HR ANALYTICS CASE STUDY

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Problem Description:

The probability of attrition in XYZ company is around **15%** every year . Company gets effected due to such a large proportion of Attrition every year. The issues caused due to attrition are as follows

- The former employees' projects get delayed, which makes it difficult to meet timelines, resulting in a reputation loss among consumers and partners
- A sizeable department has to be maintained, for the purposes of recruiting new talent
- More often than not, the new employees have to be trained for the job and/or given time to acclimatise themselves to the company.

Let us find out the reason behind such havoc and help XYZ to retain its employees.

Data Understanding:

The data provided to us only contains information about employees and whether they attrite or not. Data contains 4 flat files as follows

Column Name	Information
General_data.csv	This file contains information about Age, Attrition, Business Travel, Department, Distance From Home, Education, Education Field, Employee Count, Employee ID, Gender, Job Level, Job Role, Marital Status, Monthly Income, Number of Companies Worked, Over 18 or not, Percent Salary Hike, Standard Hours, Stock Option Level ,Total Working Years, Training Times Last Year, Years At Company, Years Since Last Promotion and Years With Current Manager
employee_survey_data.csv	This file contains information about Environment Satisfaction, Job Satisfaction, Work Life Balance
manager_survey_data.csv	This file contains information about Job Involvement, Performance Rating
in_time.csv	In time of employees for complete year (2015)
out_time.csv	Out time of employees for complete year (2015)

Factors Causing Attrition:

- There maybe multiple factors causing Attrition of employees. The factors maybe not necessarily due to company's fault in treating its employees well.

- There maybe different factors which we we analyse depending on the dataset we have got in our hand.

- Since we have 5 data files, we have merged all the 5 datasets depending on one common attribute found across all 5 files i.e. EmployeeID

- Lets find out the reason for attrition of employees by plotting some charts and find some insights out of them
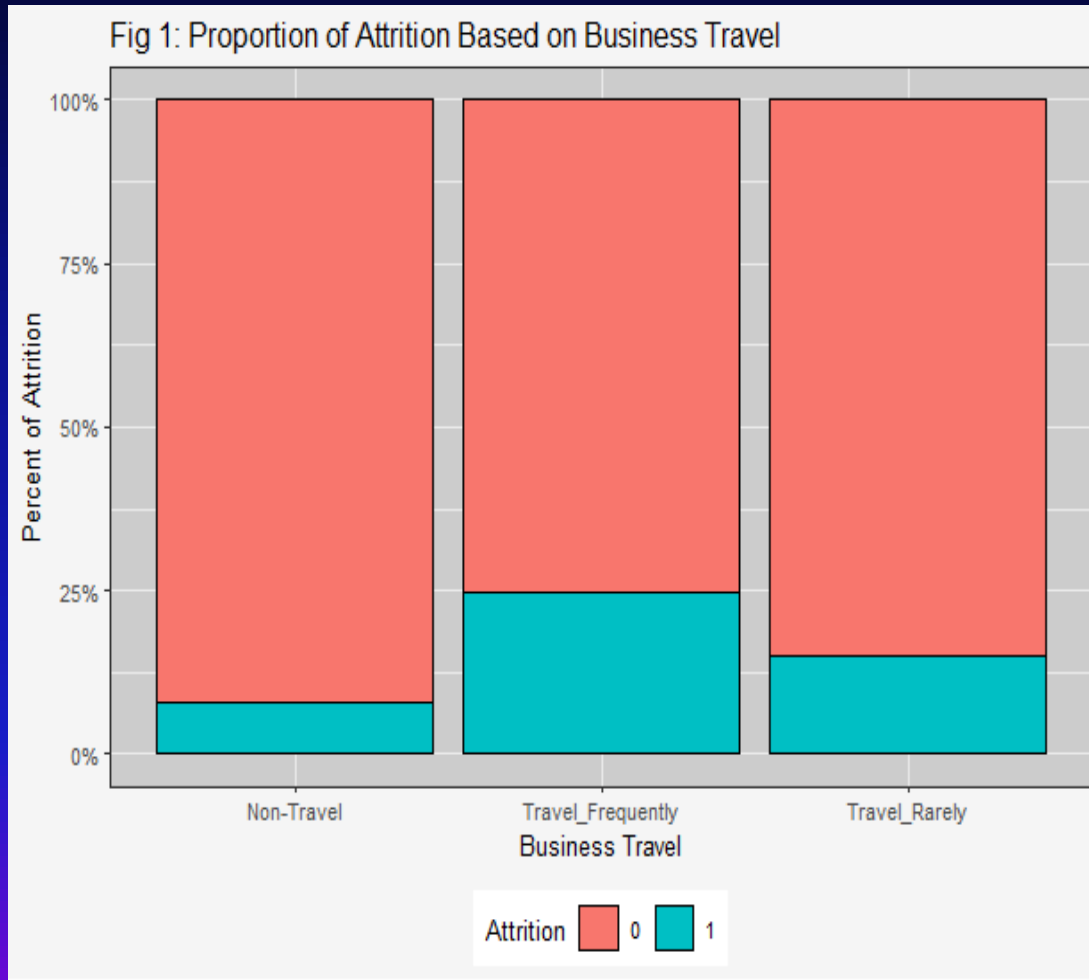
Attrition Depending on Age

