
TECH INNOVATION INC. EMPLOYEE TURNOVER PREDICTIVE ANALYSIS

By Team Bravo

Internship with 10Alytics

COLLABORATORS

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INTRODUCTION

Tech innovations Inc. is a leading technology company at the forefront of digital transformation and innovation.

The organization is experiencing high turnover rates and struggles to attract and retain top talent in key positions.

The objective of this project is to leverage HR data and advanced analytics to develop predictive models and actionable insights that will enhance employee recruitment and retention strategies.

PROJECT OVERVIEW

**DATA
COLLECTION
AND
PREPARATION**

**EXPLORATORY
DATA ANALYSIS
(EDA)**

**DATA
PRE-PROCESSING**

**SUPERVISED
MACHINE
LEARNING**



DATA COLLECTION AND PREPARATION

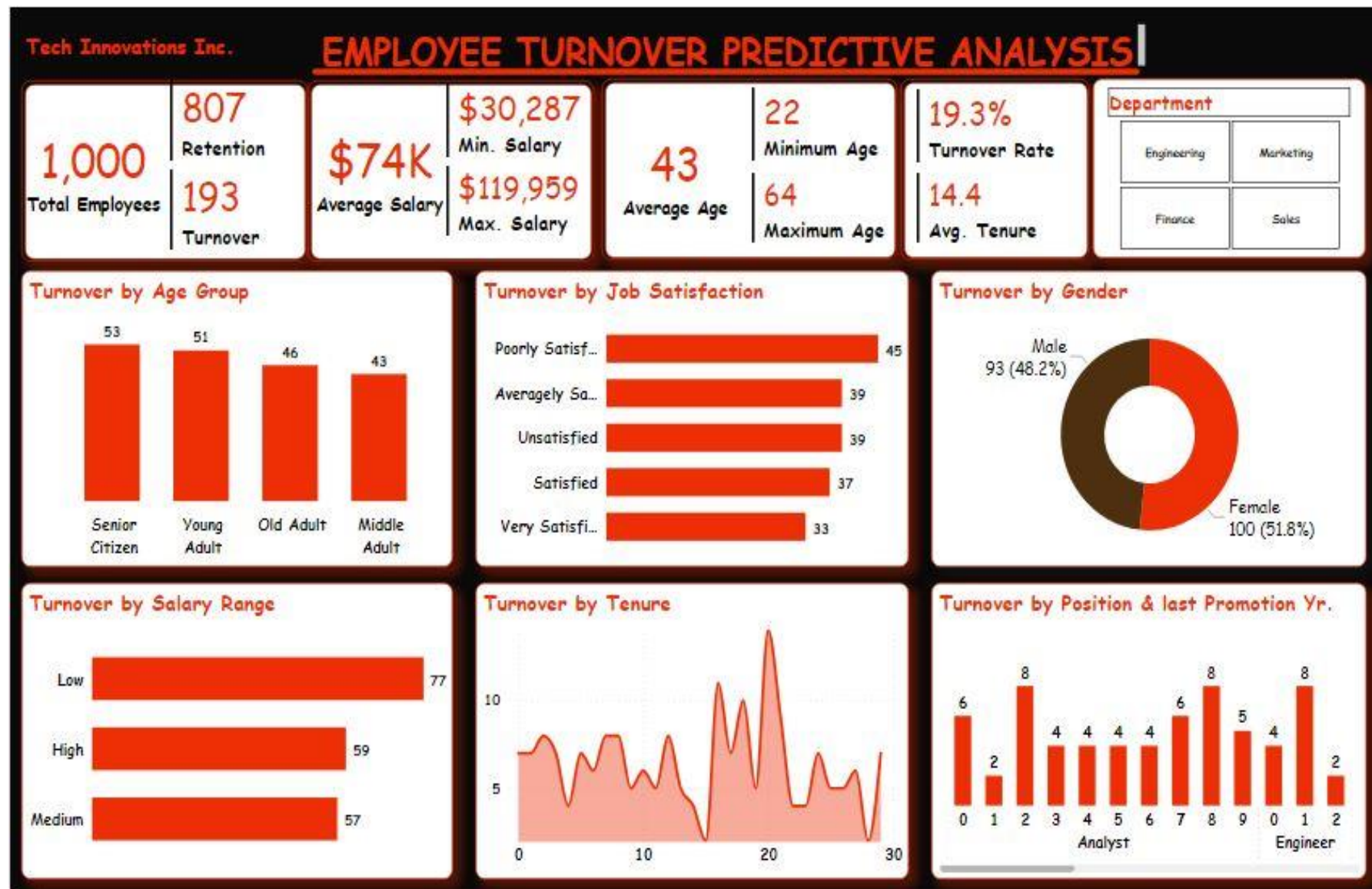
DATA SOURCES

**HR Data containing 19 Features
and 1000 Records**

DATA PREPARATION & CLEANING

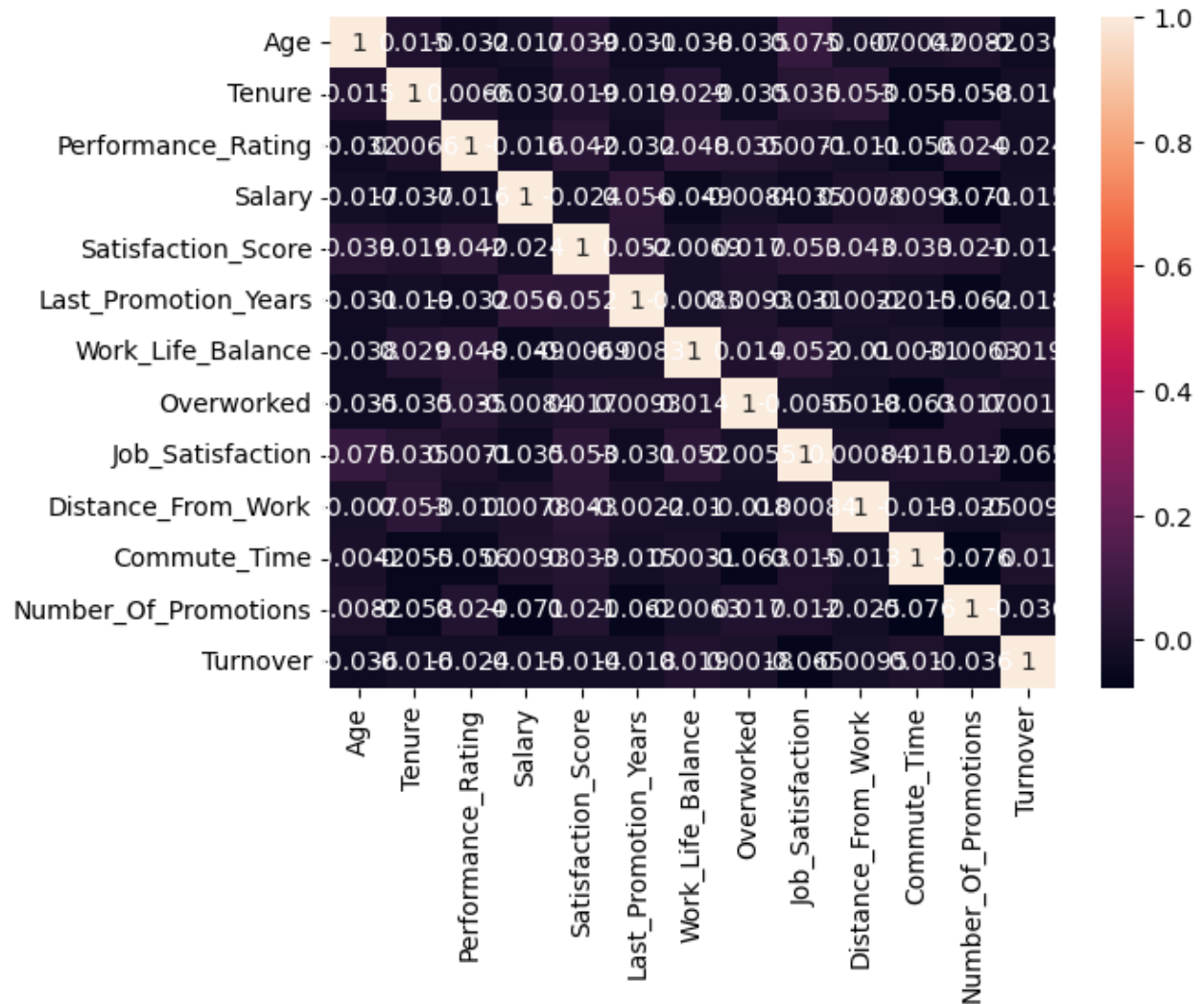
There were no missing data, however Satisfaction_Score had **13 Outliers** which were removed during preprocessing in preparation for machine learning.

