

EMPLOYEE ATTRITION PREDICTION AND ANALYSIS



TEAM MEMBERS

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INTRODUCTION

The project aims to predict whether an employee will leave the company or not

Helps HR departments reduce attrition by identifying key influencing factors

Uses data analysis and machine learning techniques

PROJECT WORKFLOW



Data collection

Exploratory Data Analysis (EDA)

Data preprocessing

Feature selection

Model training

Model evaluation

Deployment

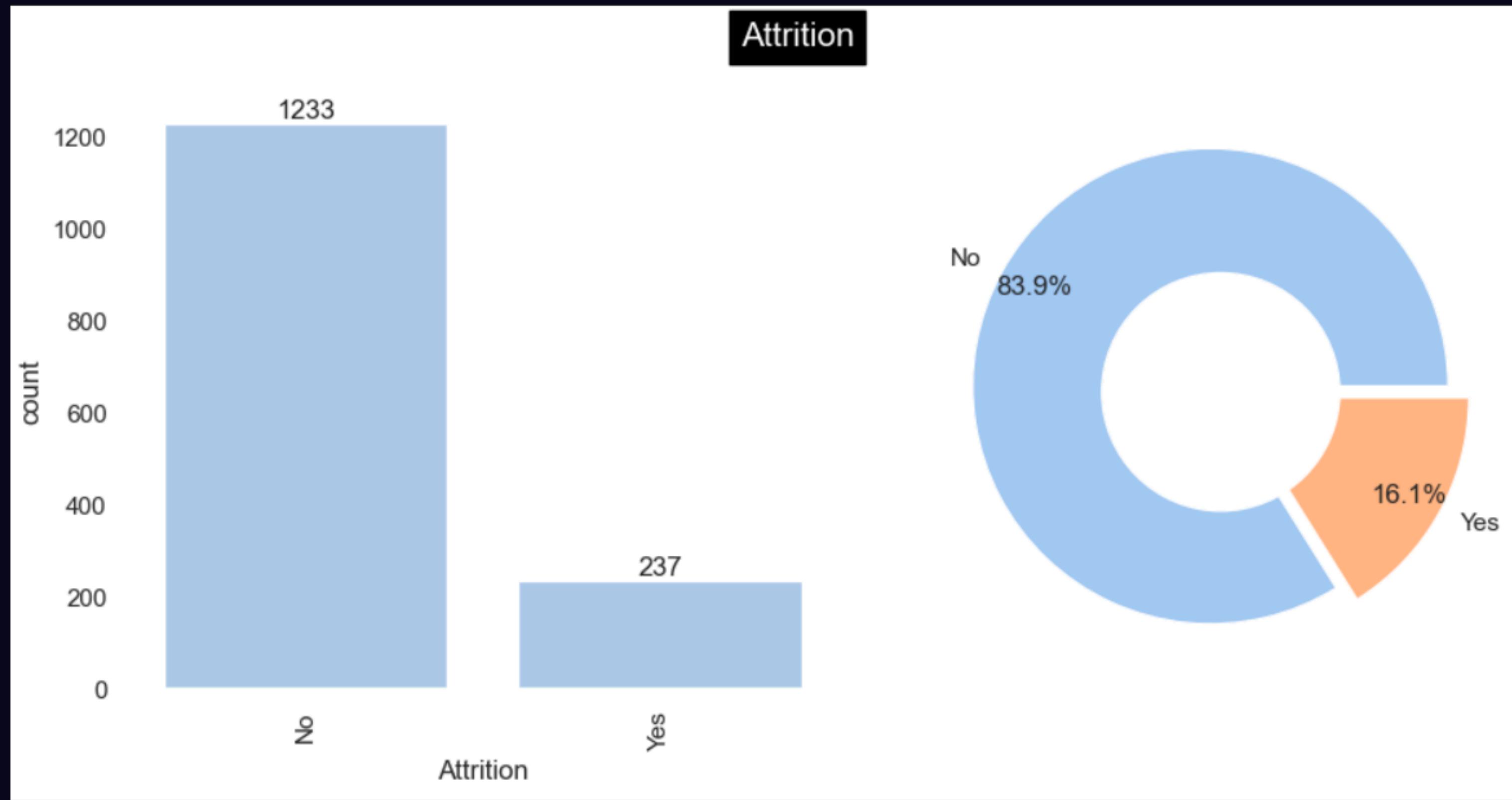
Insights & conclusion

Dataset Overview

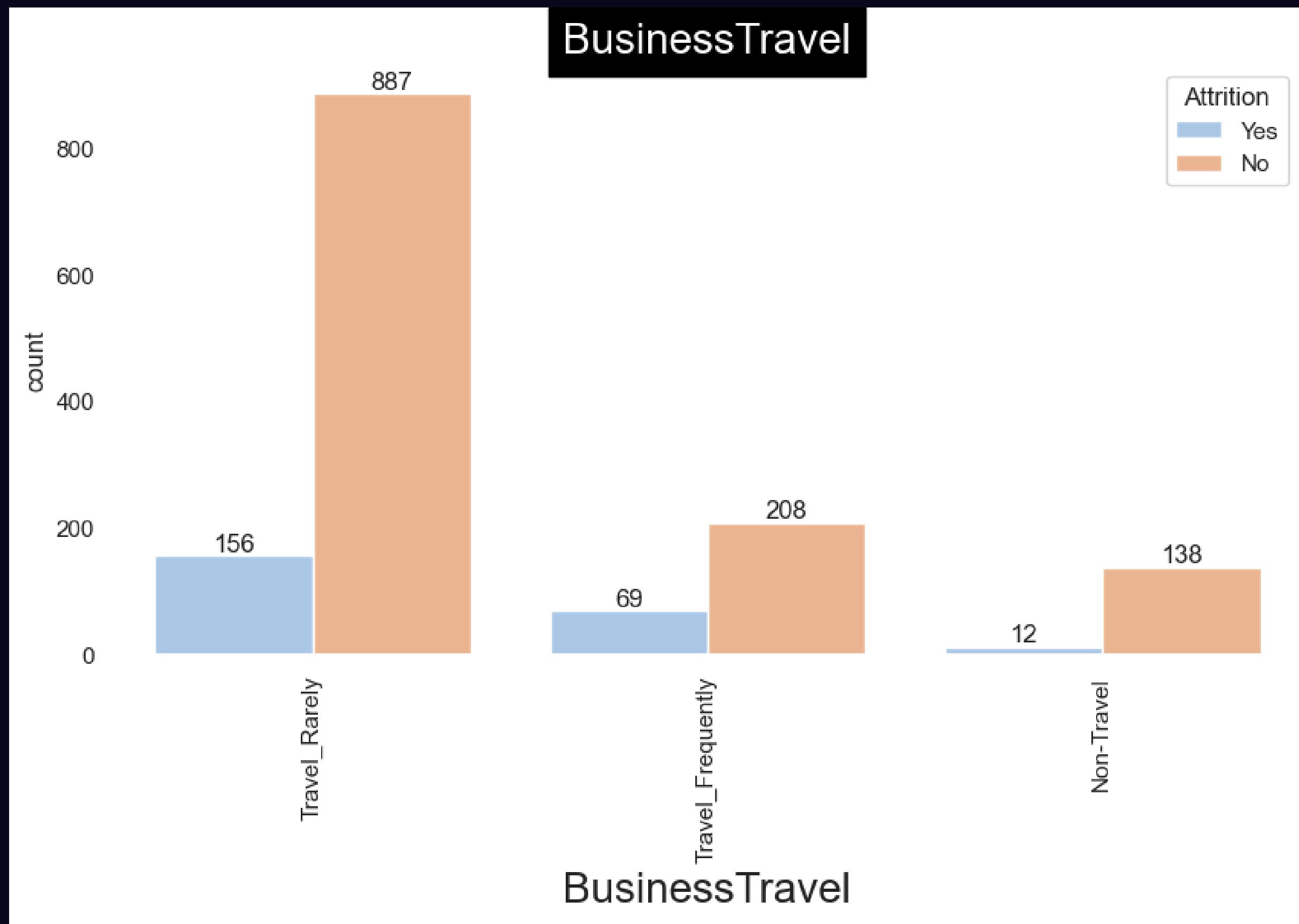
Source: [IBM HR Analytics dataset](#)

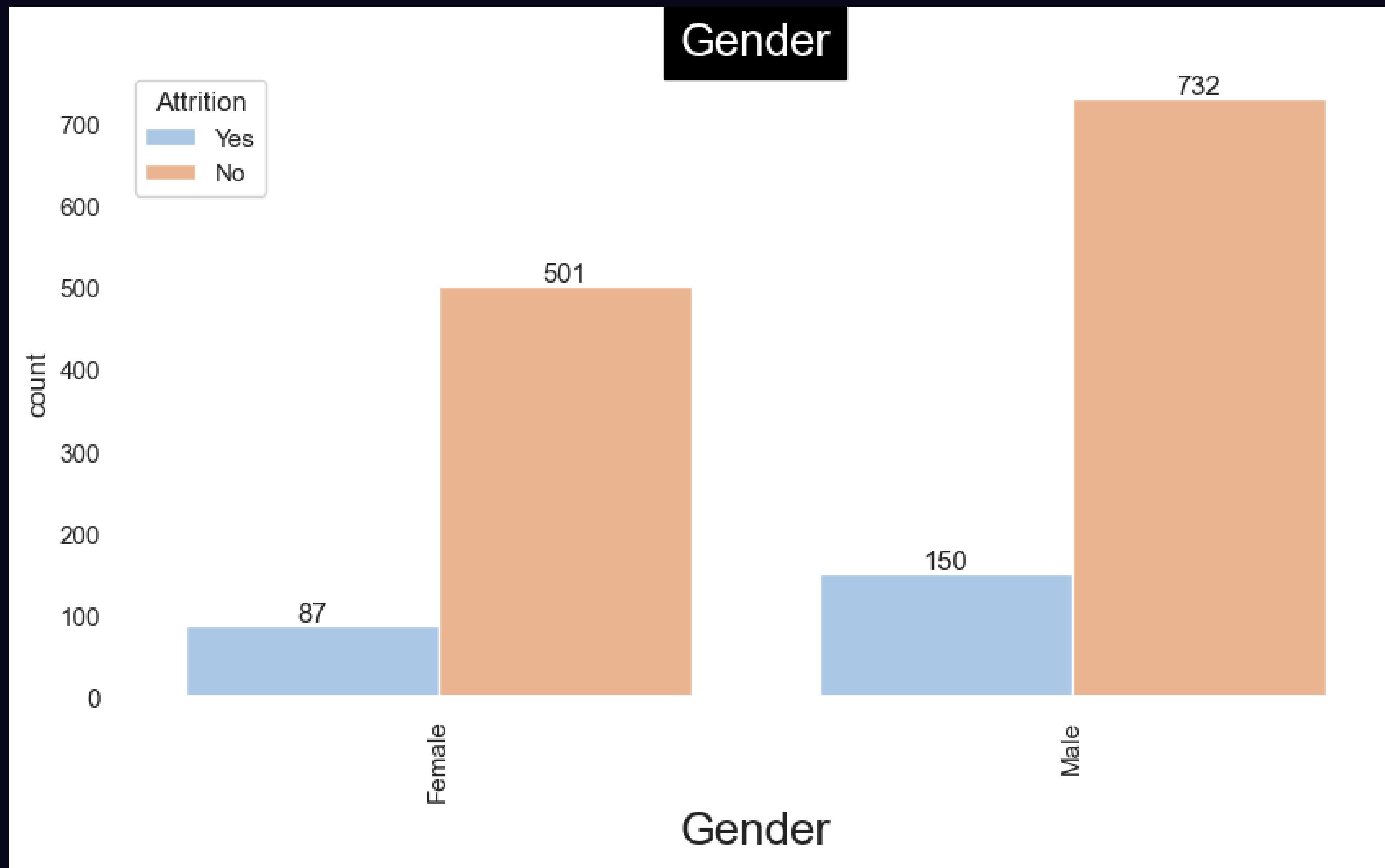
Age	Attrition	BusinessTravel	DailyRate	Department	DistanceFromHome	Education	EducationField	EmployeeCount	EmployeeNumber	...	RelationshipSatisfaction	StandardHours
41	Yes	Travel_Rarely	1102	Sales	1	2	Life Sciences	1	1	...	1	80
49	No	Travel_Frequently	279	Research & Development	8	1	Life Sciences	1	2	...	4	80
37	Yes	Travel_Rarely	1373	Research & Development	2	2	Other	1	4	...	2	80
33	No	Travel_Frequently	1392	Research & Development	3	4	Life Sciences	1	5	...	3	80
27	No	Travel_Rarely	591	Research & Development	2	1	Medical	1	7	...	4	80

