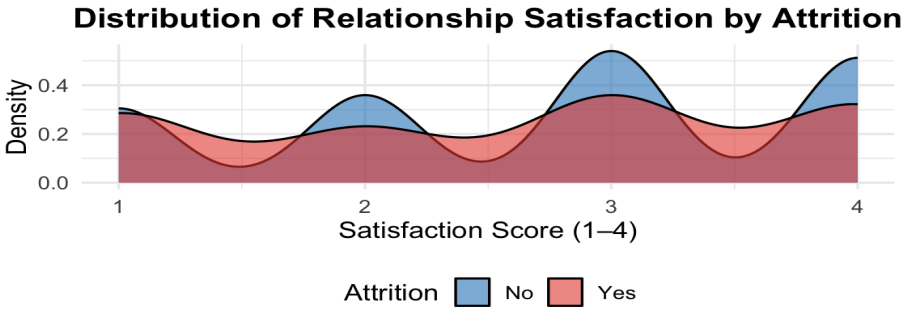
Income, salary hikes, overtime, and work-life balance were significant contributors to attrition. Employees with poor work-life balance and lower compensation were more likely to leave.

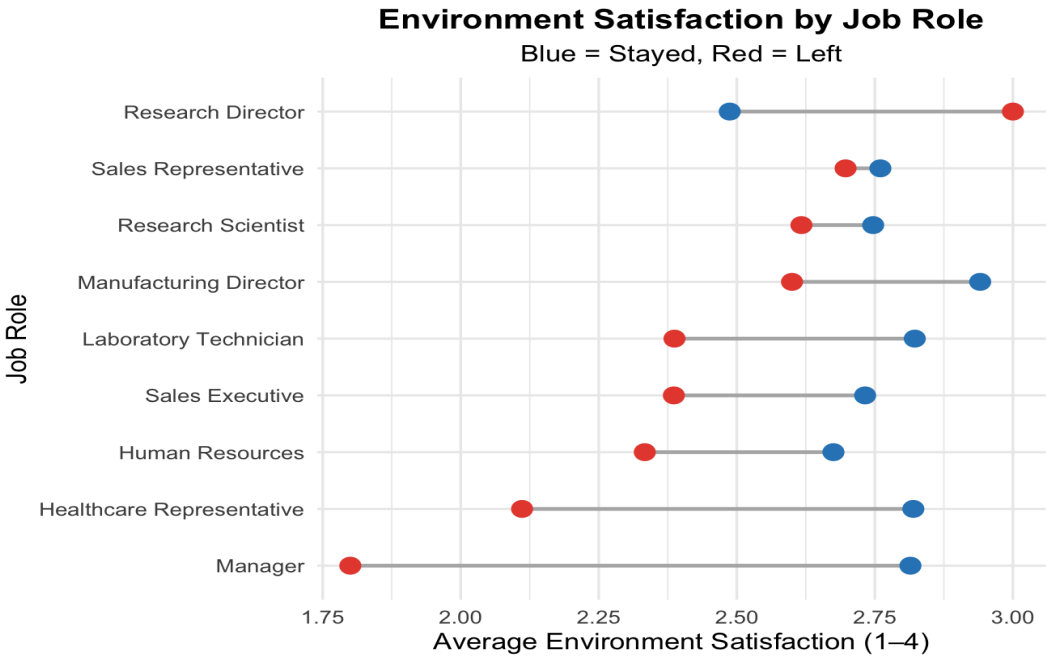


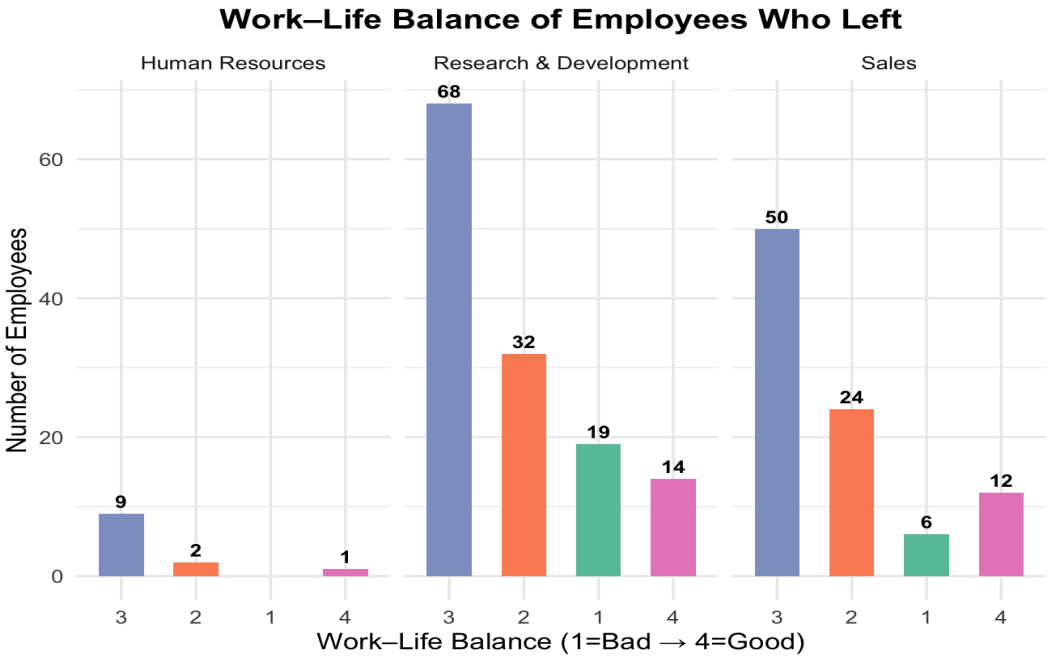