Fig 1: Proportion of Attrition Based on Age
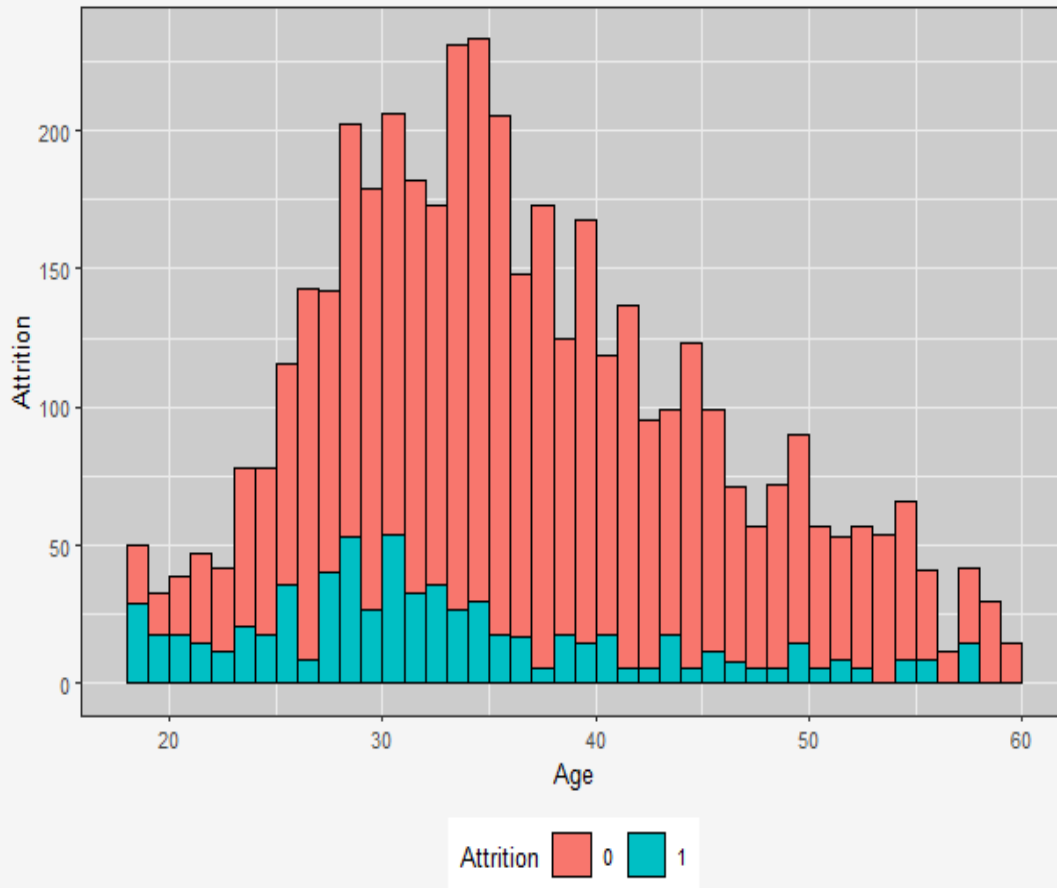
- Depending on the Age factor we get to see that higher proportion of younger population usually attrite as compared to Middle Aged and Old Aged employees.

- Freshers tend to get high opportunities in the job market compared to Experienced ones due to low cost and greater capabilities

Attrition Depending on Business Travel

Fig 1: Proportion of Attrition Based on Business Travel

- Employees who Travel Frequently Attrite compared to those who Do not travel or Rarely Travel

- People tend to get fed up of high amount of travel disrupting their personal life due to instability

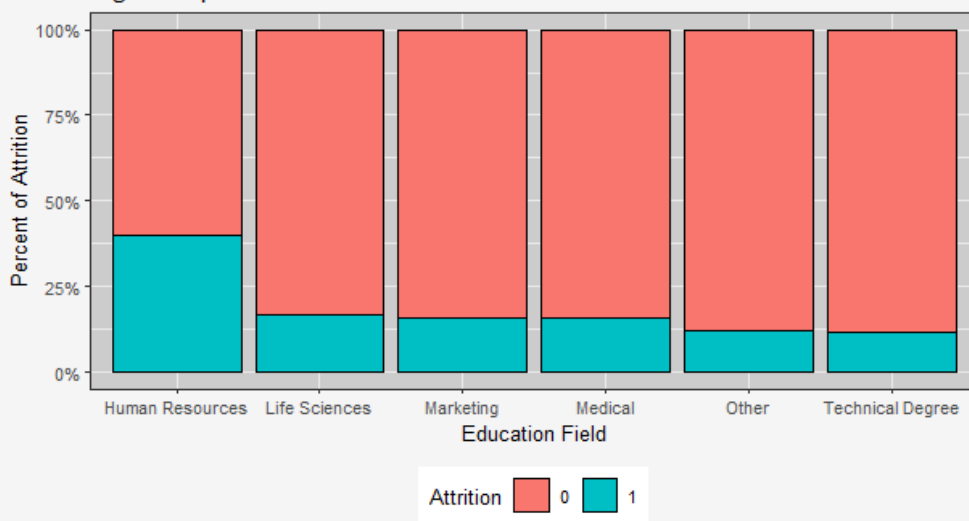# Attrition Depending on Department and Education Field

Fig 1: Proportion of Attrition Based on Department

Fig 1: Proportion of Attrition Based on Education Field

• Employees in HR Department tend to Attrite more compared to other departments.

