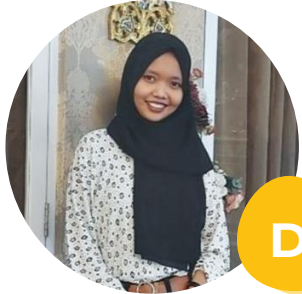


Employee Attrition

Kaizen Team

改善

OUR TEAM



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Summary



01

Business Case

- Attrition Cost & Employee Value
 - Problem Statement
 - Goal & Objective

Business Case

Estimating Attrition Cost and Employee Value



Attrition Cost

- Recruitment Cost
- Training Cost



Employee Value

- Skill and experience
- Performance Matrix

Cost to Value of an Employee

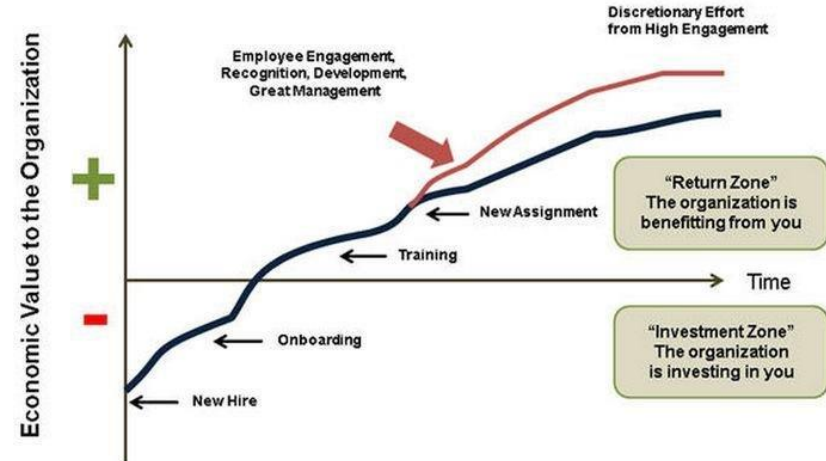


Fig 1: Economic Value of an Employee to the Organization over Time (C) Bersin by Deloitte

Business Case

Goal

Understand, prevent employee attrition and reduce cost related with attrition.

- *Understand key factors influence for attrition*
- *Predict and prevent employee attrition*
- *Reduction in costs*

Business Matrix

- *Reduction of overall attrition rate*
- *Reduction in costs related with attrition*



02

Pre-Processing

- Exploratory Data Analysis (EDA)
 - Business Insight

Feature

Dataset Info

Age

Attrition (target)