Monthly Income vs. Salary Hike by Attrition
Monthly Income
20000
15000
10000
5000
10
15
20
25
Percent Salary Hike
Attrition
No
Yes

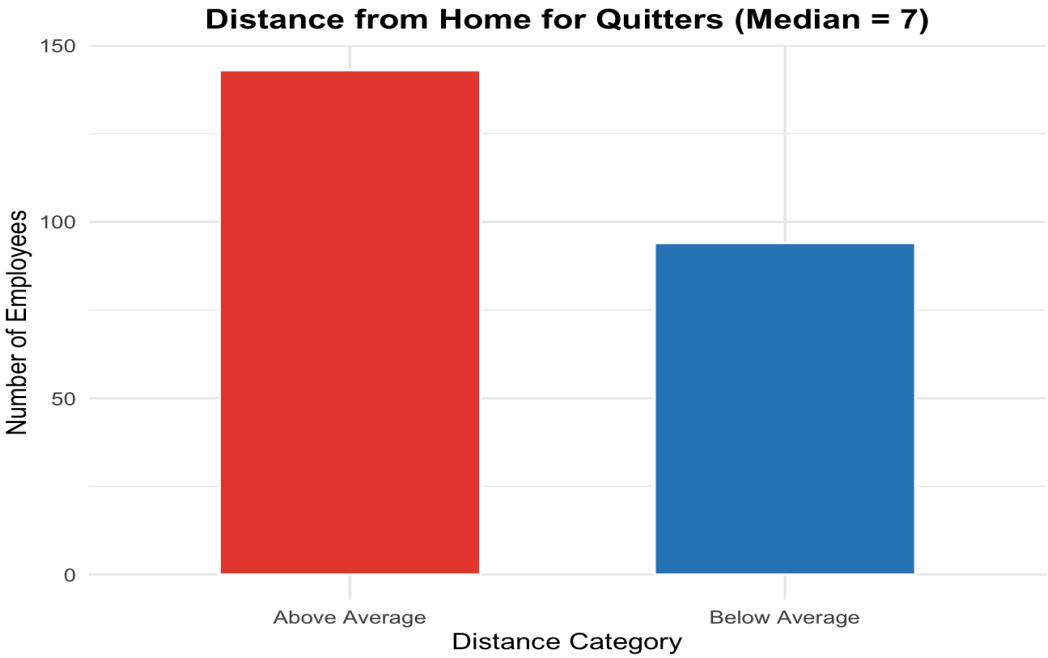

Income Distribution by Performance Rating & Attrition
Monthly Income
25000
20000
15000
10000
5000
0
3
4
Performance Rating
Attrition
No
Yes