EXPLORATORY DATA ANALYSIS (EDA)



EXPLORATORY DATA ANALYSIS (EDA)

CORRELATION MATRIX



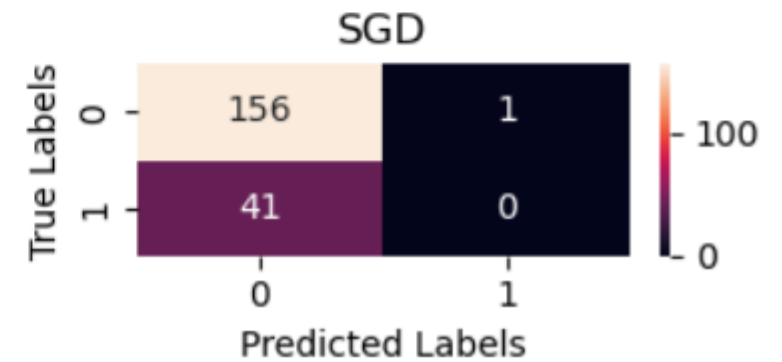
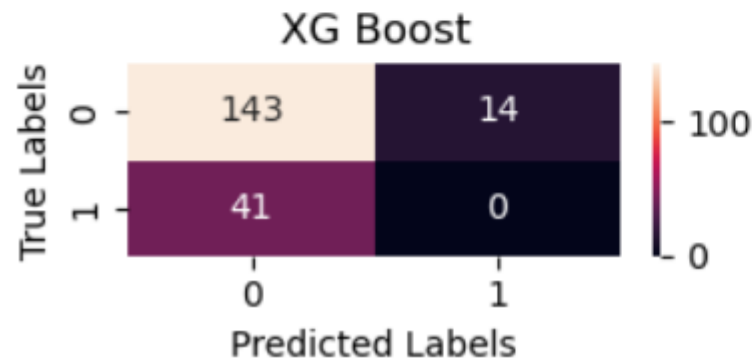
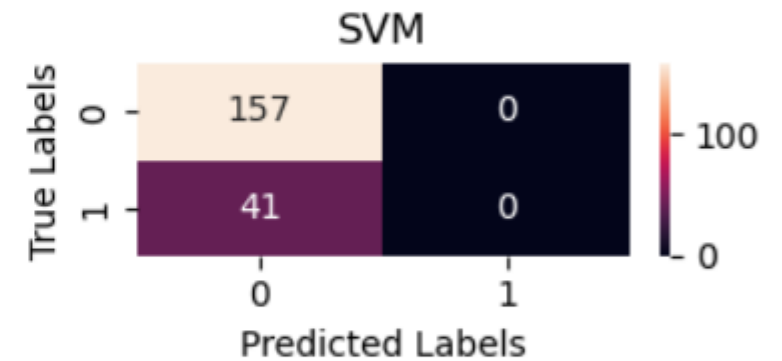
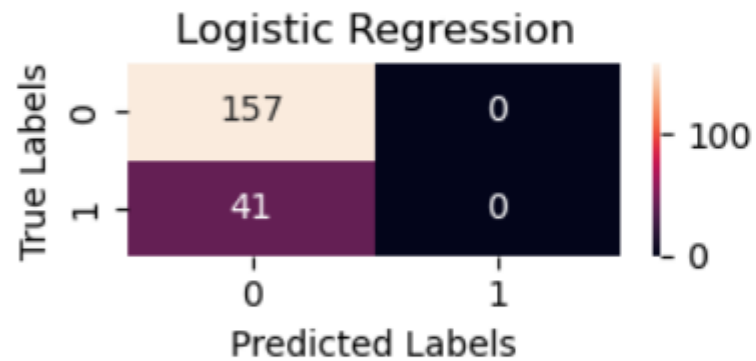
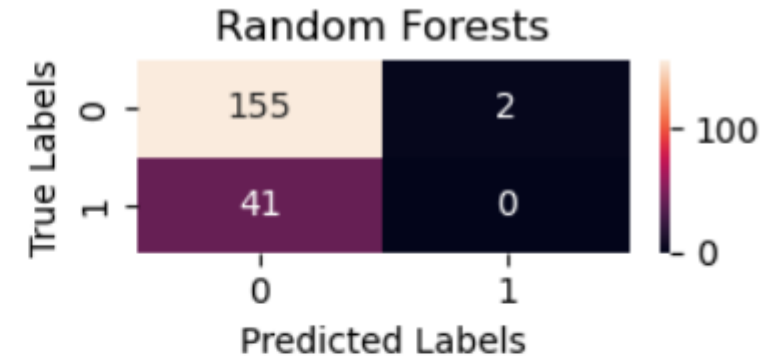
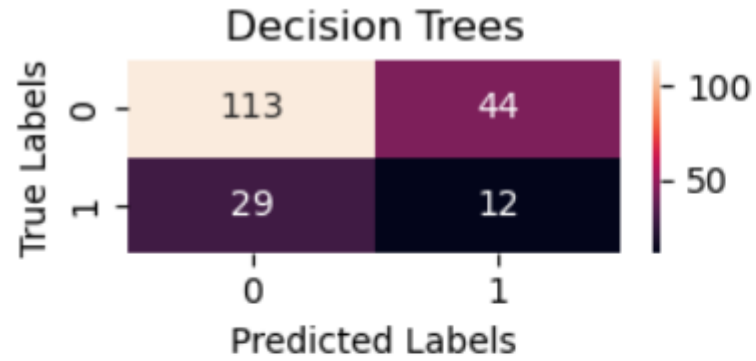
FEATURE ENGINEERING