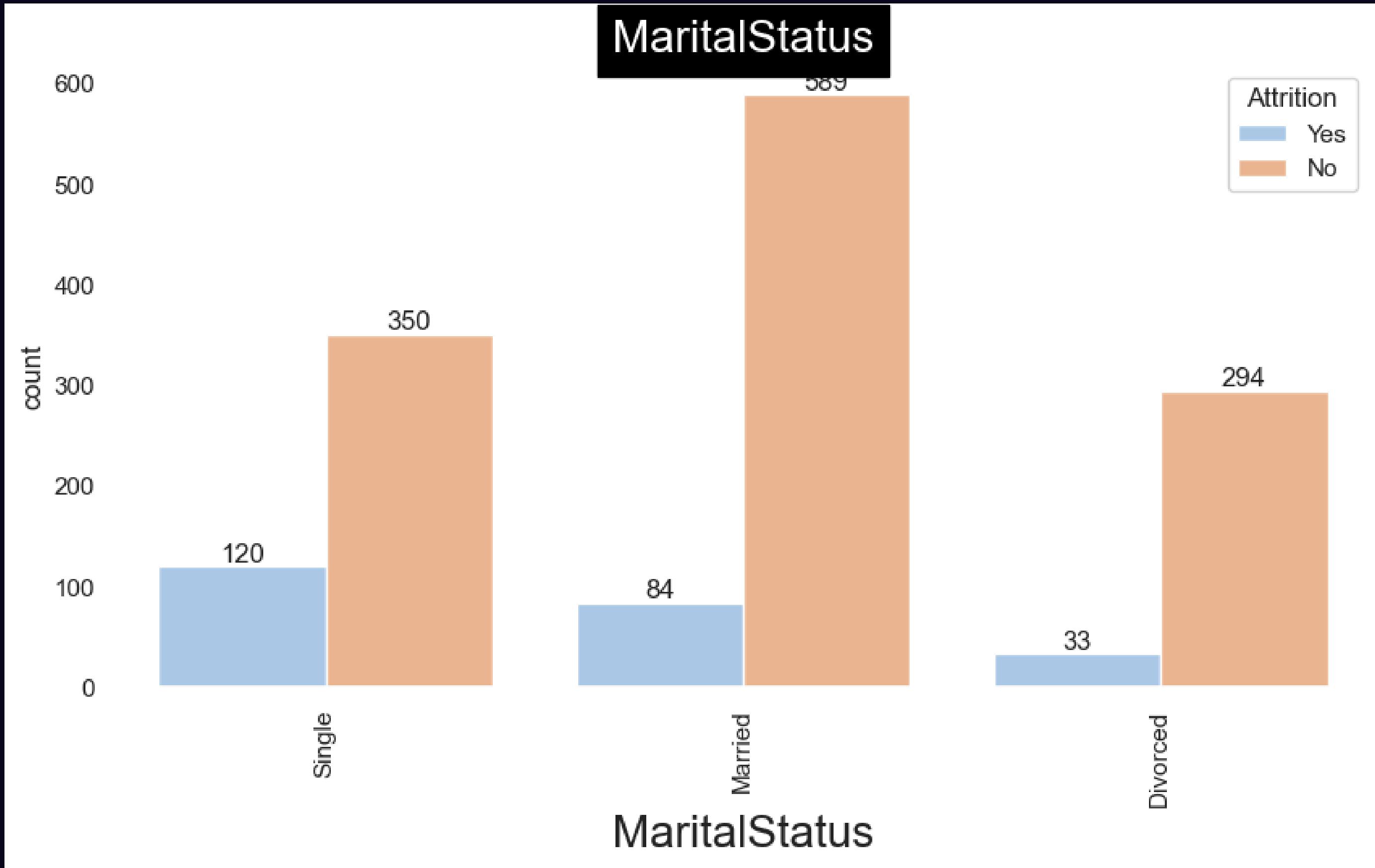
EDA

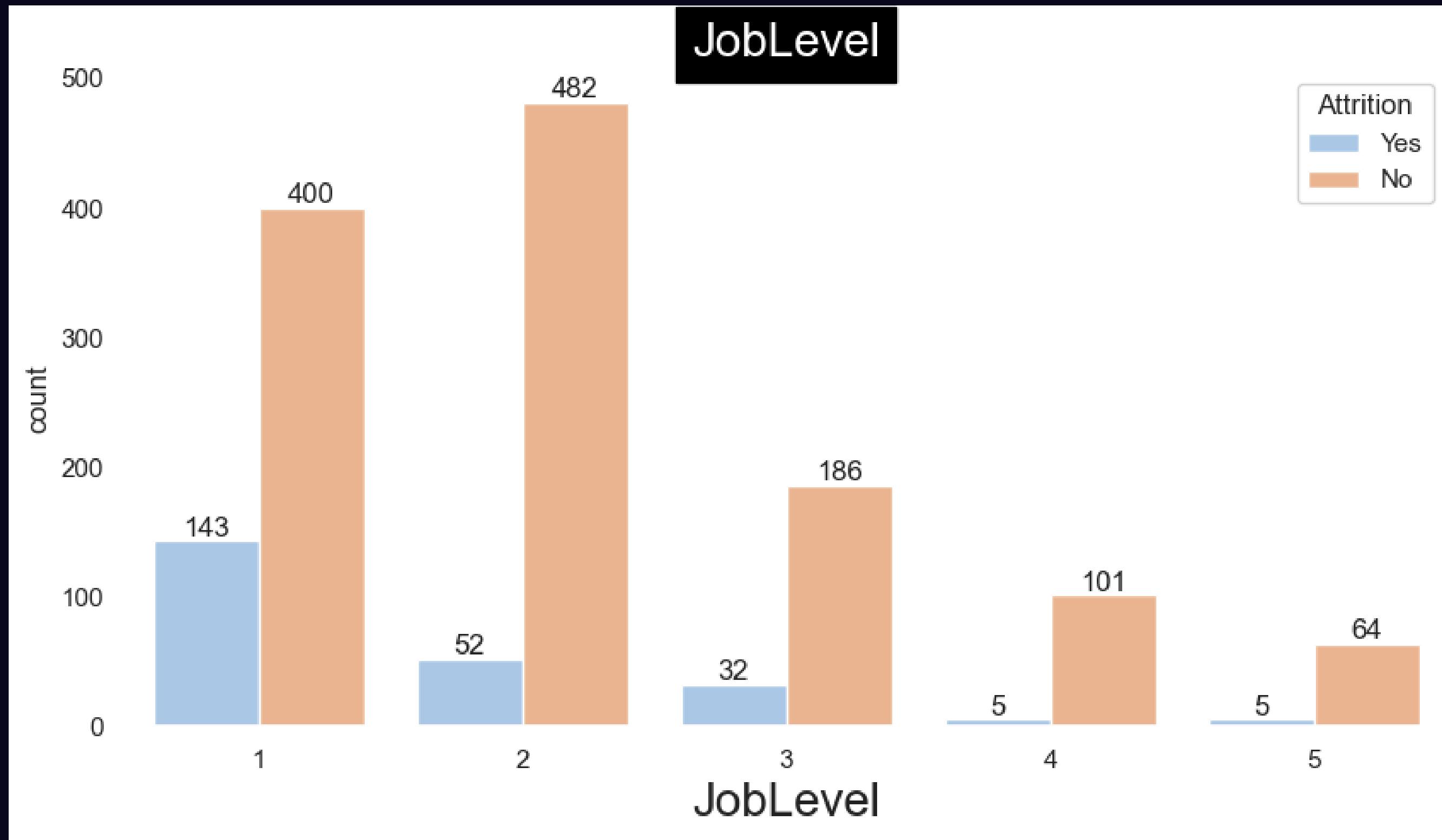


BusinessTravel

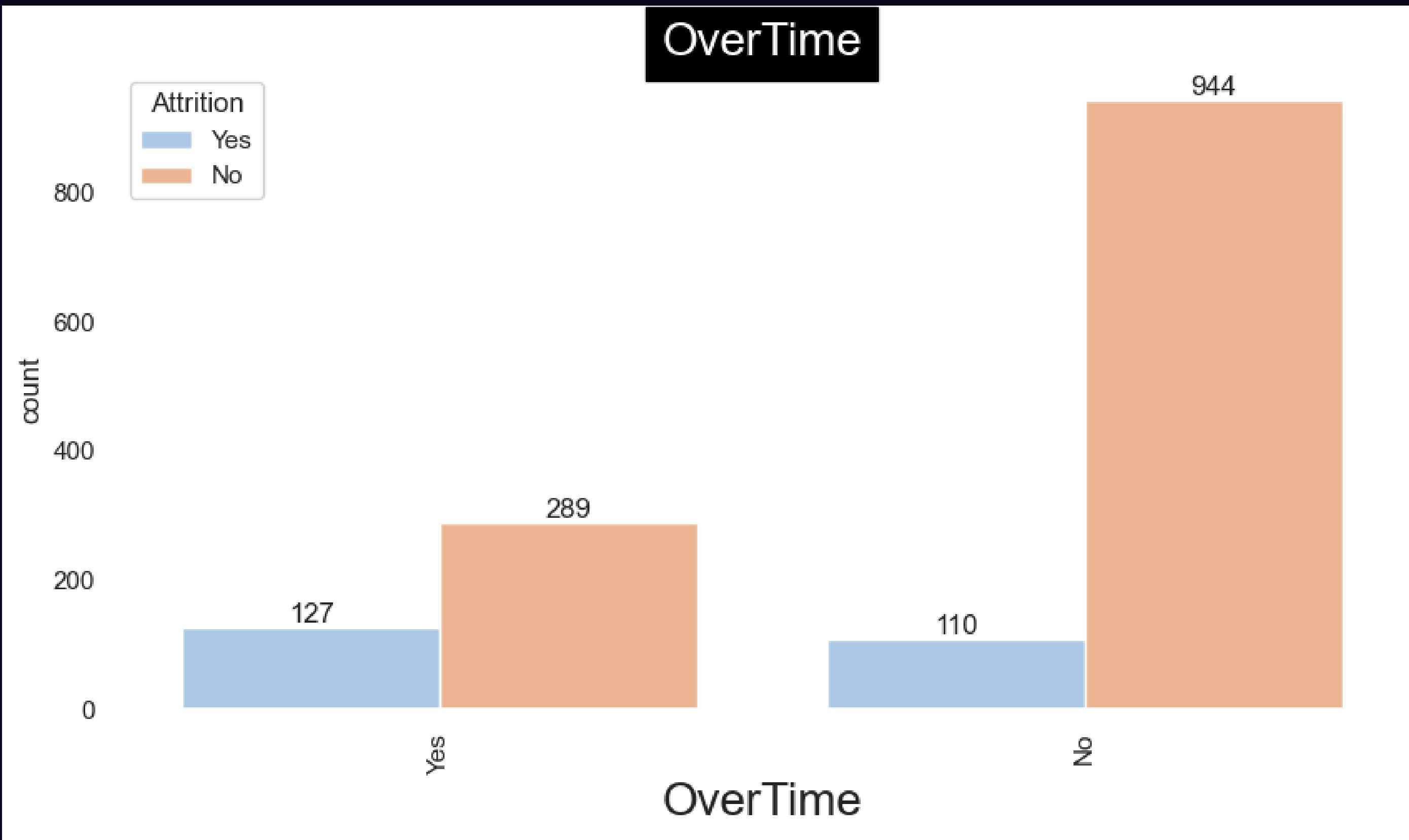








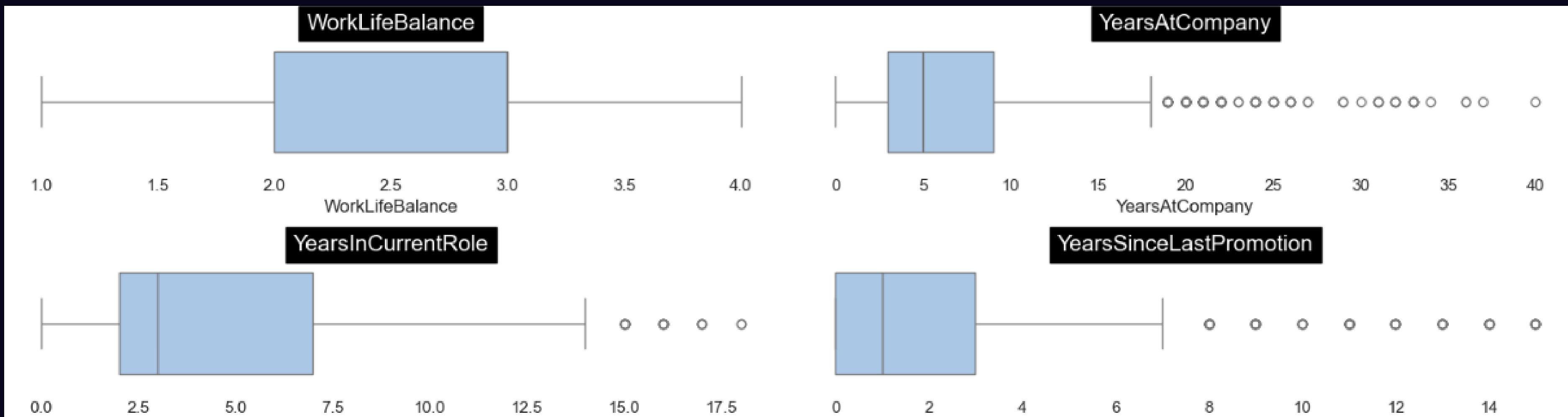
OverTime







Box plot



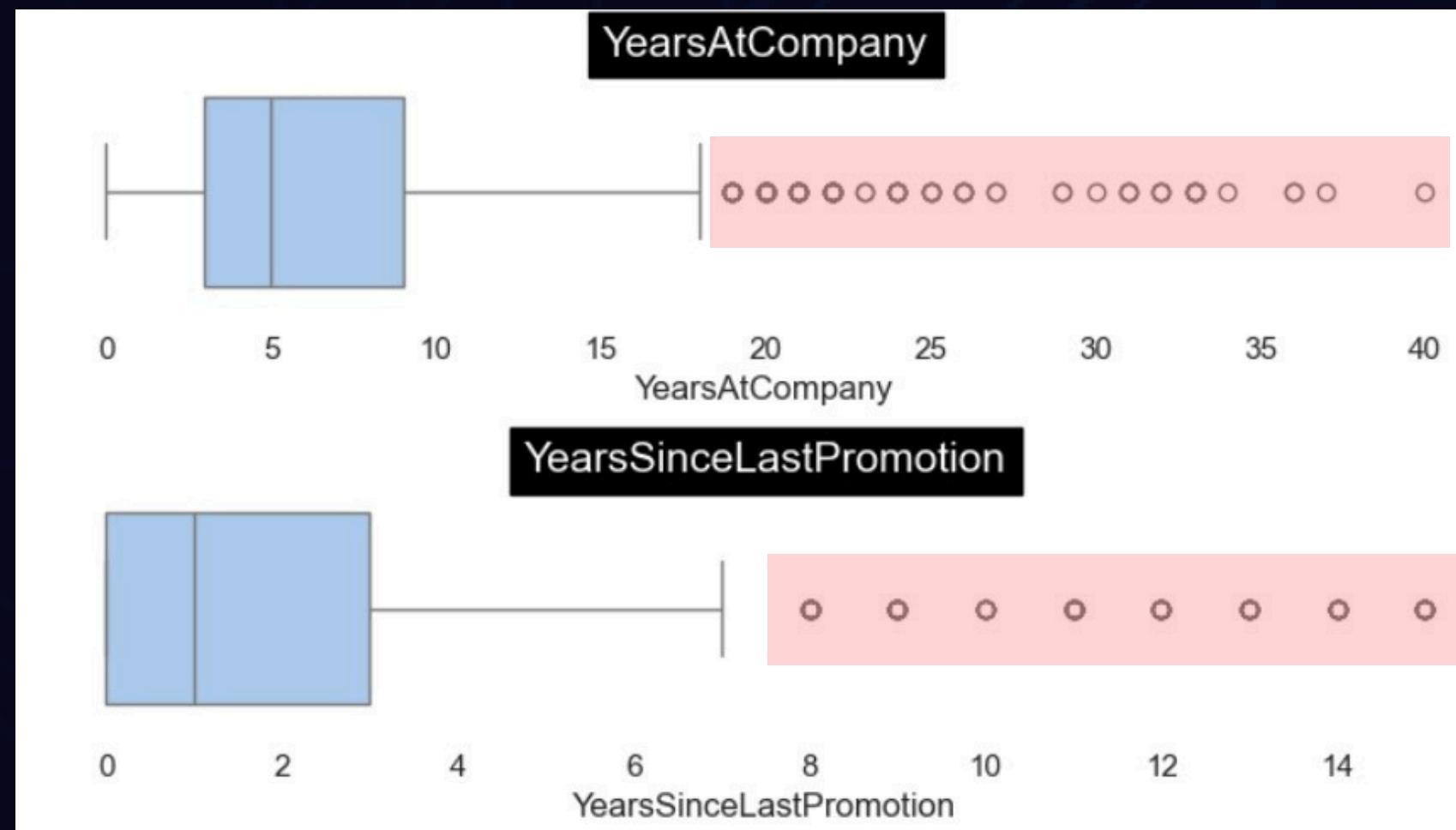
WE NOTICED

- No balance in attrition
- Attrition is the highest for both men and women from 18 to 35 years of age and gradually decreases.
- As income increases, attrition decreases.