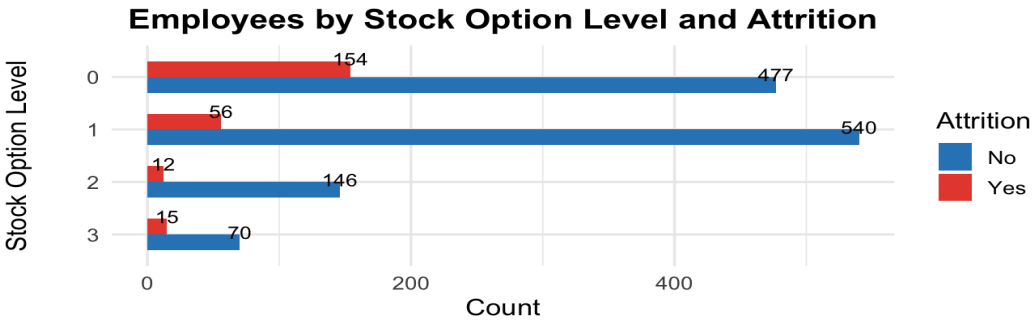
Relationship Satisfaction by Years with Current Manager
Average Satisfaction (1–4
2
1
0
ong Established Manager
2-4 Years Hired
Recently Hired
Years with Current Manager
Attrition
No
Yes

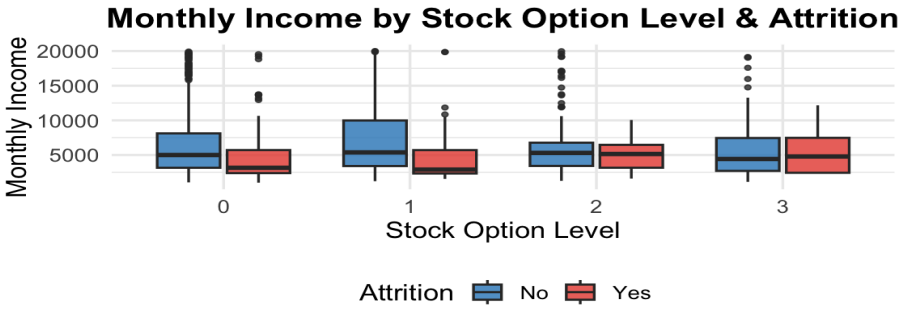

Distribution of Relationship Satisfaction by Attrition
Density
0.4
0.2
0.0
1
2
3
4
Satisfaction Score (1–4)
Attrition
No
Yes

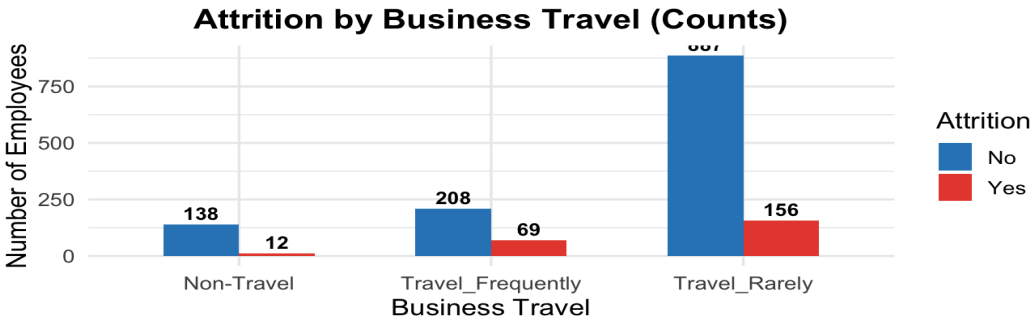

Environment Satisfaction by Job Role
Blue = Stayed, Red = Left
Job Role
Research Director
Sales Representative
Research Scientist
Manufacturing Director
Laboratory Technician
Sales Executive
Human Resources
Healthcare Representative
Manager
1.75
2.00
2.25
2.50
2.75
3.00
Average Environment Satisfaction (1–4)