Engineered 10 New Features, A total of 29 Features.

DATA PRE-PROCESSING

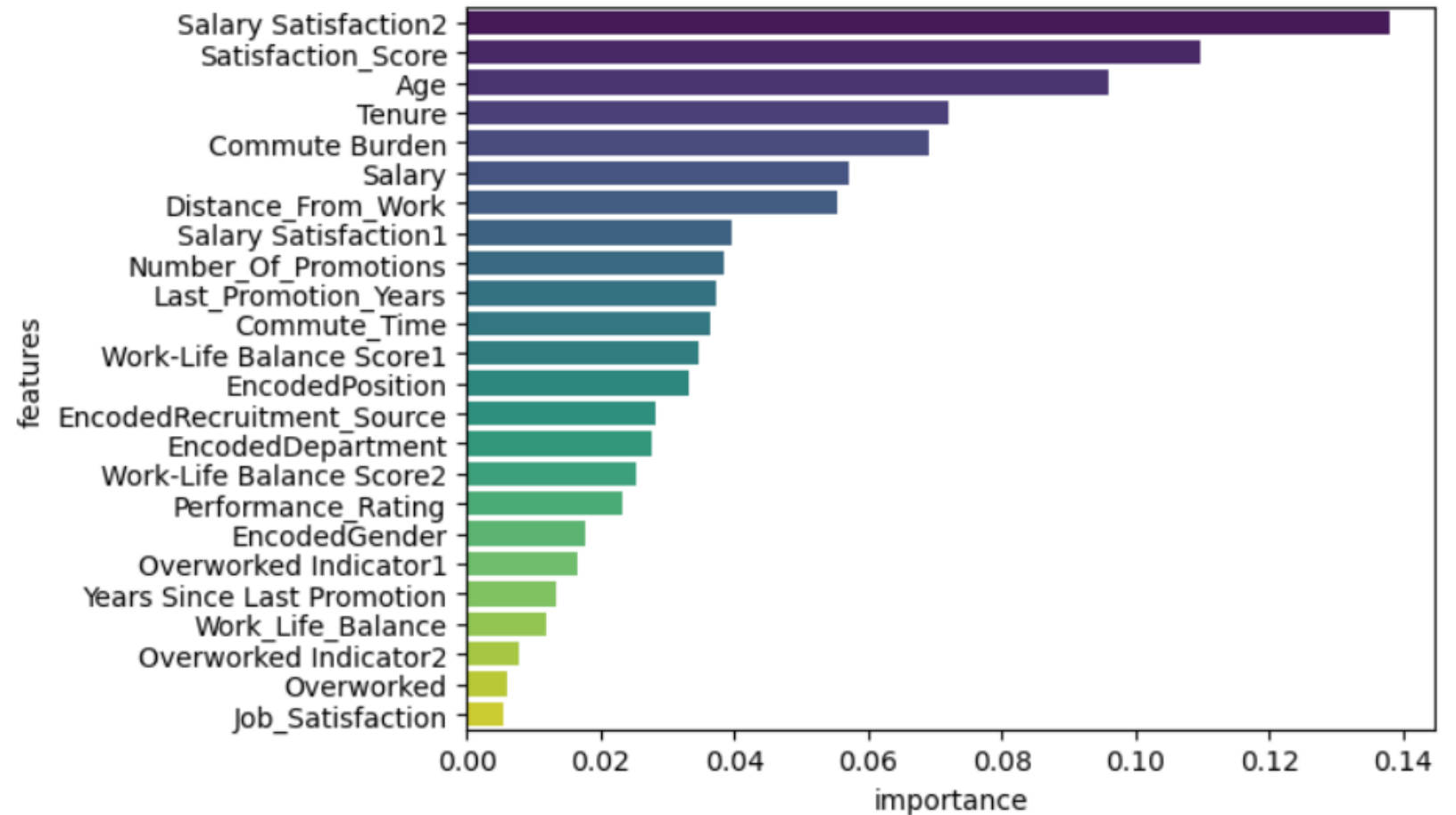
- ❖ All four categorical variables were labeled encoded
- ❖ All 29 variables were then Standardized.
- ❖ Data was split into train and test data in a ratio of 80:20. However 5 features were rejected as they had anomalies. Thus, **24 Features** were used to train and test data.