- Attrition is higher for employees who usually travel than others, and this rate is higher for women than for men
- Attrition is the highest for those in level 1 jobs
- Men with the position of sales expert have a lot of attrition

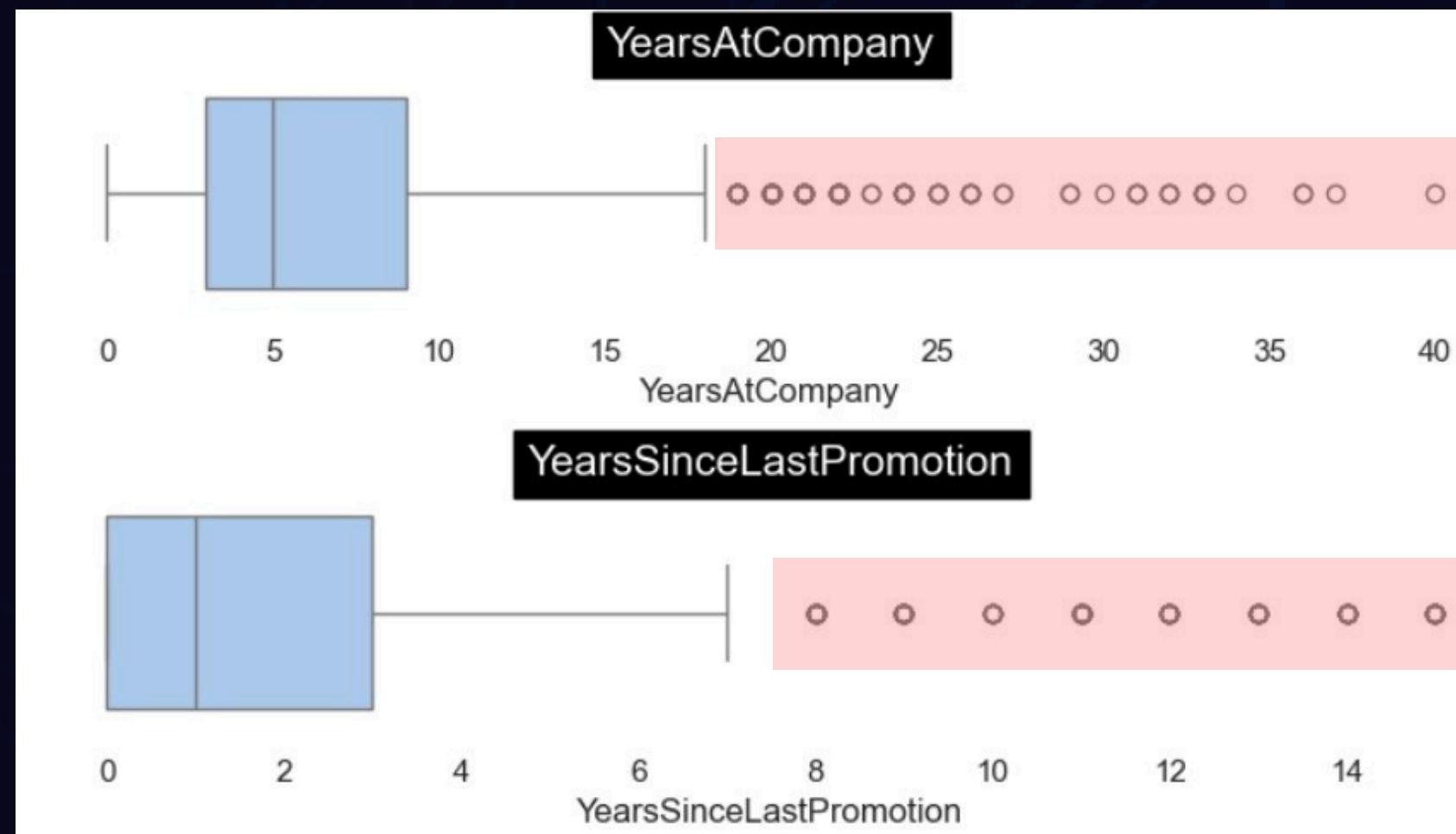
DATA CLEANING & PROCESSING

- No Nulls or Duplicates
- But:
 1. **Over18** : All values are Y
 2. **EmployeeCount** : All values are 1.0
 3. **StandardHours** : All values are 80.0
 4. **EmployeeNumber** : is the id of the employee