Business Travel

Daily Rate

Department

Distance From Home

Education

Education Field

Employee Count

Employee Number

Environment Satisfaction

Gender

Hourly Rate

Job Involvement

Job Level

Job Role

Job Satisfaction

Marital Status

Monthly Income

Monthly Rate

Num Companies Worked

Over 18

Over Time

Percent Salary Hike

Performance Rating

Relationship Satisfaction

Standard Hours

Stock Option Level

Total Working Years

Training Times Last Year

Work Life Balance

Years At Company

Years In Current Role

Years Since Last

Promotion

Years With Curr

Manager

- Contains 1470 rows and 35 column
- 'Attrition' is our target



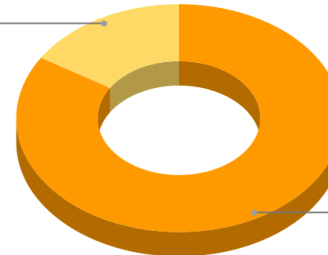
No Missing
Value



No Duplicate
Data

Attrition

Yes
16.1%

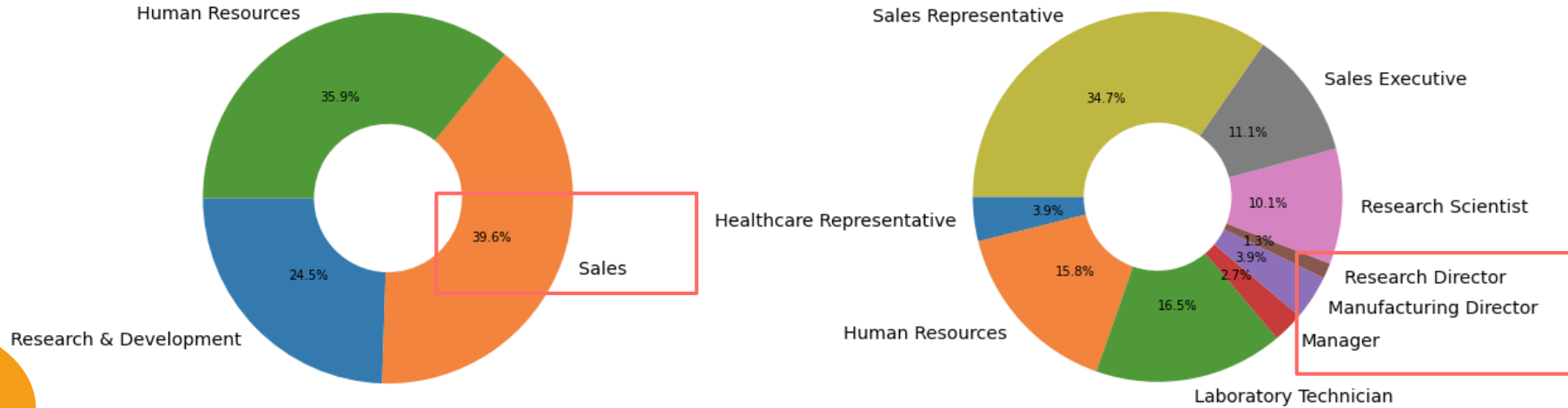


No-attrition(83,9%)
vs
Attrition (16,1%)

No
83.9%

Business Insight

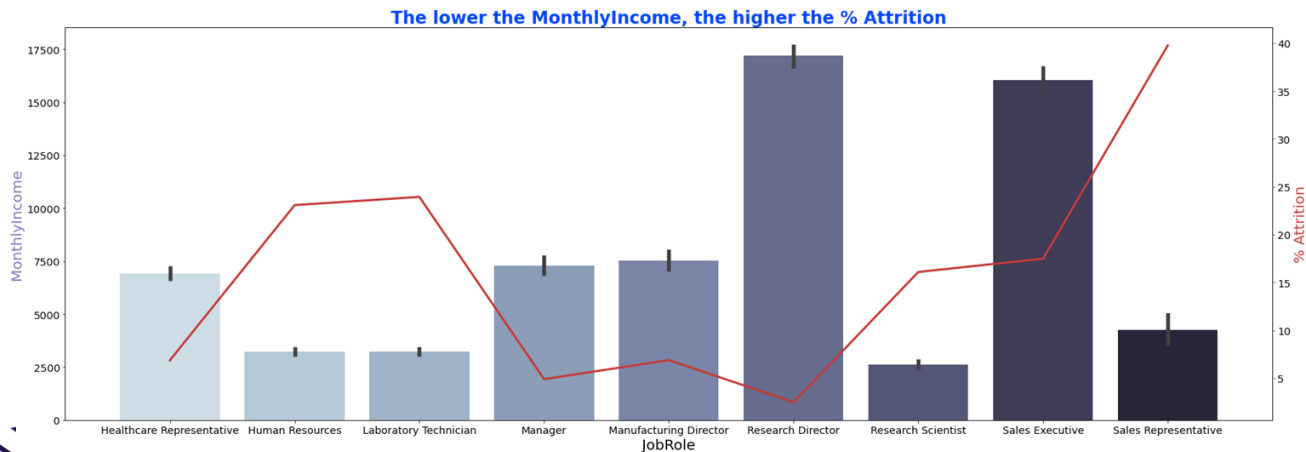
Do the Department and Job Role Impact The Attrition?



- 39,6% attrition occurred in Sales Department
- 34,7 % attrition occurred in Sales Representative Role
- Director and manager position have the lowest attrition rate