SUPERVISED MACHINE LEARNING



FEATURE IMPORTANCE (DECISION TREE)

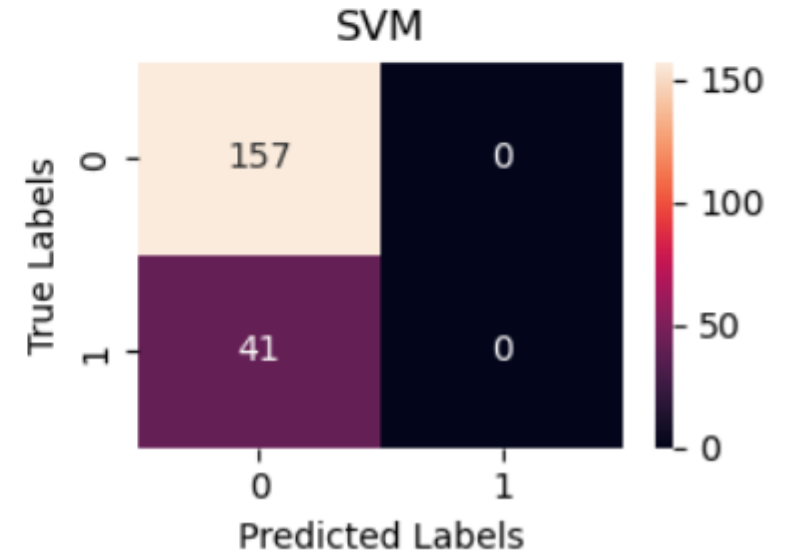
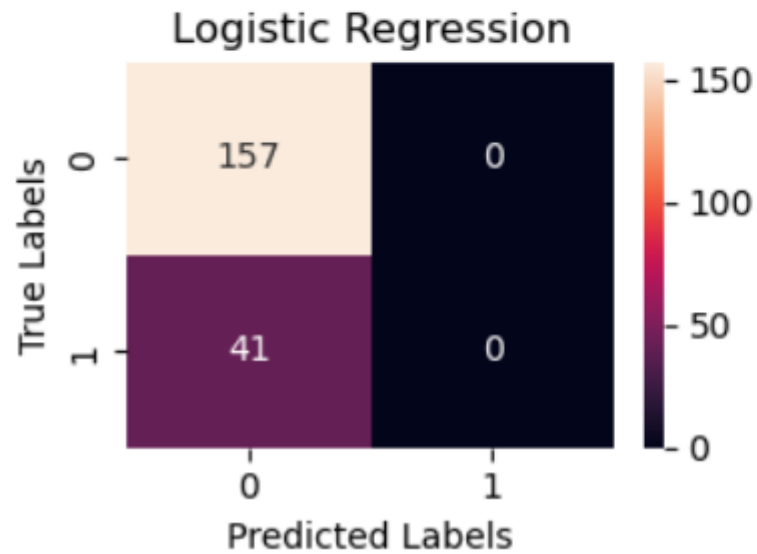
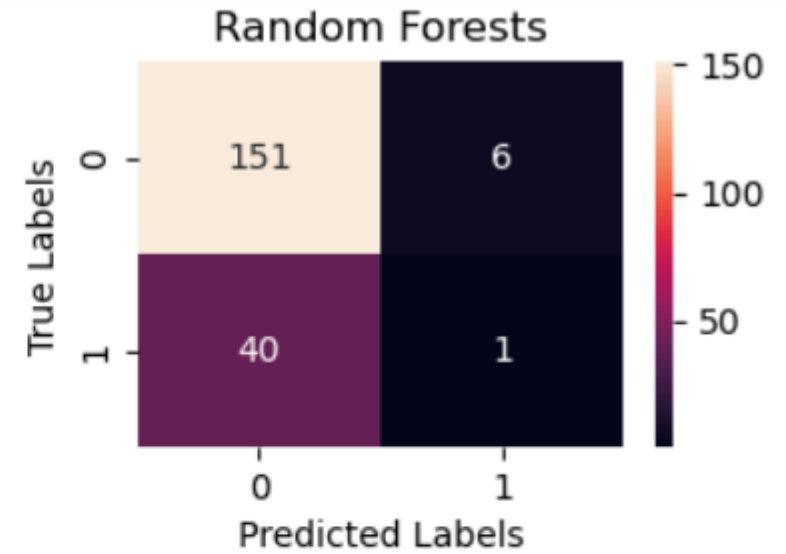
**SUPERVISED
MACHINE
LEARNING**