IQR



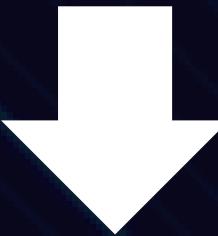
IQR



CAPPING

Capped 'MonthlyIncome' to range [-5291.00, 16581.00]
Capped 'TotalWorkingYears' to range [-7.50, 28.50]
Capped 'YearsAtCompany' to range [-6.00, 18.00]
Capped 'YearsSinceLastPromotion' to range [-4.50, 7.50]
Capped 'YearsInCurrentRole' to range [-5.50, 14.50]
Capped 'YearsWithCurrManager' to range [-5.50, 14.50]
(1470, 31)

Categorical



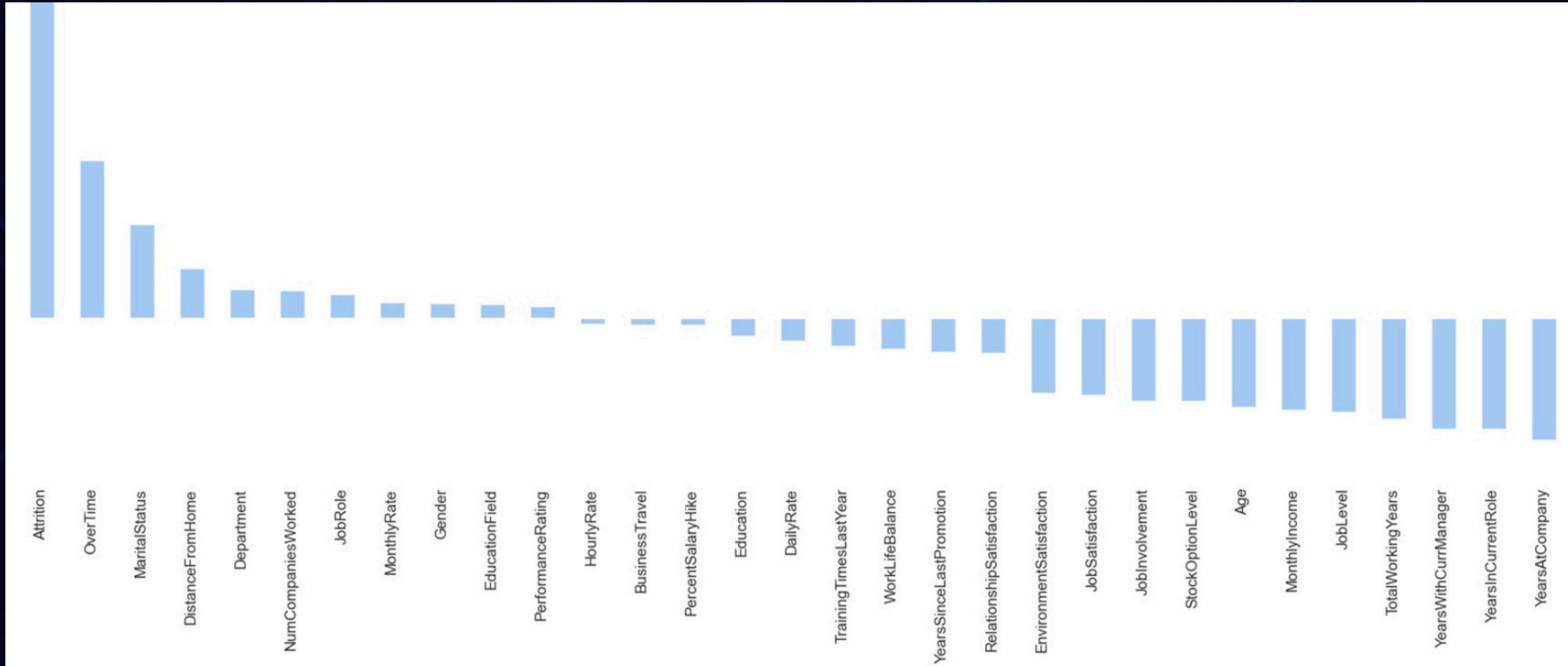
Numerical

LABEL ENCODING

	Attrition	Gender
0 >>	No	Female
1 >>	Yes	Male
	BusinessTravel	JobRole
0 >>	Non-Travel	Healthcare Representative
1 >>	Travel_Frequently	Human Resources
2 >>	Travel_Rarely	Laboratory Technician
	Department	...
0 >>	Human Resources	Single
1 >>	Research & Development	Overtime
2 >>	Sales	0 >> No
	EducationField	1 >> Yes
0 >>	Human Resources	
1 >>	Life Sciences	
2 >>	Marketing	
3 >>	Medical	
4 >>	Other	
5 >>	Technical Degree	

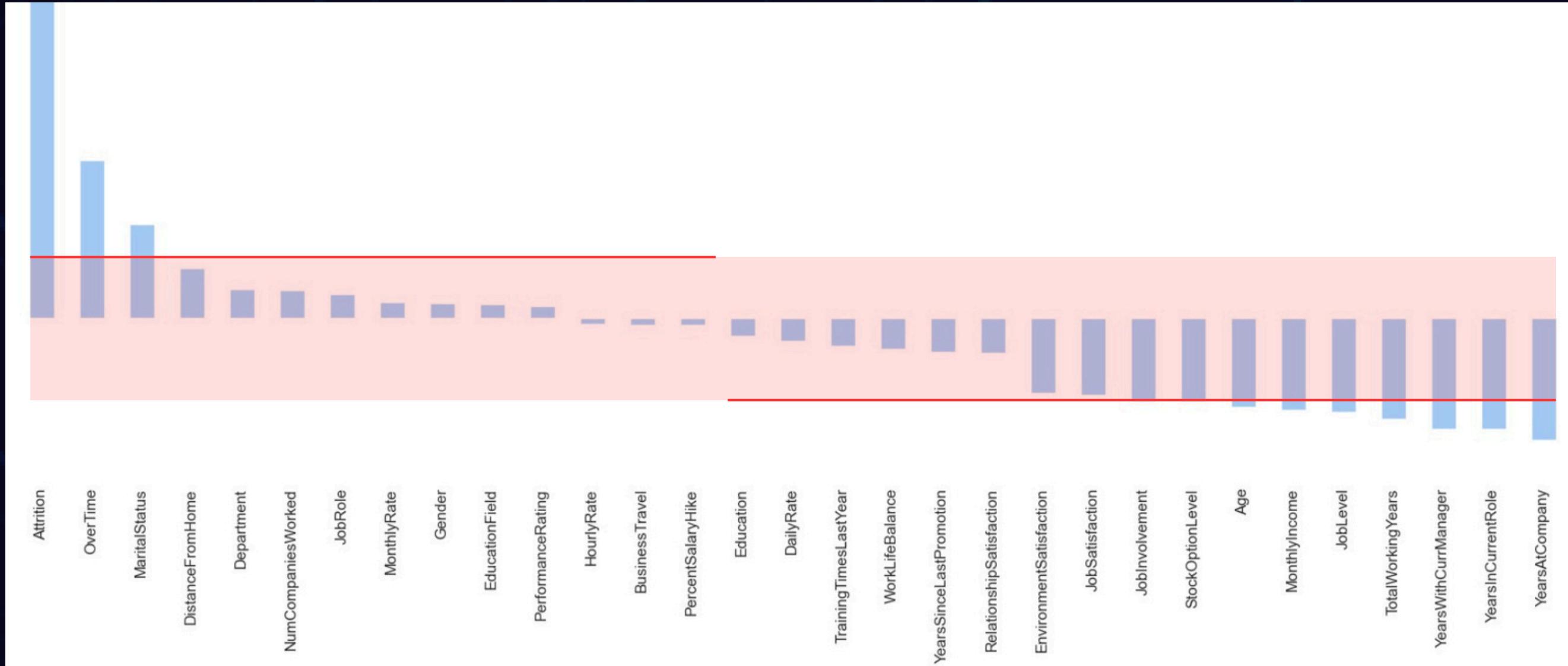
CORRELATION WITH TARGET

[ATTRITION]

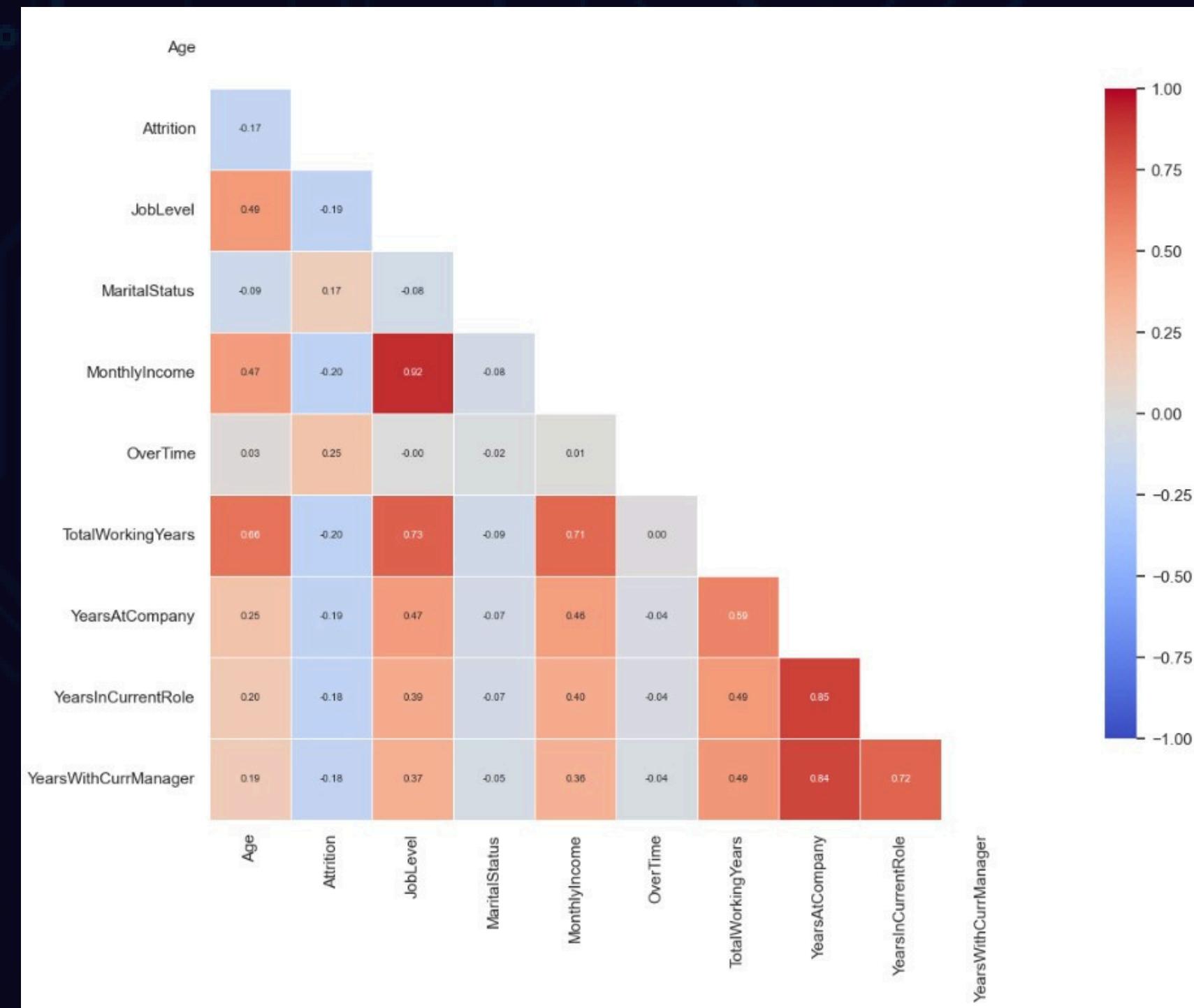


CORRELATION WITH TARGET

[ATTRITION]