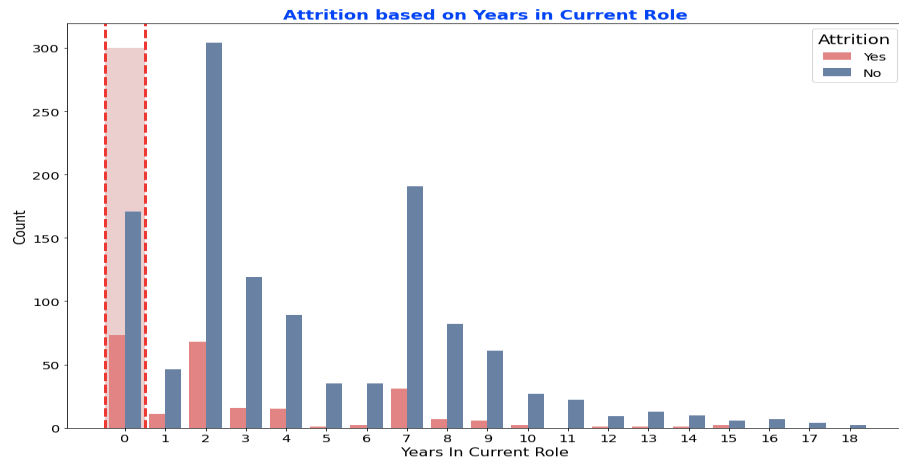
Business Insight

How the Attrition Rate is Affected by both Monthly Income and Job Role?



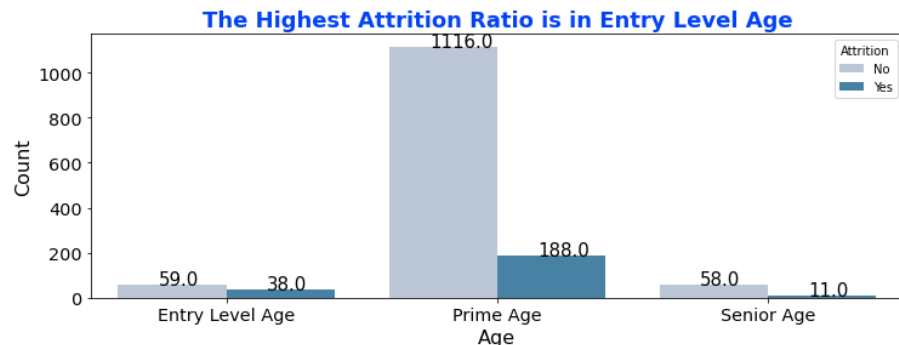
Business Insight

Do the Years of Working in Current Role and Age Impact The Attrition?



30%

Employees with less than 1 year in current role, attrited



39%

Employees in Entry Level Age, attrited

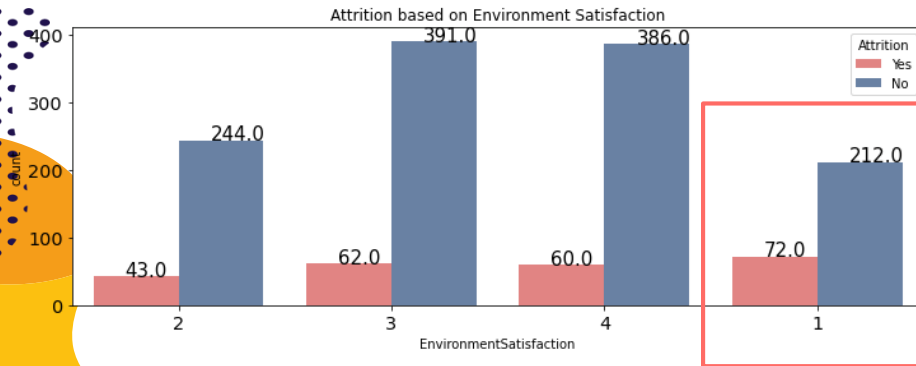
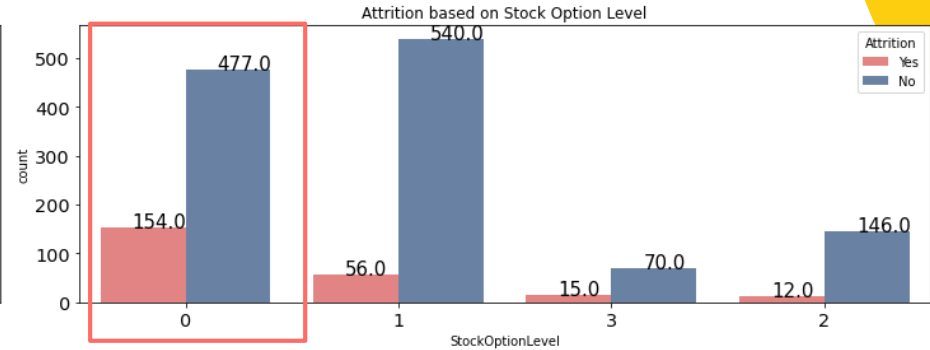
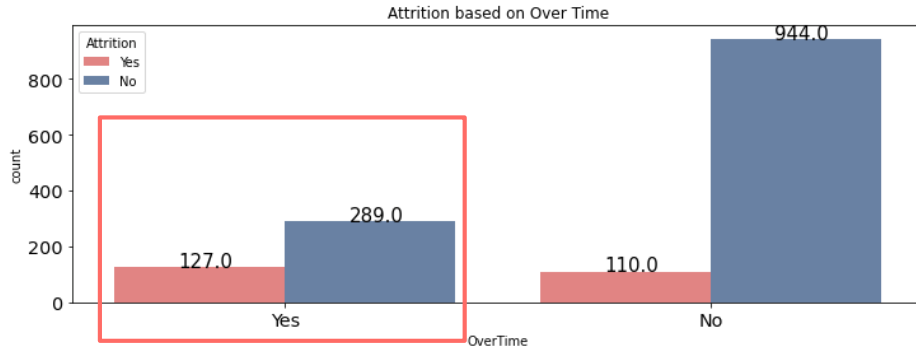
15%