Selected the Top (5) Features having Two(2) Engineered Feature

- ✓ Salary Satisfaction = Salary X Job Satisfaction
- ✓ Commute Burden = Distance from Work X Commute Time

SUPERVISED MACHINE LEARNING



SUPERVISED MACHINE LEARNING

MODEL FINE TUNING (HYPERPARAMETER)

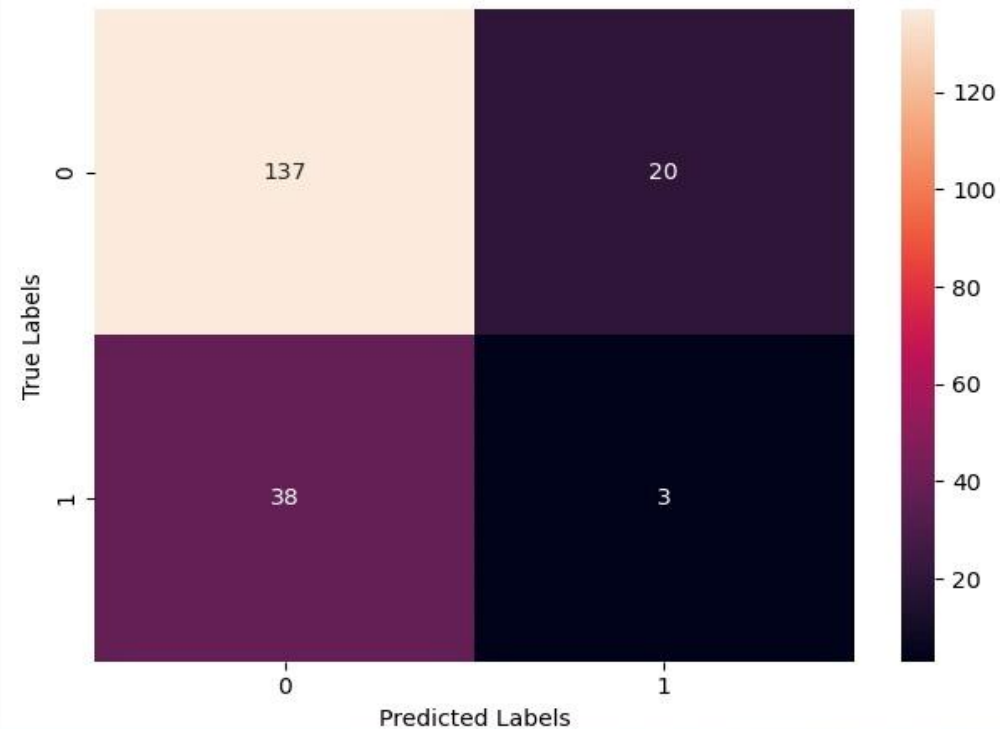
```
Best Hyperparameters: {'ccp_alpha': 0.0, 'max_depth': 10, 'min_samples_leaf': 2, 'min_samples_split': 2}
```

```
### Best Decision Trees Models ###
```

```
Accuracy: 0.7071
```

```
Classification Report:
```