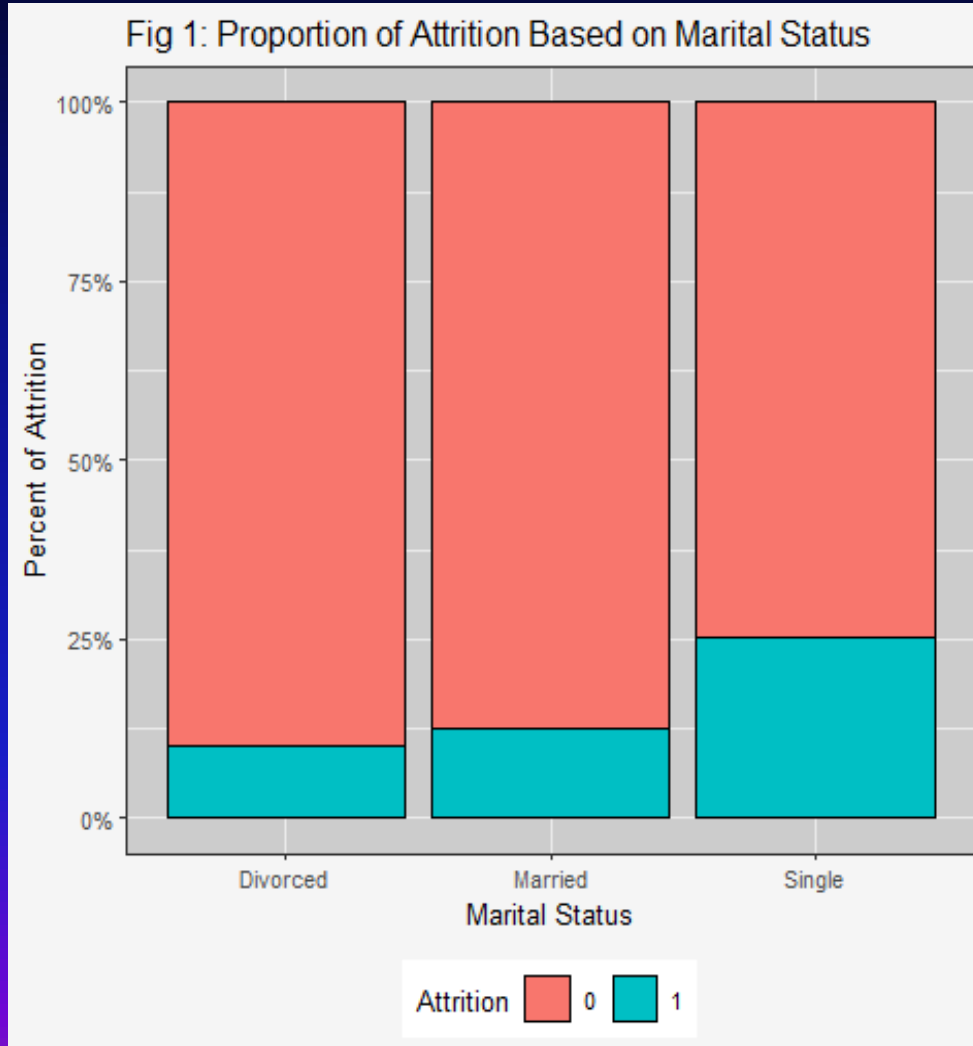• Employees having HR Education Field tend to Attrite more compared to other fields.

• There is higher inconsistency in HR Department in XYZ.

• The company should look after the HR Department

Attrition Depending on Marital Status

Fig 1: Proportion of Attrition Based on Marital Status

- Single People tend to attrite more followed by Married and then Divorced people.

- Singles are mostly young or fresher population. Here we reach at the same point which we found earlier that the young population attrite more.

- XYZ should focus on the younger/Single population more

Attrition Depending on Total Working Years

Fig 1: Proportion of Attrition Based on Total Working Years

- Most the people having 0 working years i.e. Fresher population tend to attire more compared to higher experienced people.

- Since higher level or experienced people have responsibilities on them they tend to give over the wish of changing the current organization which is not in case of freshers.

# Attrition Depending on Years at Company

Fig 1: Proportion of Attrition Based on Years At Company
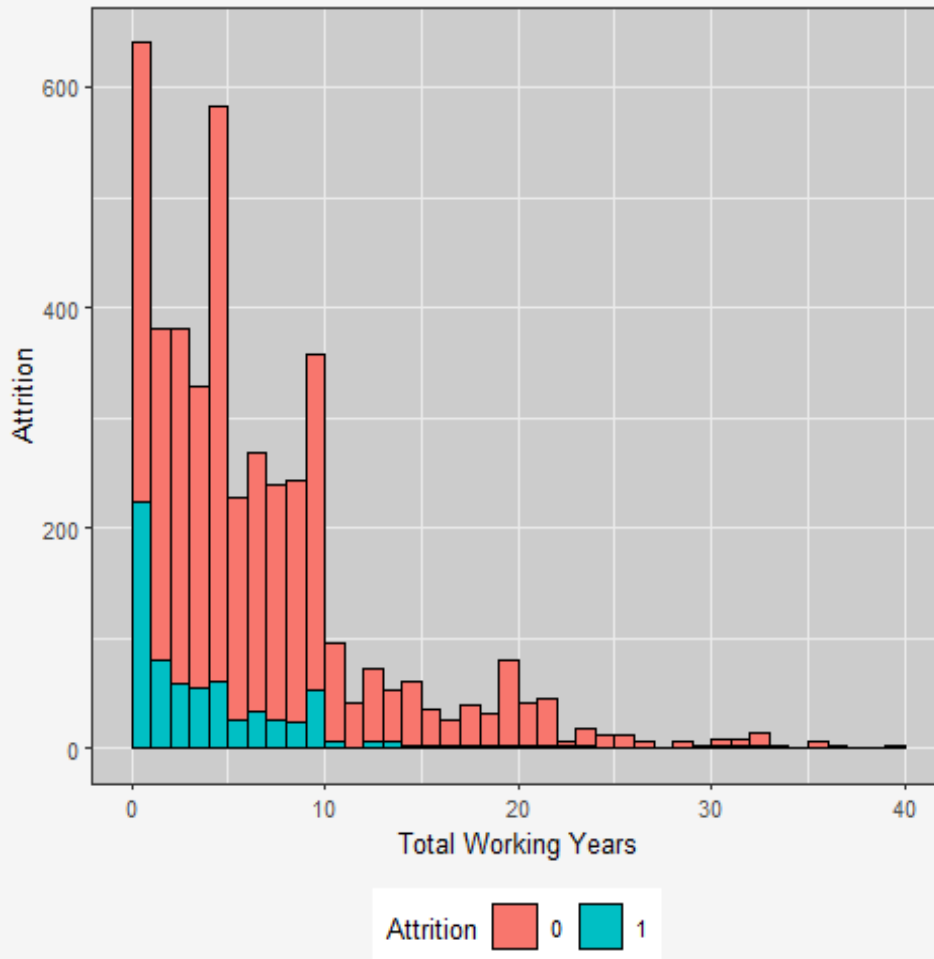
- Employees who have joined the company 1-2 years ago tend to attrite more

- These people can consists of freshers as well as experienced people.

- This may happen, due to imbalance of working culture. People joining XYZ are not welcomed as they expect.