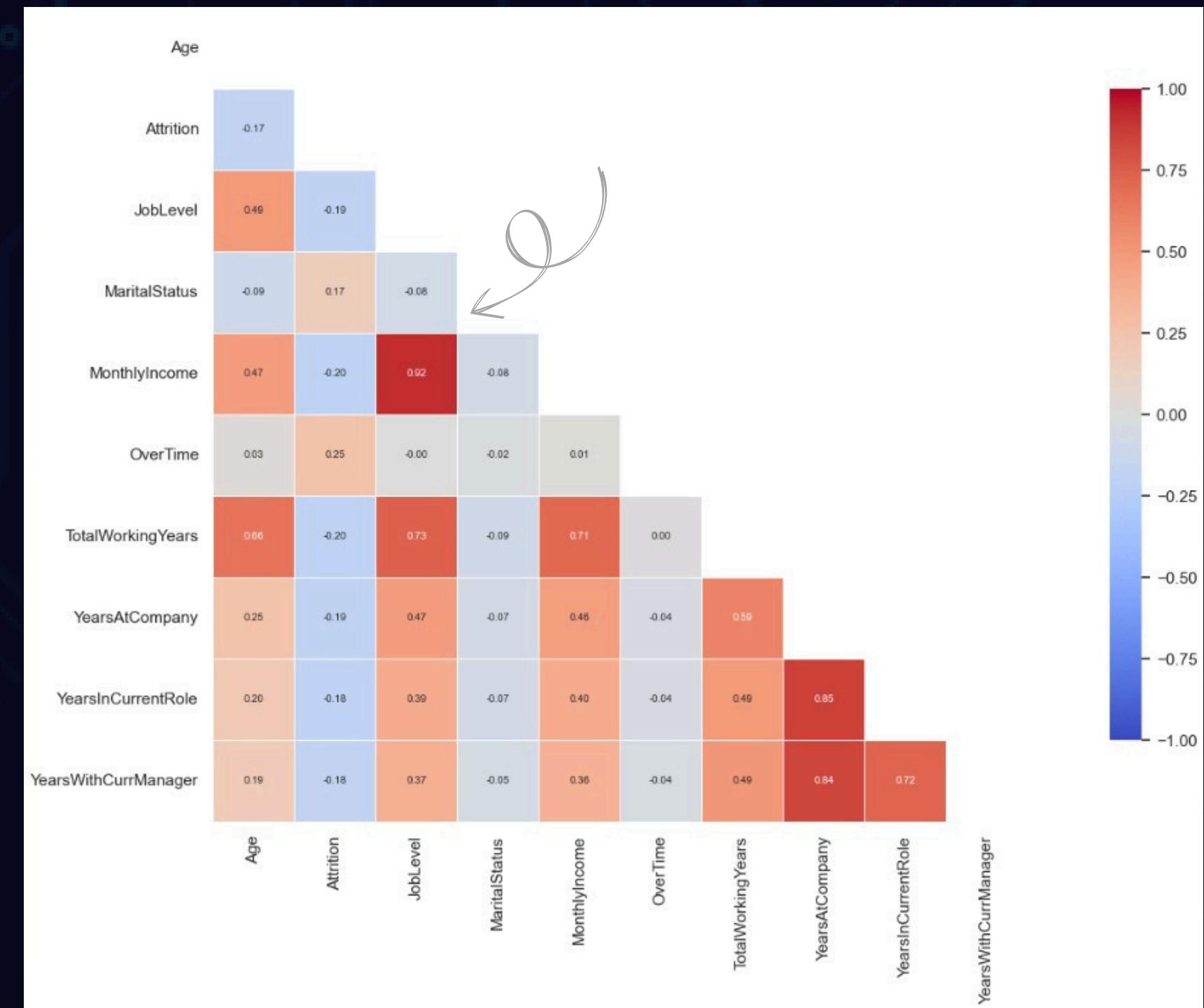


HEAT MAP



Monthly income

HEAT MAP



FEATURE SELECTION

Age

Job Level

Marital Status

OverTime

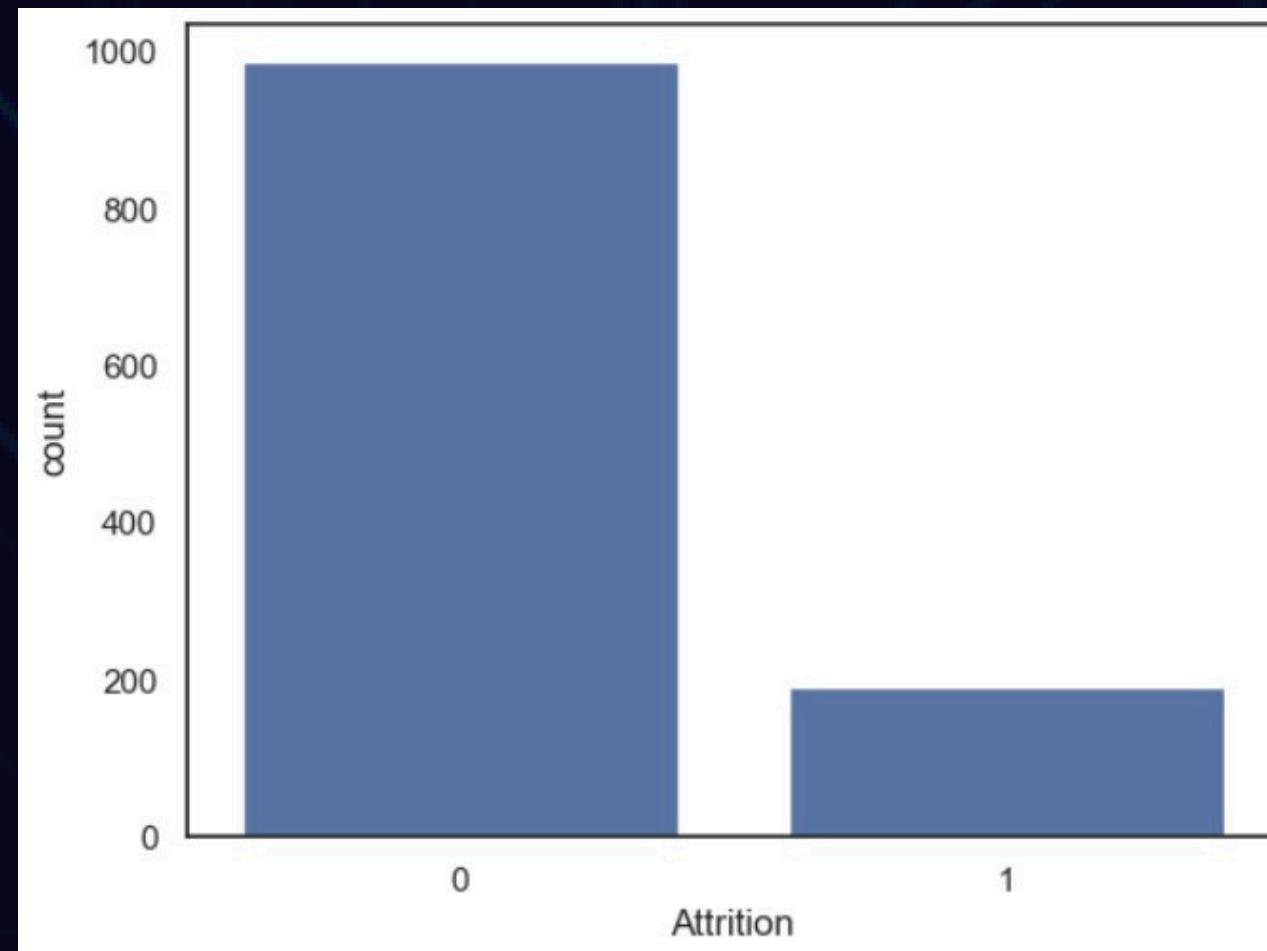
Total Working Years

Years At Company

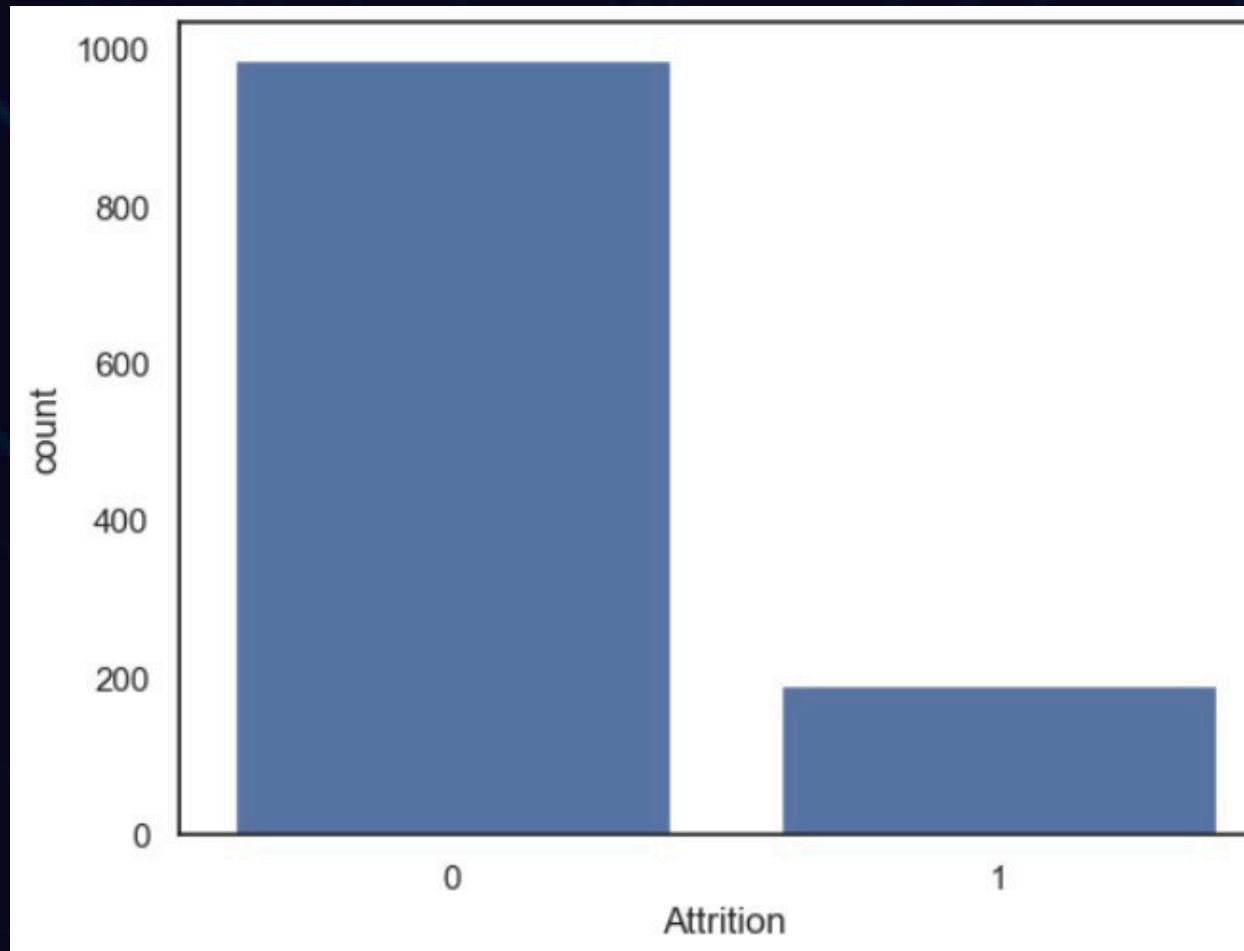
Years In Current Role