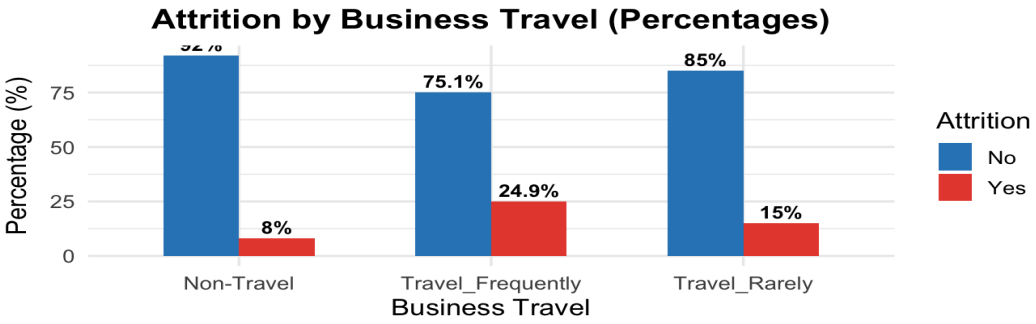

Work–Life Balance of Employees Who Left
Human Resources
Research & Development
Sales
Number of Employees
0
20
40
60
9
2
1
68
32
19
14
50
24
6
12
3
2
1
4
Work–Life Balance (1=Bad → 4=Good)


Distance from Home for Quitters (Median = 7)
Number of Employees
150
100
50
0
Above Average
Below Average
Distance Category


Employees by Stock Option Level and Attrition
Stock Option Level
0
1
2
3
154
477
56
540
12
146
15
70
0
200
400
Count
Attrition
No
Yes

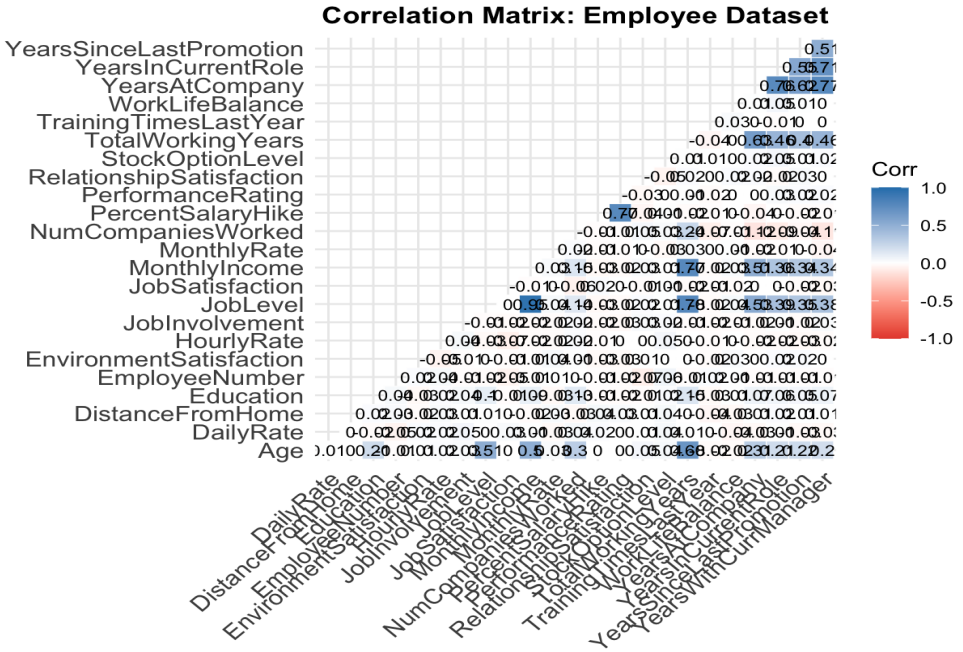

Monthly Income by Stock Option Level & Attrition
Monthly Income
20000
15000
10000
5000
0
1
2
3
Stock Option Level
Attrition
No
Yes