- Company should focus on newly joined employees to make them comfortable in the company's environment

Attrition Depending on Years with Current Manager

Fig 1: Proportion of Attrition Based on Years With Curr. Manager
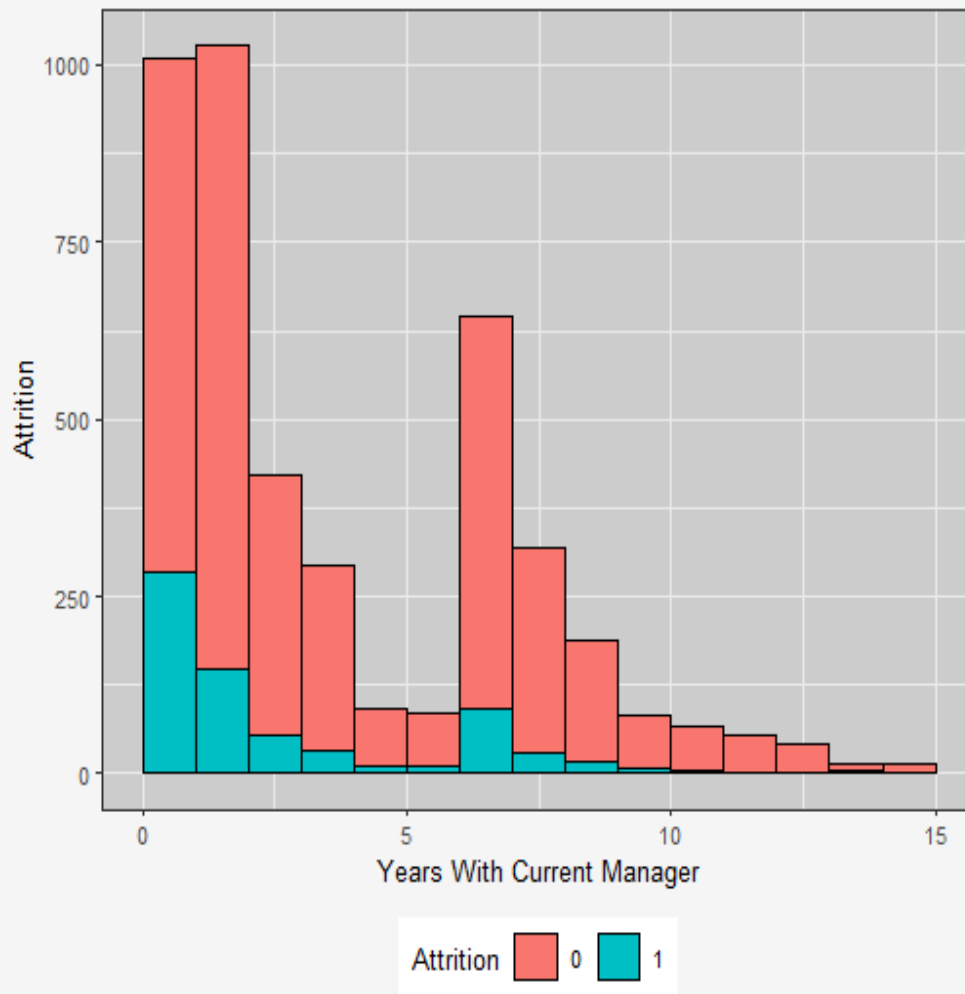
- Around 30% of the people with their current manager Attrite in around 1-2 years.

- The managers are not able to adjust with their new juniors.

- Manager should try to adjust with their new employees and assist them for their initial years.

Attrition Depending on Employee Feedback- 1
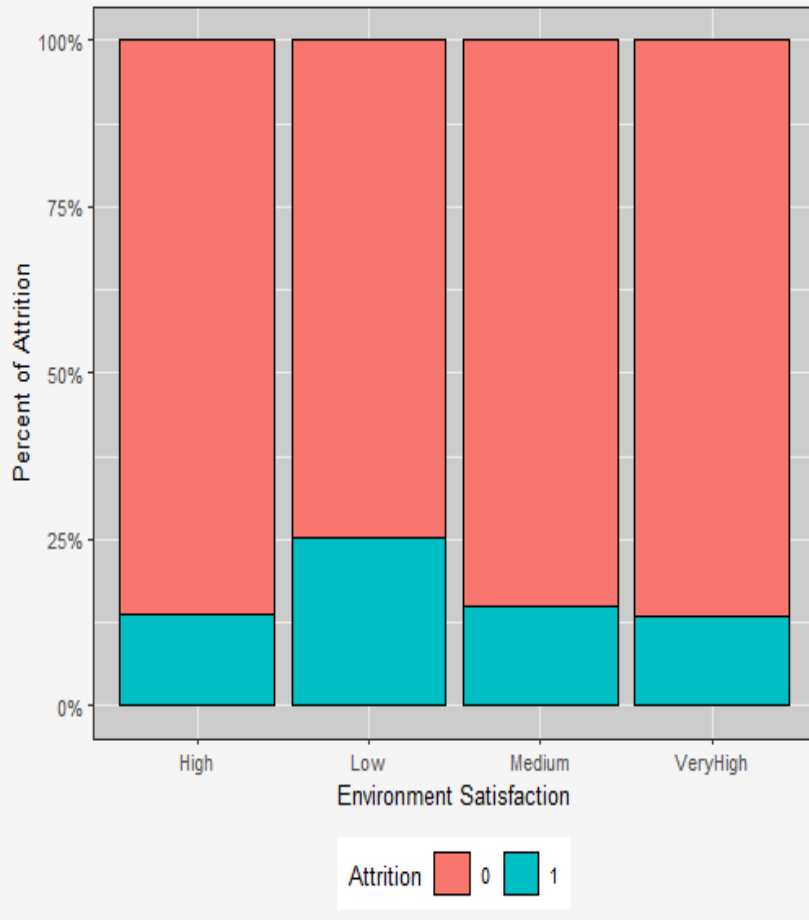
# Attrition Depending on Employee Feedback- 2