Employees in Senior Age, attrited

15-24 : Entry level Age
25-54 : Prime Age
55-64 : Senior Age

(OECD (2022), Employment rate by age group (indicator). doi: 10.1787/084f32c7-en (Accessed on 03 April 2022))

Business Insight



Criteria of attrition employees:

- From Sales department, and Sales Representative role
- Years in Current role less than 1 year
- Monthly income below 5000\$
- 30.5% of employees who do overtime
- 24.4% of employee who have Stock option level 0
- 25.4% of employee with Low environment satisfaction

Inferences

1

Early Stage Career

People who in the start of their careers tend to change different jobs.

2

Salary & Stock Option

The part of the motivation of employees to stay in an organization

3

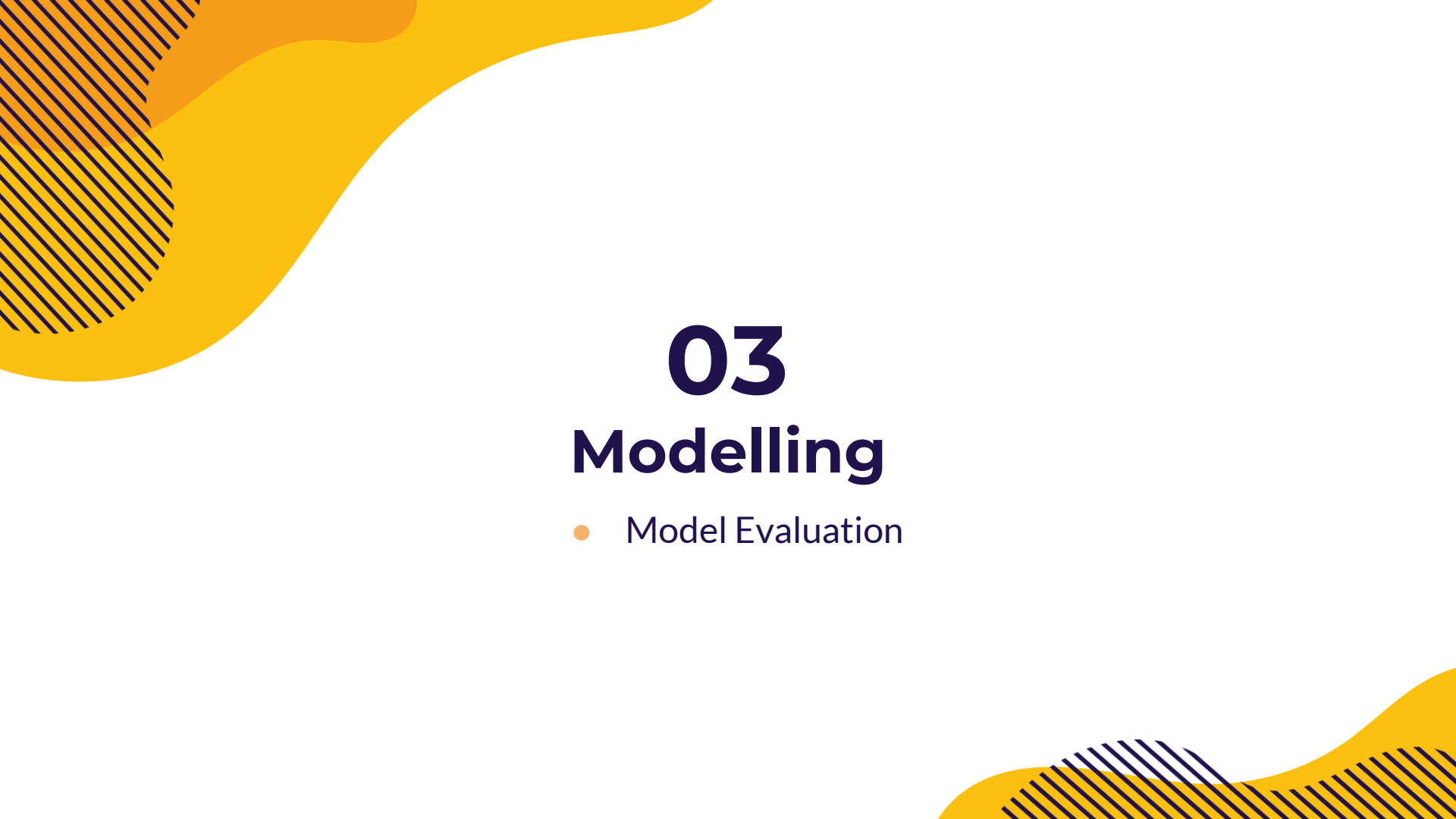
Targeting Performance

Departments with job roles that have crucial performance targets, tend to be attrition

4

Monthly Income