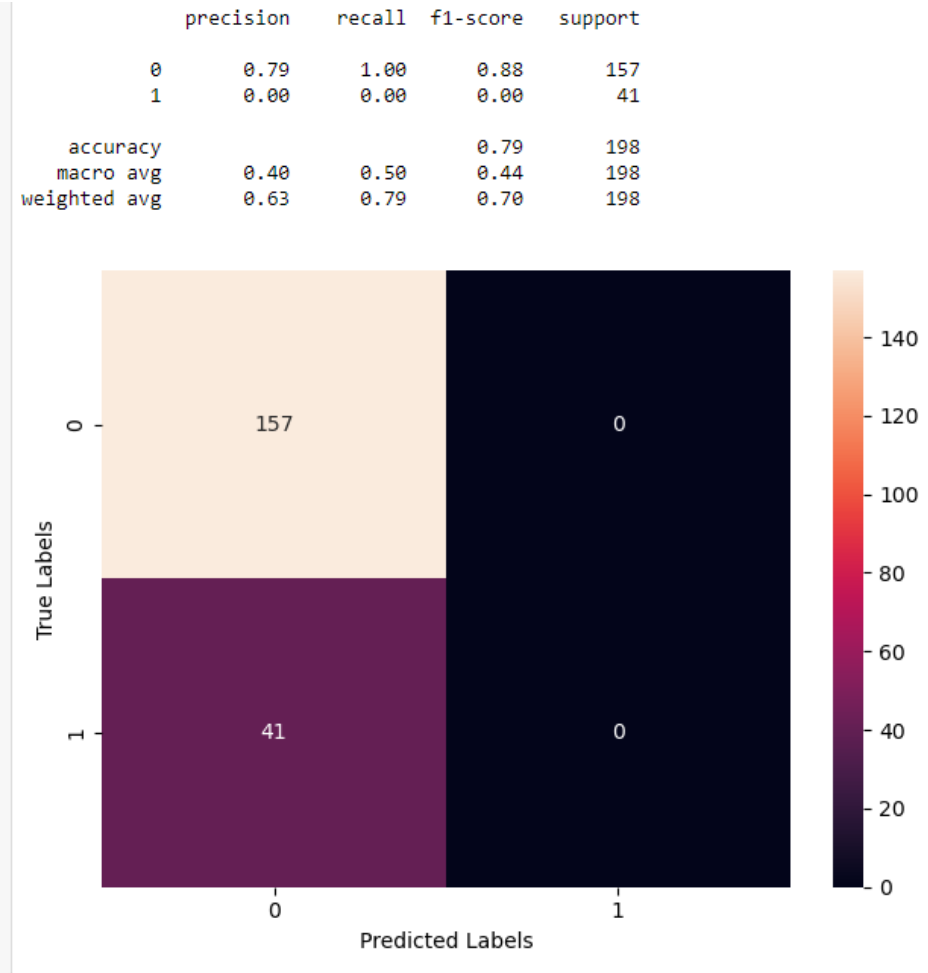
	precision	recall	f1-score	support
0	0.78	0.87	0.83	157
1	0.13	0.07	0.09	41
accuracy			0.71	198
macro avg	0.46	0.47	0.46	198
weighted avg	0.65	0.71	0.67	198



SUPERVISED MACHINE LEARNING

EMSEMBLE METHOD

Combined all four models



INSIGHTS

- ❖ Employee Turnover correlates with Job Satisfaction inversely; Employee Turnover increased with low Job Satisfaction
- ❖ Employee Turnover was much more with employees with newer employees than older ones.
- ❖ Although employee turnover was more for employees in the low salary class, data shows it takes a longer time for employees to be promoted

CONCLUSION & RECOMMEDATION

- ❖ Tech innovation should investigate their onboarding process and their work environment to find out why newer employees are prone to leave
- ❖ Job promotion process should be streamlined and if possible employees should be incentivized to give a sense of belonging, while encouraging employee performance and retention.
- ❖ For this project, Decision Tree would be the best model with **Best Hyperparameters: {'ccp_alpha': 0.0, 'max_depth': 10, 'min_samples_leaf': 2, 'min_samples_split': 2}** for Employee Turnover Prediction though with an accuracy of 71%.