Fig 1: Proportion of Attrition Based on Work Life Balance
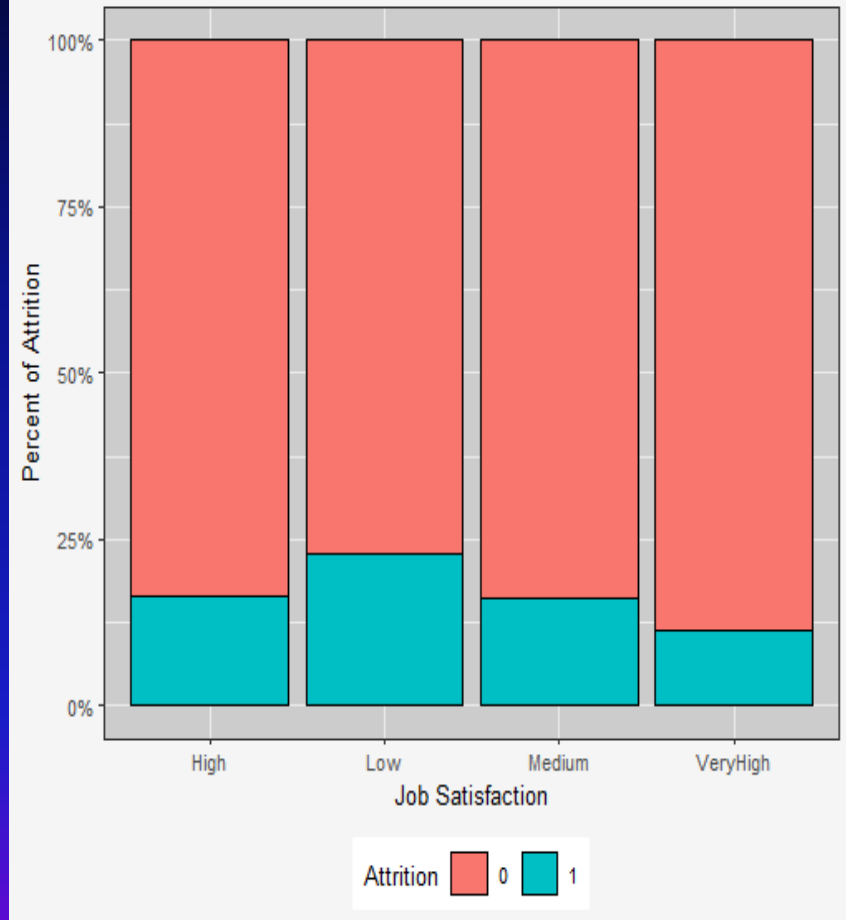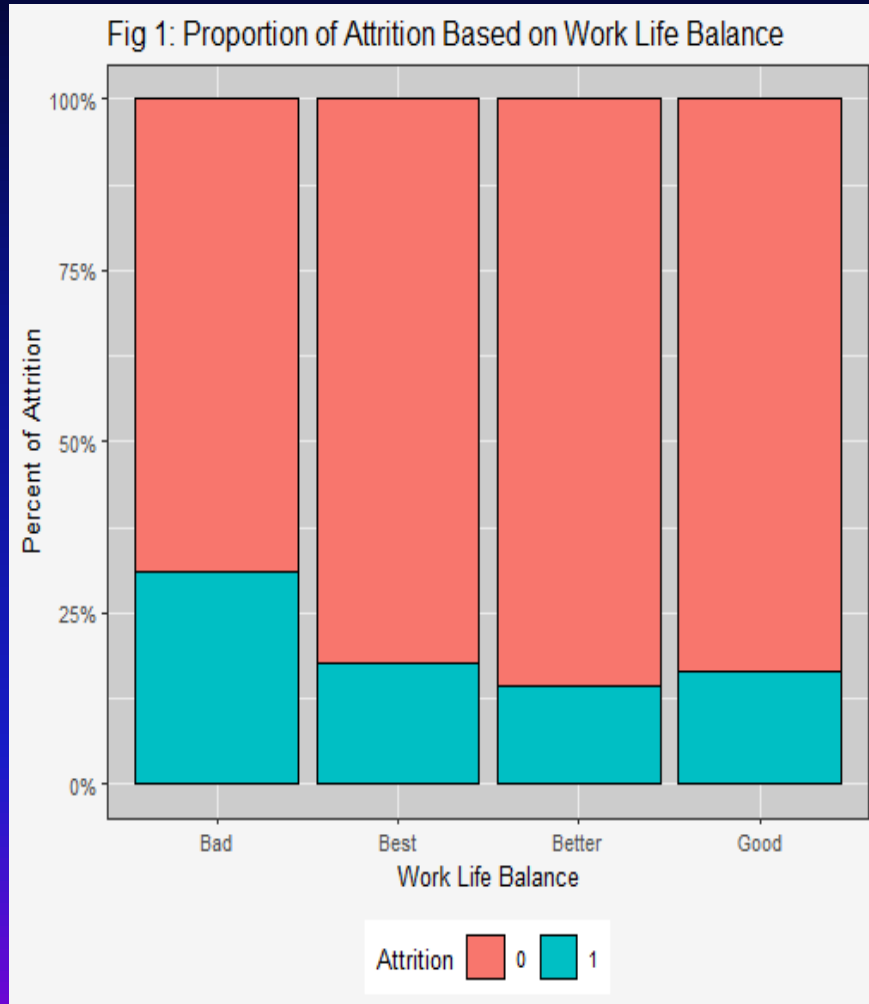
- As we saw from previous slide and current slide. All the factors of Employee feedback point fingers toward similar trend.

- Environment Satisfaction, Job Satisfaction and Work Life Balance when Low/Bad result in Attrition of Employees.

- Company should focus on Employees who have given Low/Bad feedback on their Environment Satisfaction, Job Satisfaction and Work Life Balance