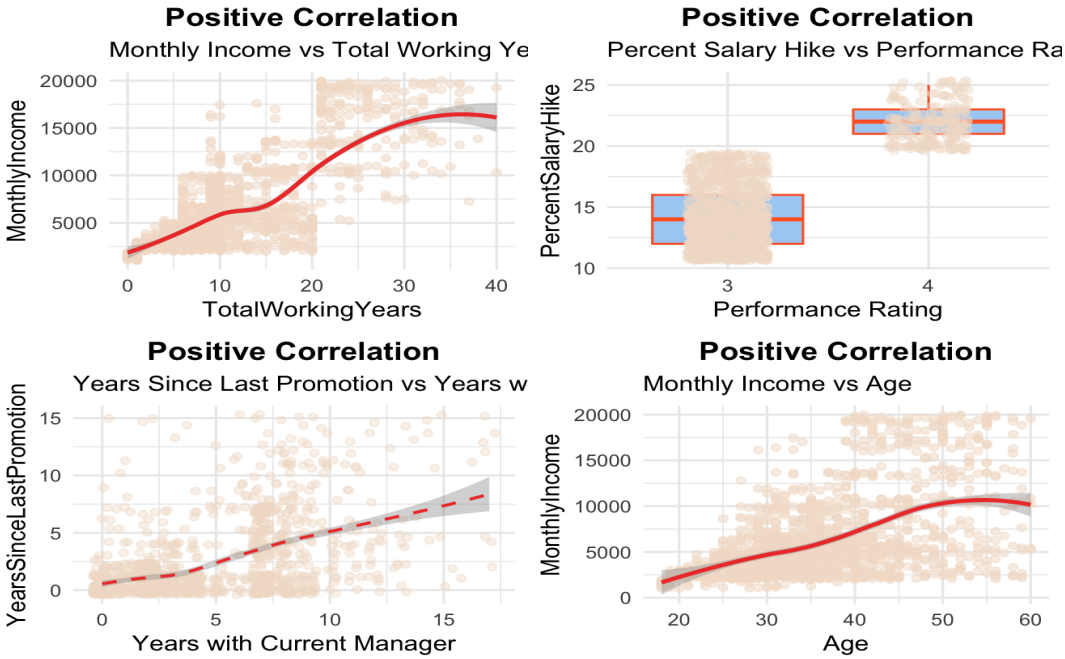




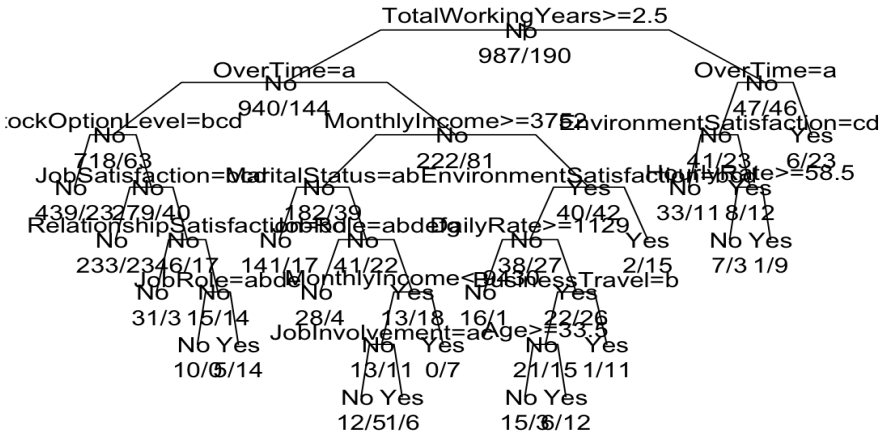
4. Correlation & Predictive Modeling

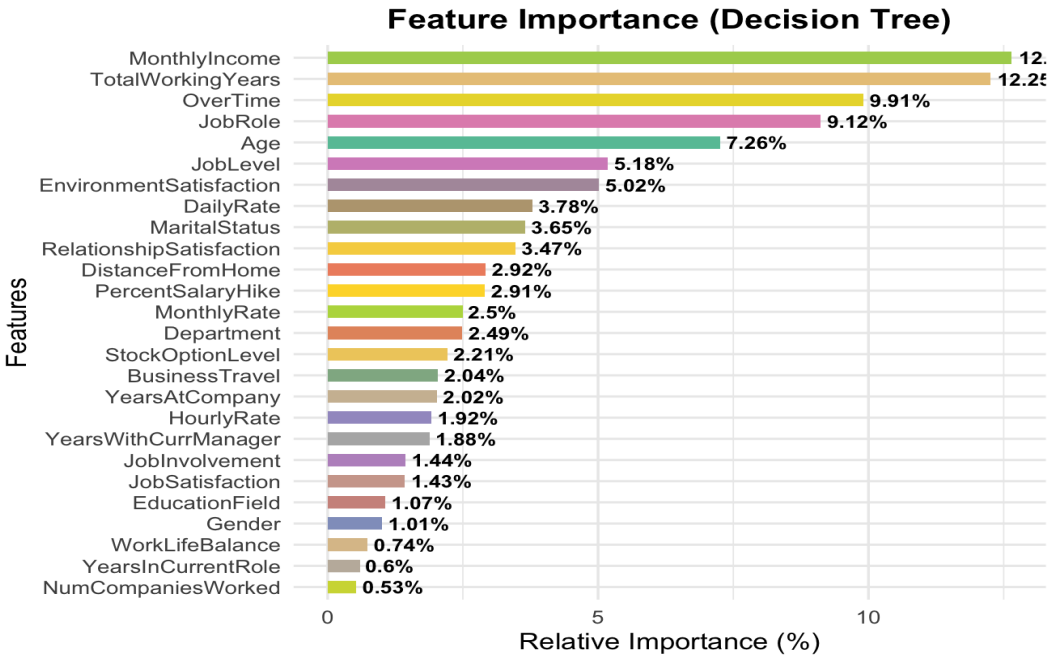
Correlation analysis revealed strong links between working years, income, and attrition. Decision trees and logistic regression models were used to predict attrition outcomes.