employees in all departments with low monthly income tend to be attrition (except those in managerial positions)



03

Modelling

- Model Evaluation

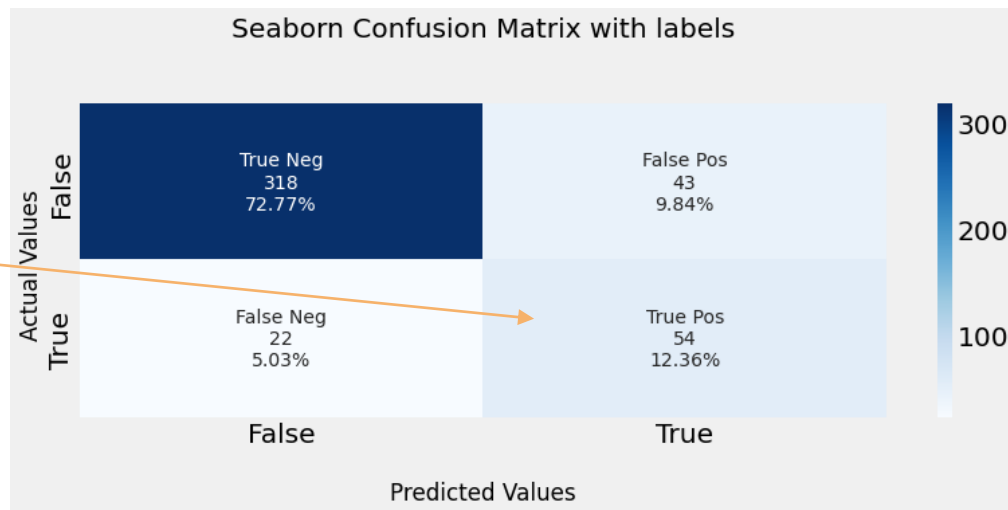
Model

We tried several models and get the best result

Model Evaluation / Model	Logistic Regression	Decision Tree	XGBoost	CATBoost	RandomForest
Precision (Test)	0.67	0.20	0.50	0.55	0.45
Precision (Train)	0.97	0.57	0.92	0.55	0.98
Recall (Test)	0.46	0.84	0.49	0.71	0.37
Recall (Train)	0.91	0.87	0.87	0.71	0.93
AUC (Test)	0.86	0.60	0.79	0.85	0.77
AUC (Train)	0.98	0.58	0.95	0.87	1.00

Model

Evaluation	Result
Recall (Test)	0.71
Recall (Train)	0.71
AUC (Test)	0.85
AUC (Train)	0.87



- We can predict Attrition-Employee : **71% (54 out of 76)**
- We also maximize the model to be able to distinguish between attrition and non-attrition -> by AUC score **85%**
- Our model is **best fit** (both of recall and auc)