Attrition Depending on Manager Feedback

Fig 1: Proportion of Attrition Based on Performance Rating

Fig 1: Proportion of Attrition Based on Job Involvement
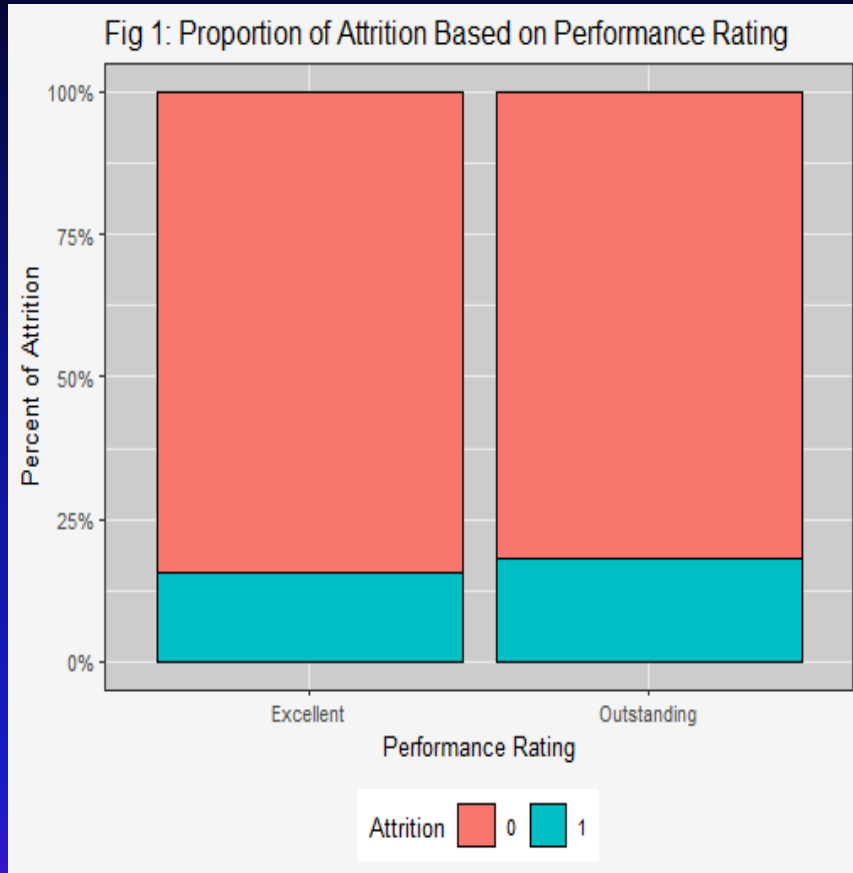
People with higher Performance rating Attrite more then others, maybe they are not getting their desired rewards.
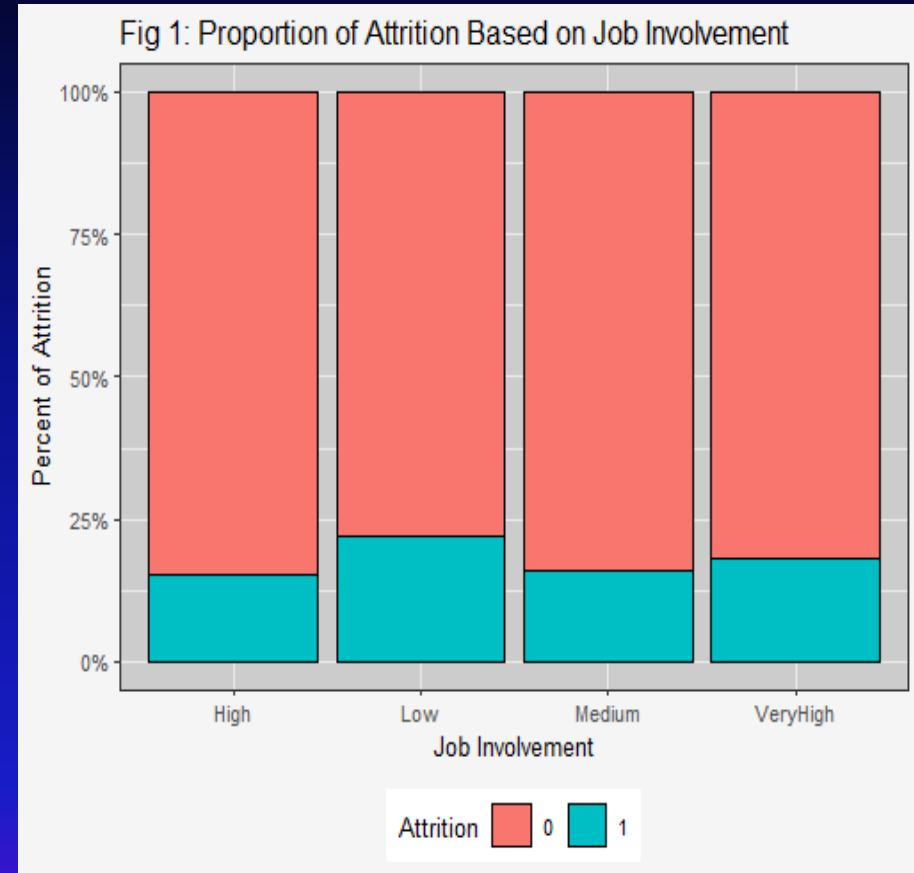
People with low Job Involvement tend to Attrite more since they might not find excitement in the work they do.