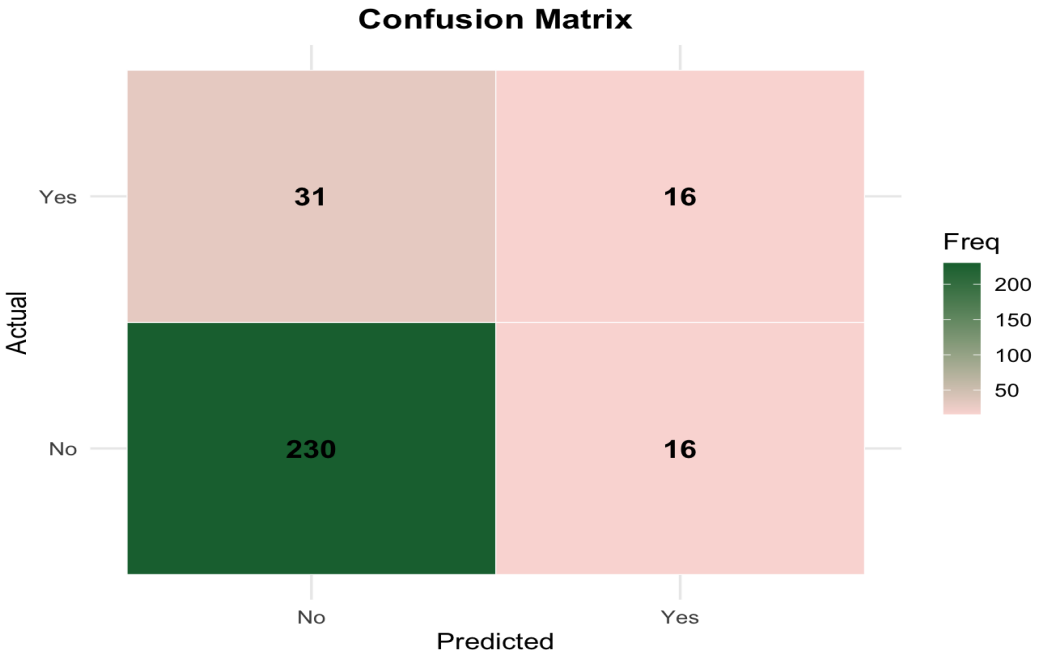


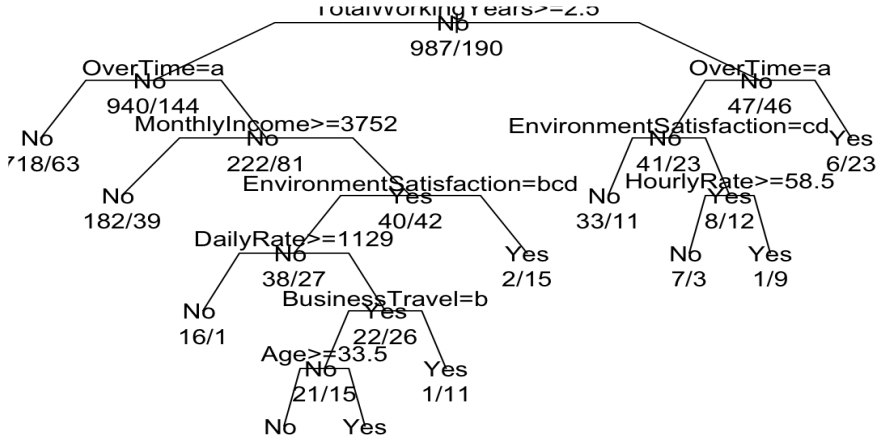


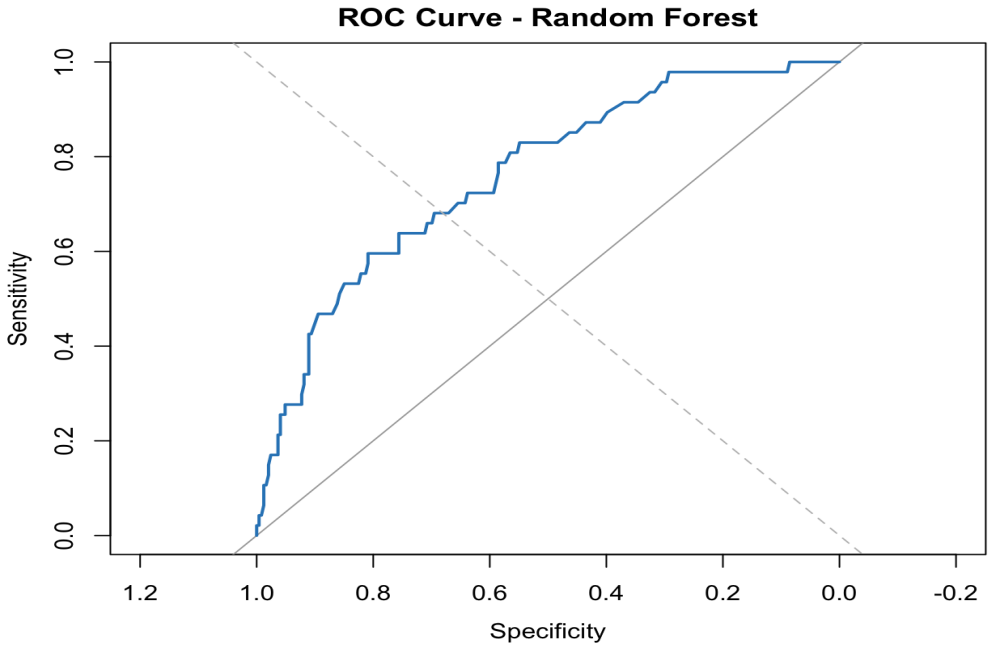
Training Set's Classification Tree

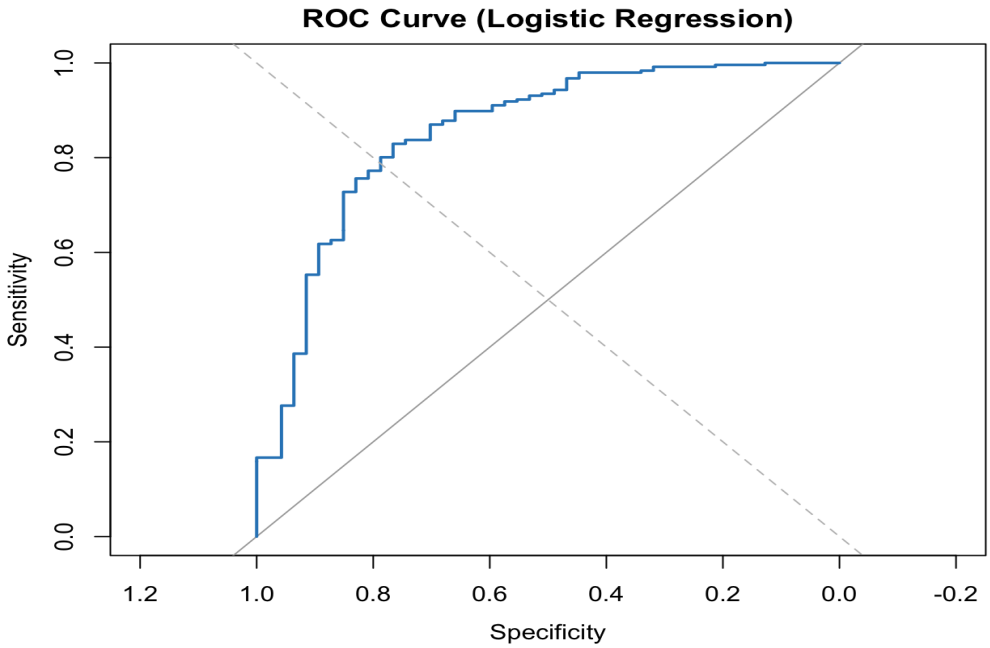



Feature Importance (Decision Tree)
MonthlyIncome
TotalWorkingYears
OverTime
JobRole
Age
JobLevel
EnvironmentSatisfaction
DailyRate
MaritalStatus
RelationshipSatisfaction
DistanceFromHome
PercentSalaryHike
MonthlyRate
Department
StockOptionLevel
BusinessTravel
YearsAtCompany
HourlyRate
YearsWithCurrManager
JobInvolvement
JobSatisfaction
EducationField
Gender
WorkLifeBalance
YearsInCurrentRole
NumCompaniesWorked
12.
12.25
9.91%
9.12%
7.26%
5.18%
5.02%
3.78%
3.65%
3.47%
2.92%
2.91%
2.5%
2.49%
2.21%
2.04%
2.02%
1.92%
1.88%
1.44%
1.43%
1.07%
1.01%
0.74%
0.6%
0.53%
Features
0
5
10
Relative Importance (%)


Confusion Matrix
Yes
No
31
16
230
16
Actual
No
Yes
Predicted
Freq
200
150
100
50


TotalWorkingYears>=2.5
No
987/190
OverTime=a
No
940/144
OverTime=a
No
47/46
No
718/63
MonthlyIncome>=3752
No
222/81
EnvironmentSatisfaction=cd
No
41/23
Yes
6/23
No
182/39
EnvironmentSatisfaction=bcd
Yes
40/42
No
33/11
HourlyRate>=58.5
Yes
8/12
DailyRate>=1129
No
38/27
Yes
2/15
No
7/3
Yes
1/9
No
16/1
BusinessTravel=b
Yes
22/26
Age>=33.5
No
21/15
Yes
1/11
No
Yes


ROC Curve - Random Forest
Sensitivity
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
Specificity



5. Recommendations

- Address gender pay disparities by introducing equitable compensation policies. - Improve work-life balance through flexible scheduling and reduced overtime. - Focus retention efforts on Millennials, who demonstrate higher job mobility. - Enhance career development and promotion pathways to reduce attrition risk. - Use predictive modeling in HR analytics for proactive employee retention strategies.