04

Result & Recommendation

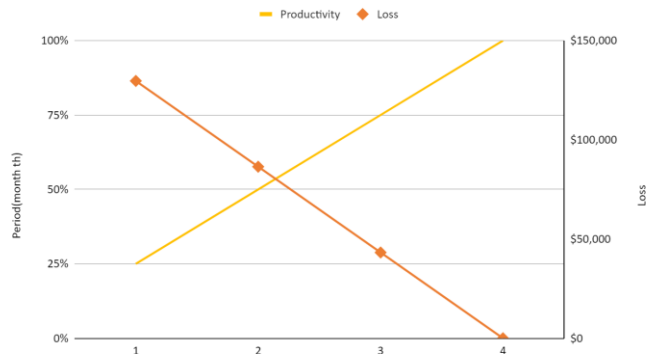
- Cost Saving
- Top Features



Attrition Rate

24% ➤ **7%**
Before After

Working Integration Cost

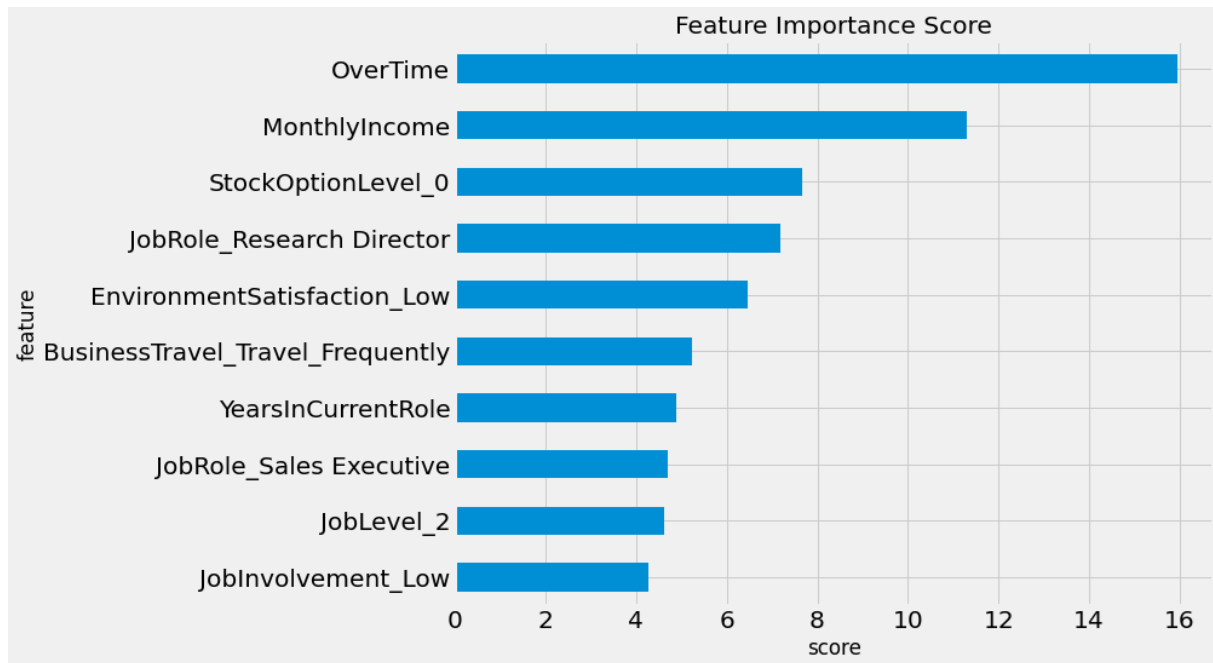


Cost Saving

67%
\$526,019

Details	Before	After
Hiring	\$ 340,692.80	\$ 242,071.20
Training	\$ 73,568.00	\$ 52,272.00
Working Integration	\$ 365,028.00	\$ 259,362.00
Total	\$ 779,288.80	\$ 526,019.94

Feature Importance



Recommendation



Managing Overtime

40h maximum /week
Compensation
Evaluation



More Stock Option

Vesting Period
Performance



Review role responsibility

Set clear goals & expectation
Provide coaching & training
Show appreciation



Salary Scheme

Salary increase policy
Performance



Good Environment

Communication and provide
growth opportunity
Measurement and reward system

05

Summaries

This project aims to understand, prevent, and reduce cost related employee attrition using machine learning CATBOOST model with recall and AUC matrix. The result showed this model can reduce Attrition rate to 7% and saving 67% cost.

Found the criterion of employee high likelihood attrition is from sales department or sales representative role, years in current role less than 1 year, monthly income below 5000\$, do overtime, stock option level 0, and low environment satisfaction. So that suggest to managing overtime, offer more stock option, build salary policy, review role responsibility, build good environment to prevent employee attrition.



THANKS!

Kaizen Team

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