Attrition Depending on Time Per Day

Fig 1: Proportion of Attrition Based on Time Per Day
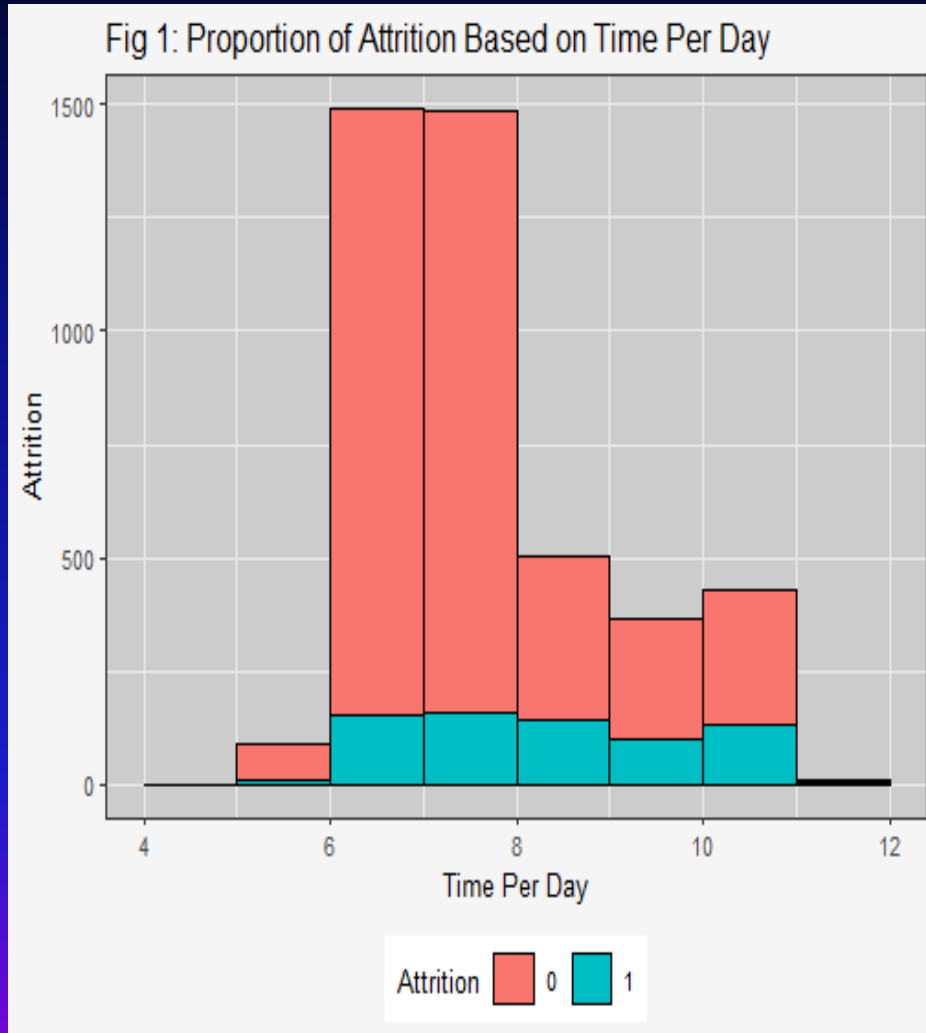
- People who work for more than average 8 hours a day tend to attrite more then then the ones who work for normal hours.

- People who work more than 8 hours might not be getting the desired compliments or overtime pay for their extra hours of work,

- Company should focus on such employees and reward them their expected rewards

Logistic Model Preparation

1. We have created our master data by merging all our datasets, we will divide our data into test and train data, then we train or model on train data and then test it on test data.

2. We create around 23 models to reach or final model. In our final model we have around 13 variables.

3. We have around Residual deviance of 2112.6 on 3053 degrees of freedom and AIC of 2140.6.

4. After testing or model on test data using a random cut-off value for the probabilities, we compare it with Actual values and calculate Accuracy, Sensitivity and Specificity.

5. We need to find out a point of perfect Accuracy, Specificity and Sensitivity.

6. For that we plot a graph of Specificity vs. Sensitivity and Accuracy

Logistic Model Evaluation - 1
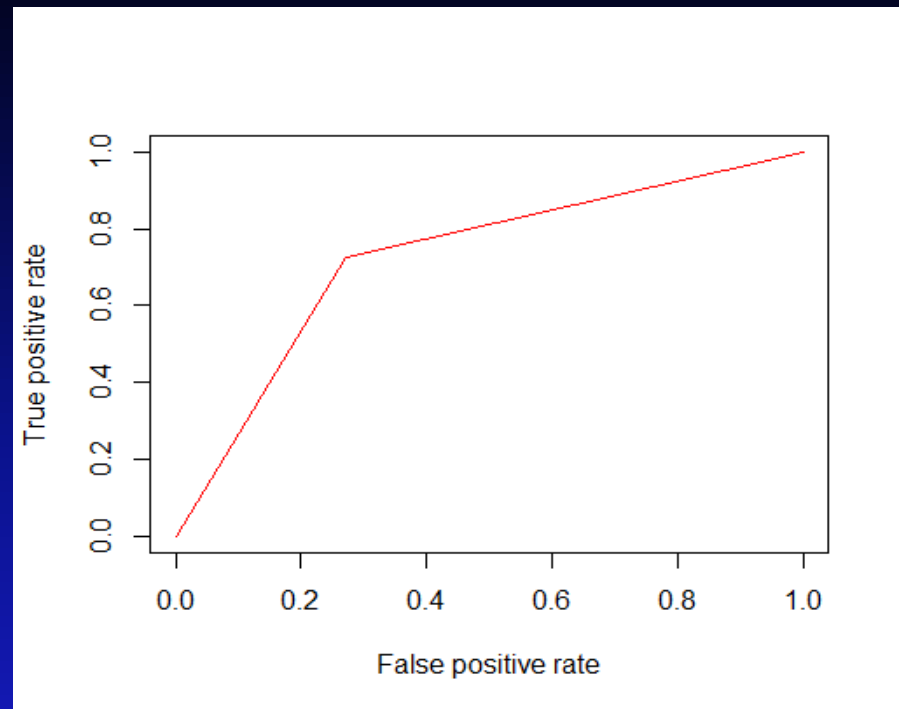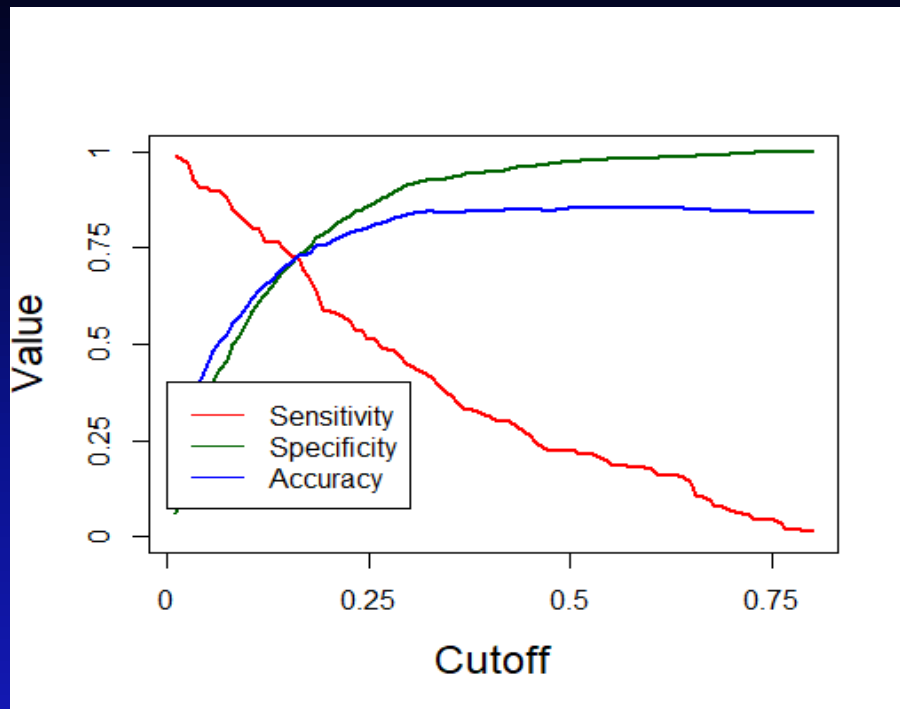
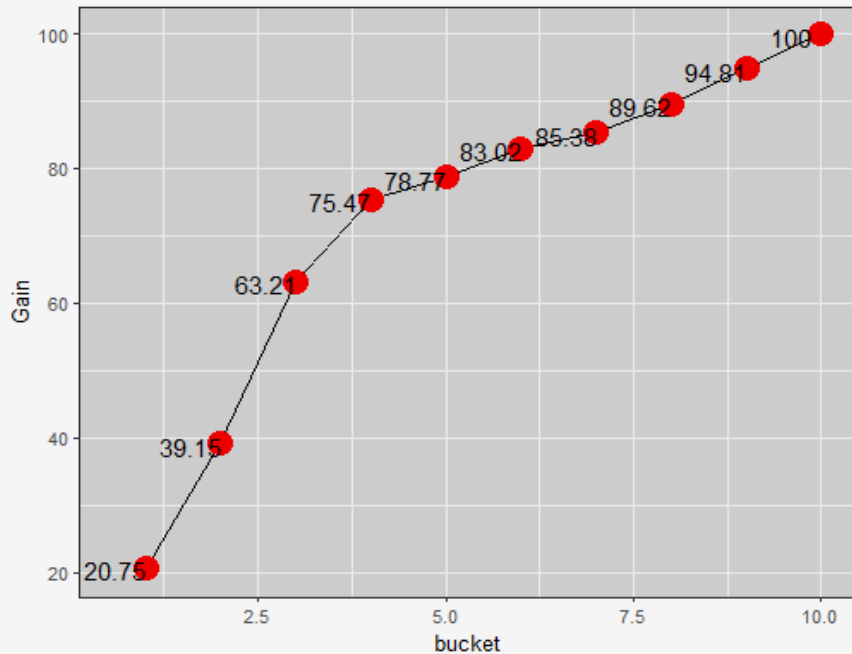Here we get a point at cut-off level 0.16here Sensitivity, Specificity and Accuracy meet.