Years With Current Manager

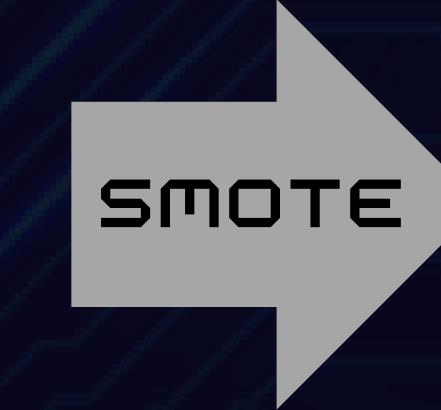
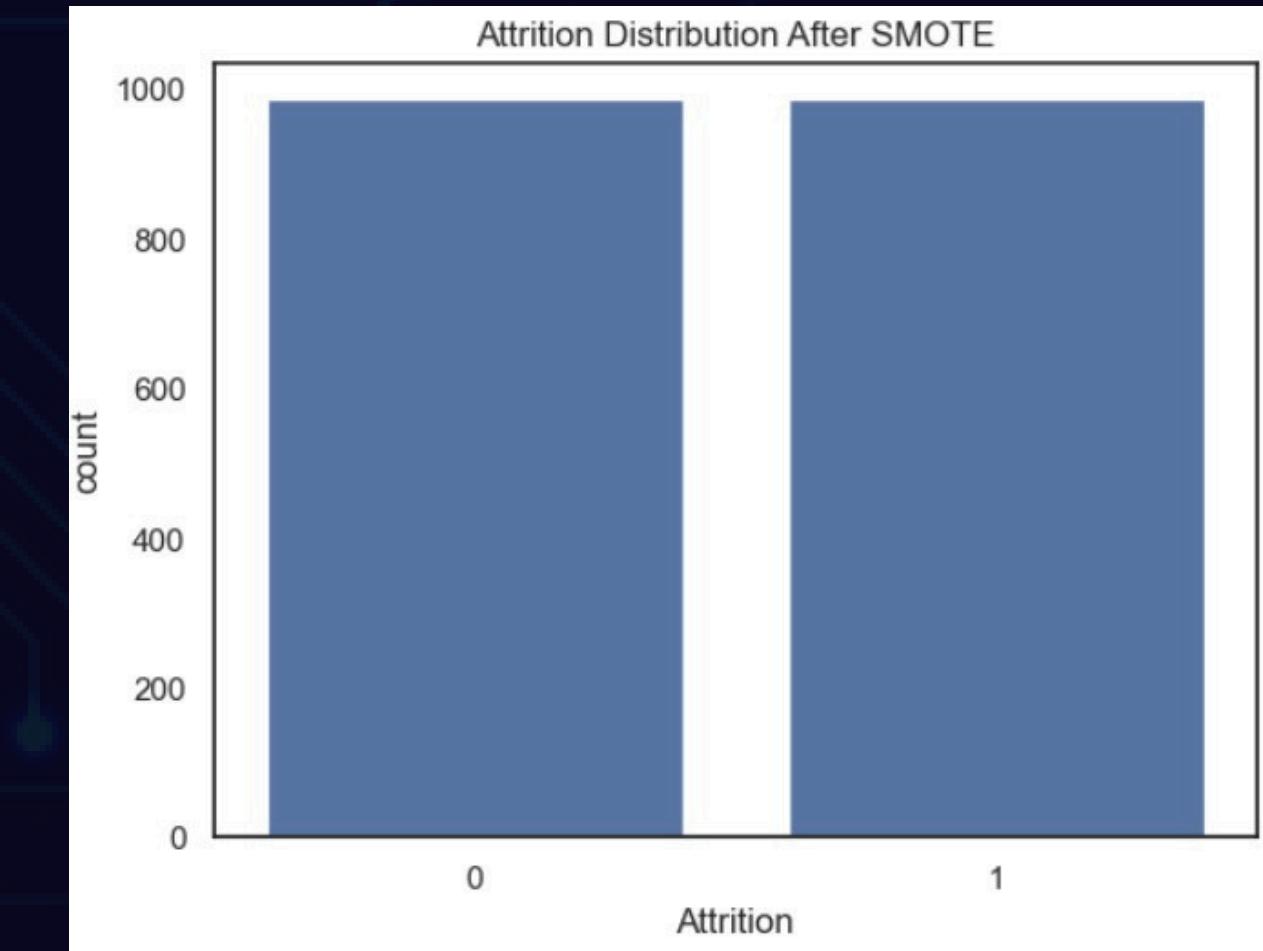
UNBALANCED



UNBALANCED



BALANCED



MODEL BUILDING

- Feature selection and scaling applied

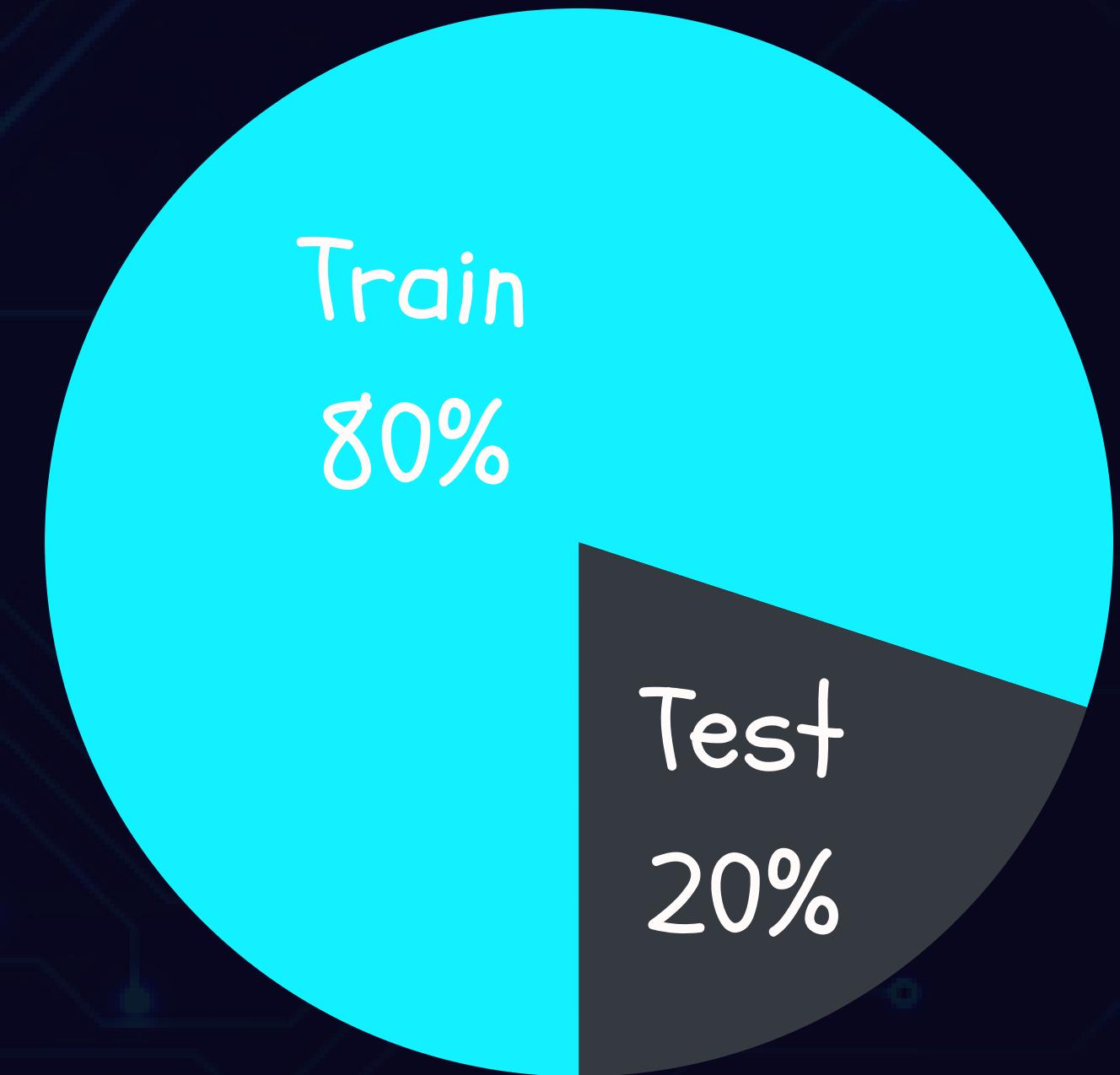
- Machine learning algorithms used:

Logistic Regression

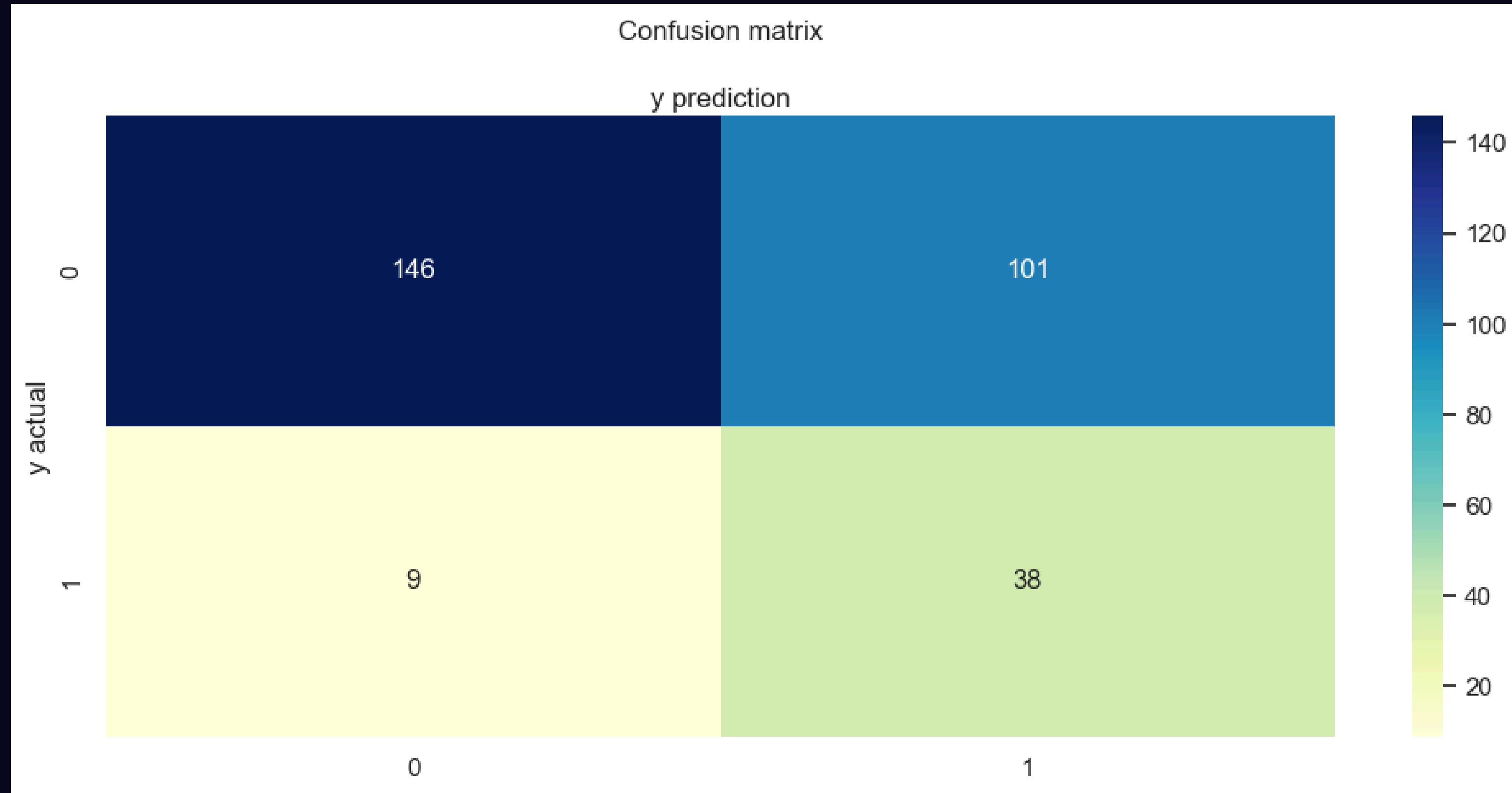
Decision Tree

Random Forest

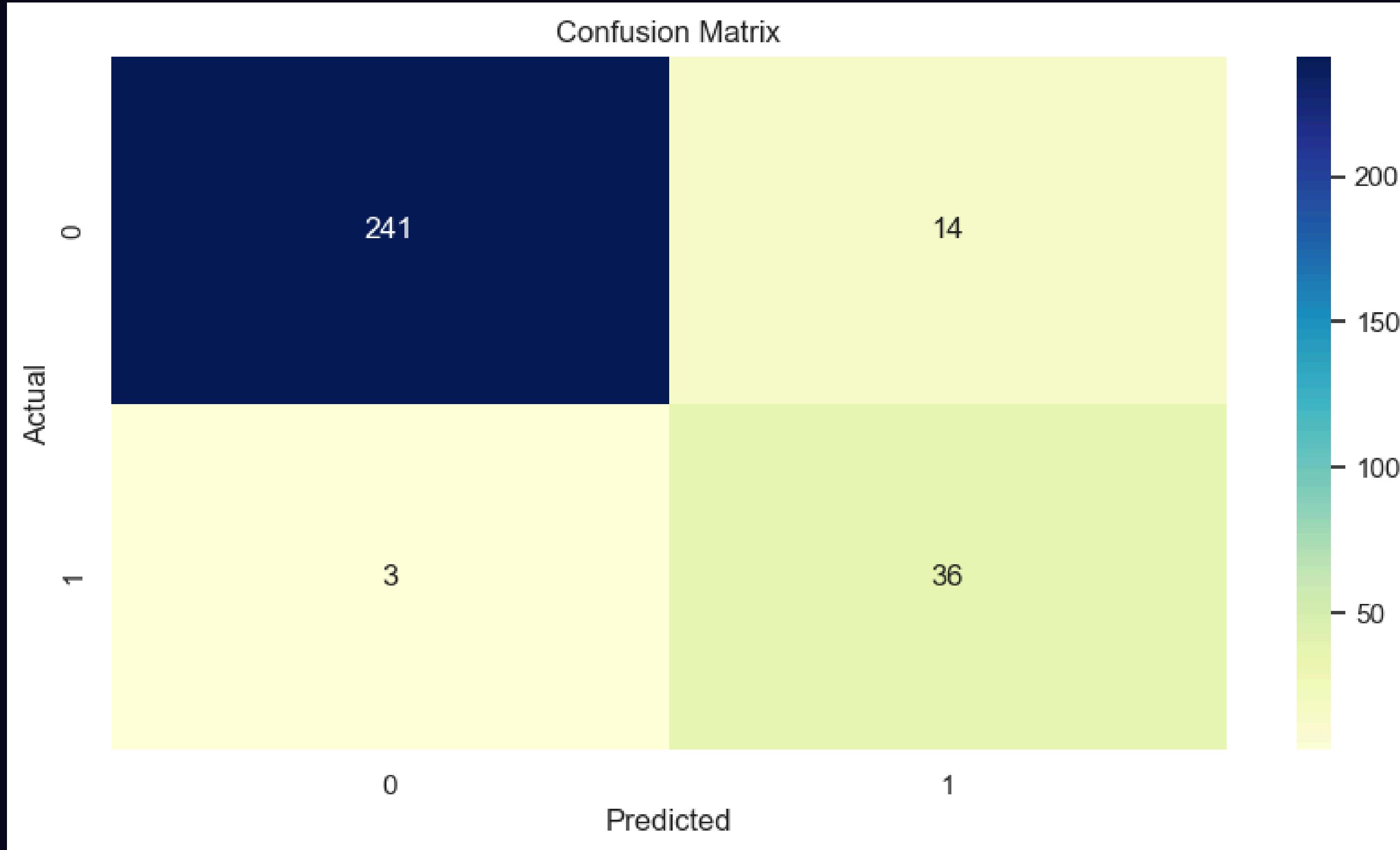
Gradient Boosted



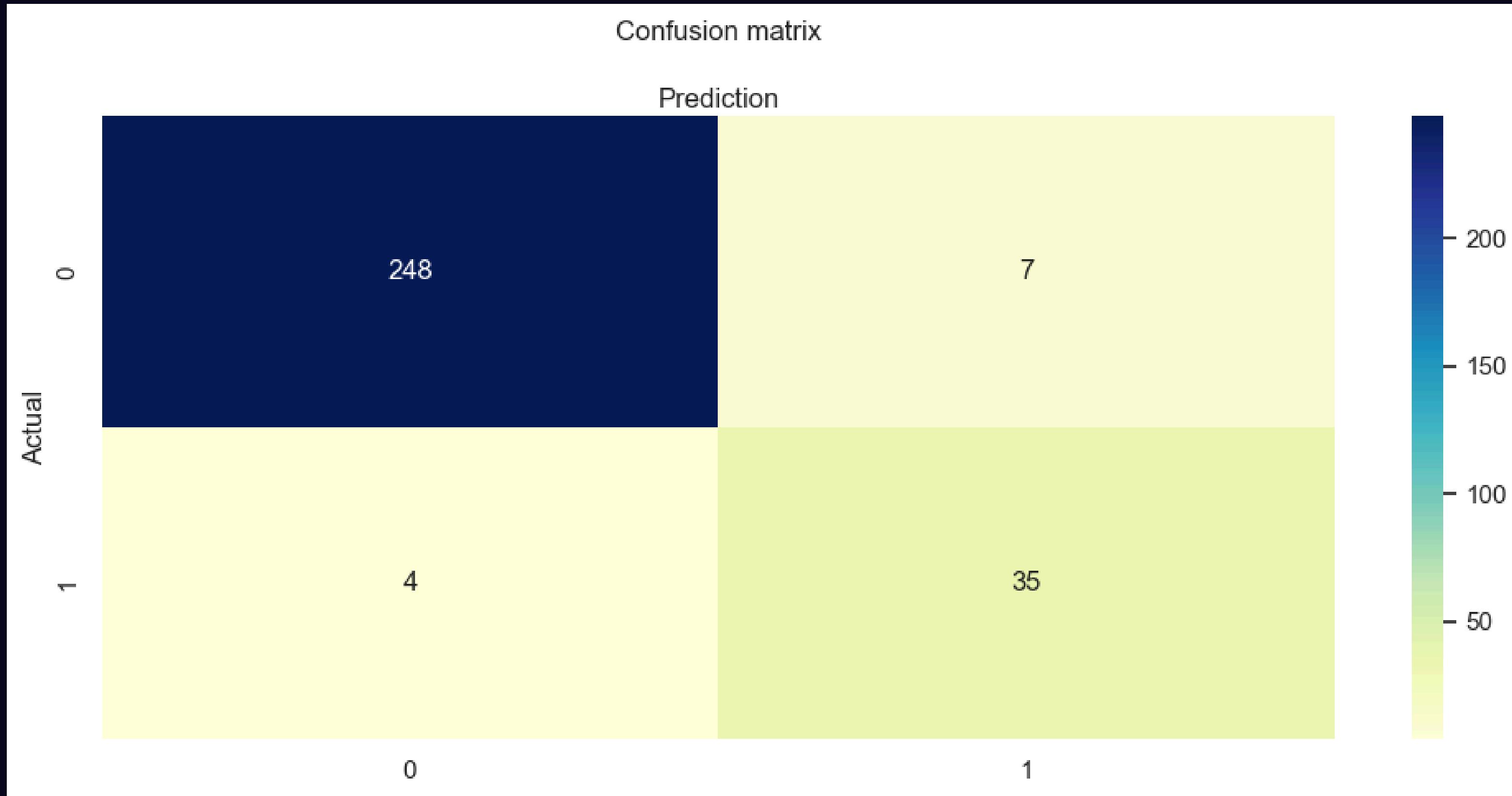
LOGISTIC REGRESSION



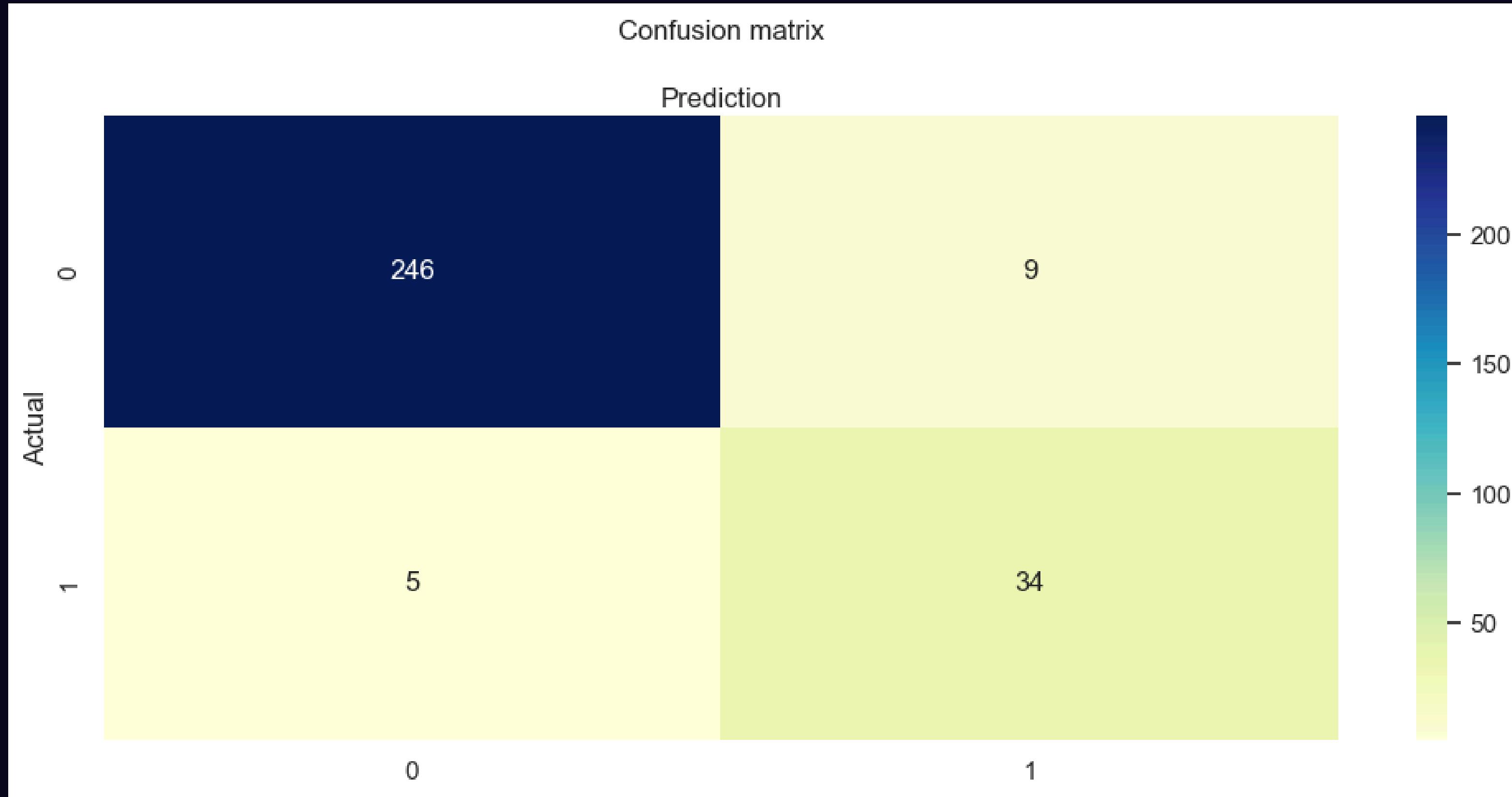
DECISIONTREE



RANDOMFOREST



GRADIENT BOOSTED



RESULTS

Best Model: Random Forest

Accuracy: 96.2%

Precision | Recall | F1-score

0.83

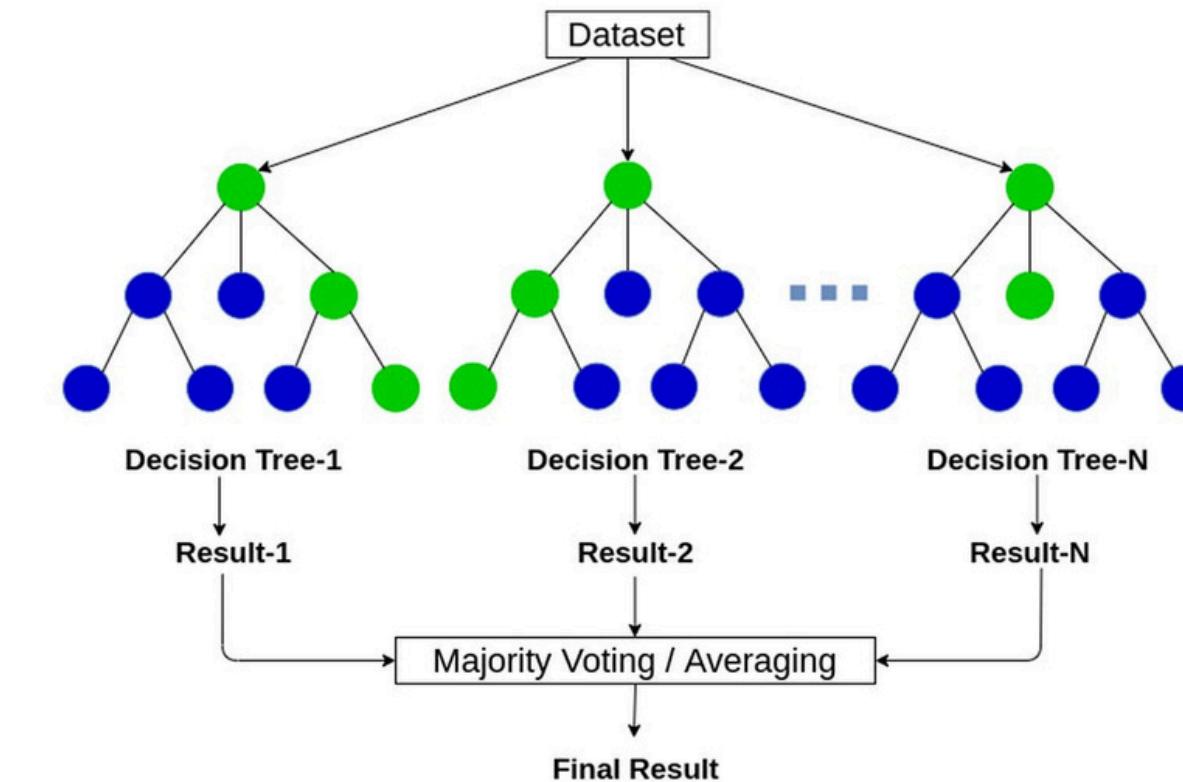
0.90

0.86

Key features impacting attrition:

Overtime, Marital status, Years at company

Random Forest



DEPLOYMENT

Streamlit

Share

EMPLOYEE ATTRITION PREDICTION

Employee Attrition Prediction

Enter employee details to predict attrition:

Model loaded successfully!

Age

24

- +

< Manage app

DEPLOYMENT

Marital Status

Married

OverTime

No

Total Working Years

5

Years At Company

4

Years in Current Role

2

Years With Current Manager

2

Predict Attrition

Employee is likely to STAY