Parameter	Value
Accuracy	0.7247148
Sensitivity	0.7264151
Specificity	0.7264151

The model is getting higher true positive rate faster, since the graph rises faster for true positive rate

Are under curve = 72.76%
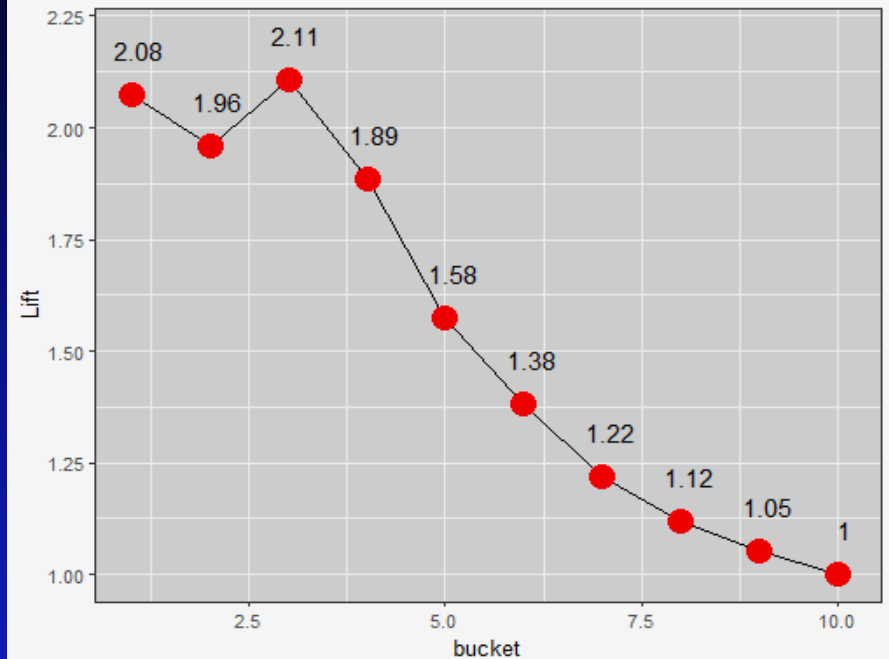
Logistic Model Evaluation - 2

Fig 1: Gain Chart

Fig 1: Lift Chart

We find KS Statistic value to be 45.5% which is great. After that we divide our data into deciles and find out gain and lift

We reach greater than 75% gain at 4th decile, which is sign of good model

By observing lift chart we see that highest lift of 2.11 found at 3rd decile.

It means our model is 2.11 times better than a random model

Summarizing Model Evaluation

Parameter	Value
Accuracy	72.47%
Sensitivity	72.64%
Specificity	72.64%
KS Statistic	45.5%
Area Under Curve (AOC)	72.76%
Gain	75.4% gain at 4th Decile
Lift	2.11 at 3rd Decile

Tips for XYZ to reduce Attrition

1. XYZ should mainly focus on freshers mostly 1-2 years work years, also the ones working at XYZ for 1-2 years or the ones working with current manager for 1-2 years should be given their expected salary, incentive or proper benefits.

2. Company should focus on Single people this may or may not include freshers.

3. Also the people who Travel Frequently for Business should be given proper compensation or should try to reduce their travel.

4. People from HR Department/Education Field also should be given proper pay or service by the company.

5. People with bad Employee Feedback should be focused on and also the ones with less Job Involvement.

6. People with higher rating should be given desired rewards.

7. People with greater than 8 hours of work time per day should be given proper compensation

Thank You