Marital Status

Married

OverTime

Yes

Total Working Years

2

Years At Company

1

Years in Current Role

1

Years With Current Manager

1

Predict Attrition

Employee is likely to LEAVE

Limit user inputs

Age

14

Press Enter to apply

-

+

Job Level (1-5)



Value must be greater than or equal to 18.

Years At Company

90

-

+

Years in Current Role



Value must be less than or equal to 40.

Total Working Years

-5

Press Enter to apply

-

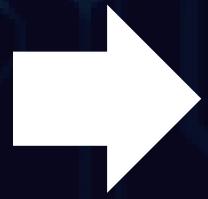
+

Years At Company



Value must be greater than or equal to 0.

LOCAL



GLOBAL

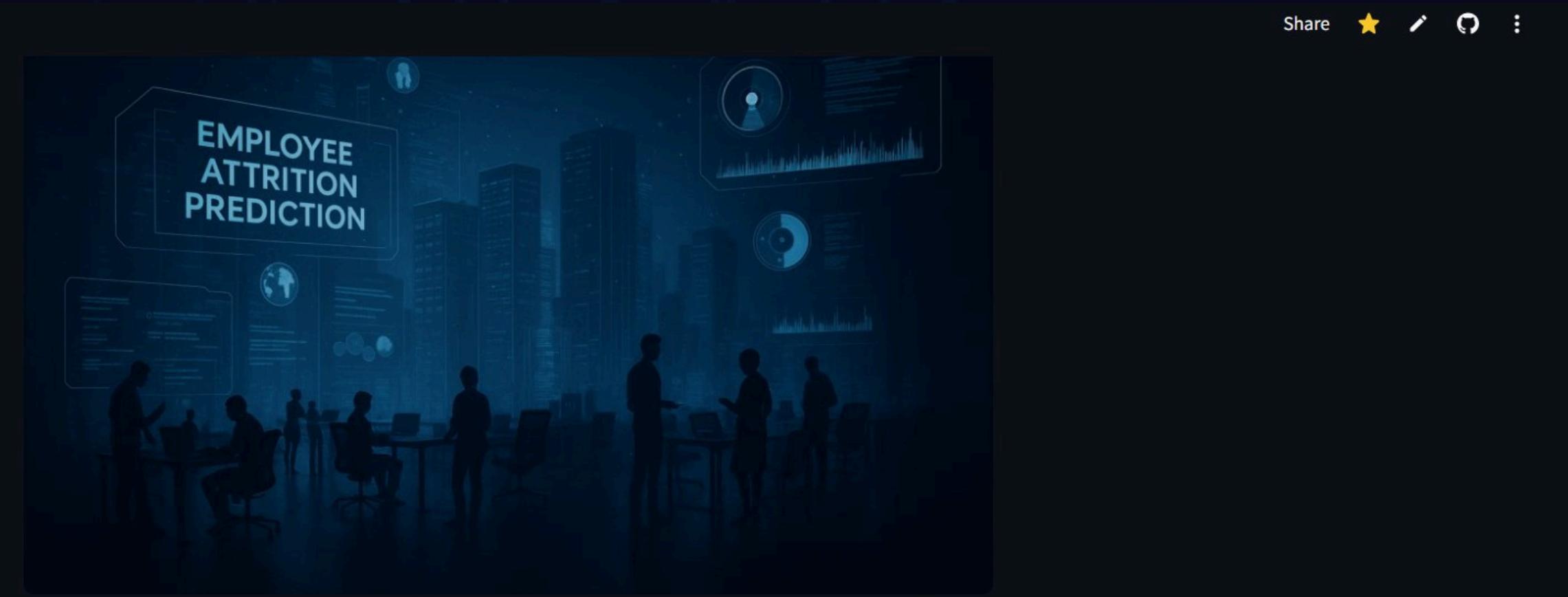
App & model



GitHub



Streamlit sharing



Employee Attrition Prediction

Enter employee details to predict attrition:

Model loaded successfully!

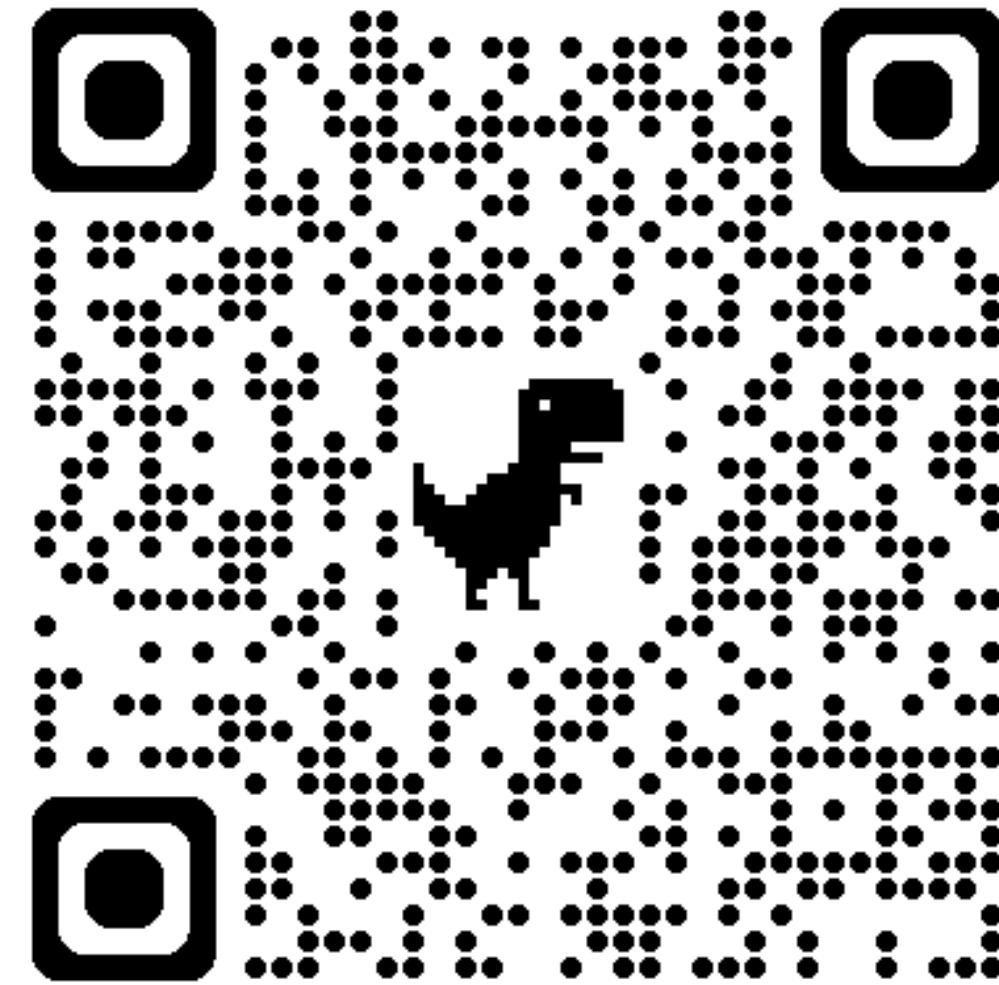
Age

24

- +

< Manage app

TRY IT!



<https://employee-attrition-depi-project.streamlit.app/>

THANK YOU

Any Questions ?