

HR Analytics CASE STUDY

SUBMISSION

BGNS Analytics:

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Business Objective and Goal

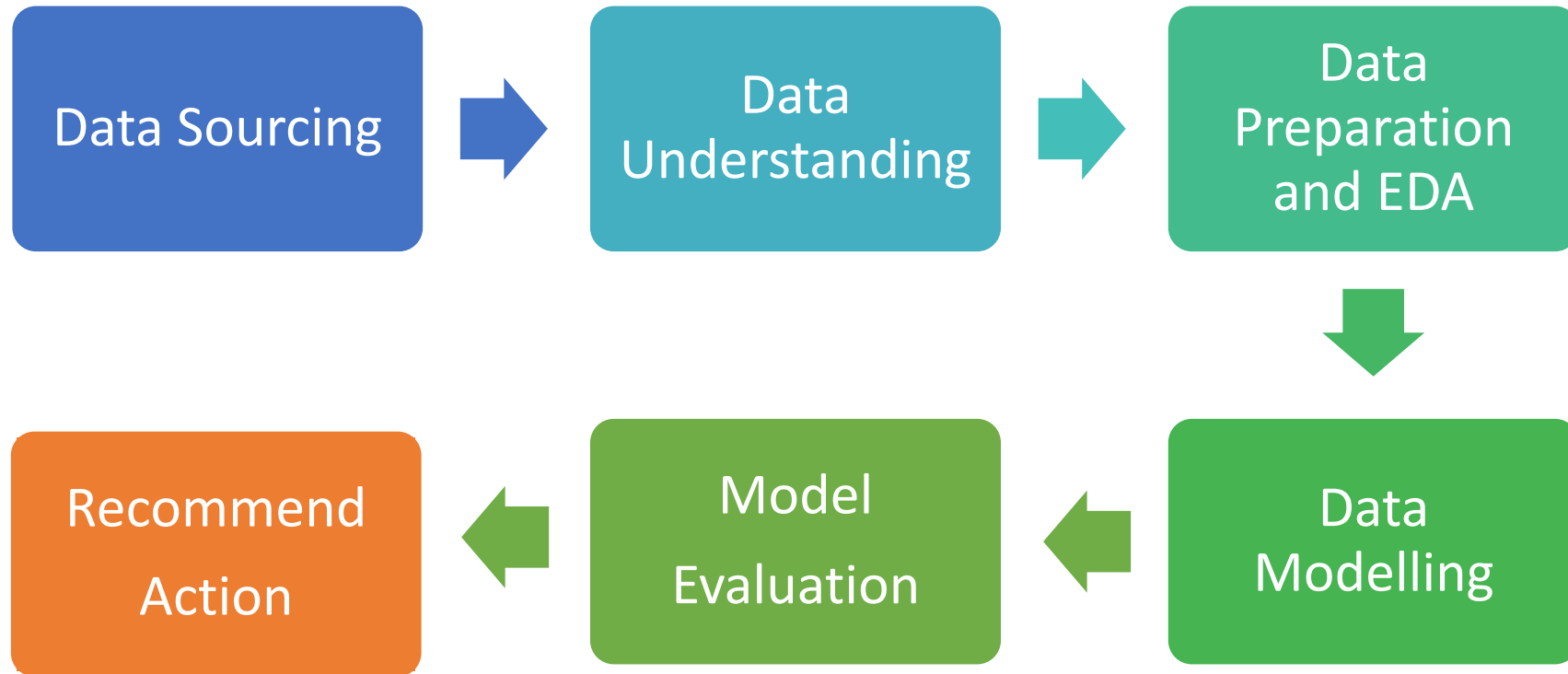
❑ Business Objective :

- To Identify key factors due to which employees at XYM are leaving the company.
- What changes should be made to their workplace, in order to reduce attrition.

❑ Data Analysis Goals :

- From the collected data derive a model the probability of attrition.
- Identify the key variables which significantly affect the rate of attrition.
- Recommend actions to reduce attrition level.

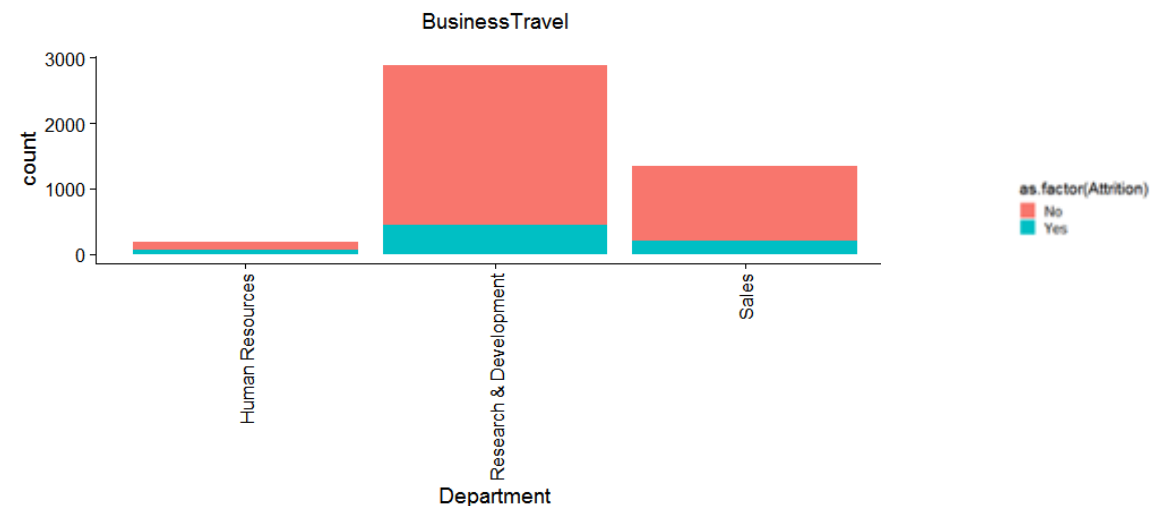
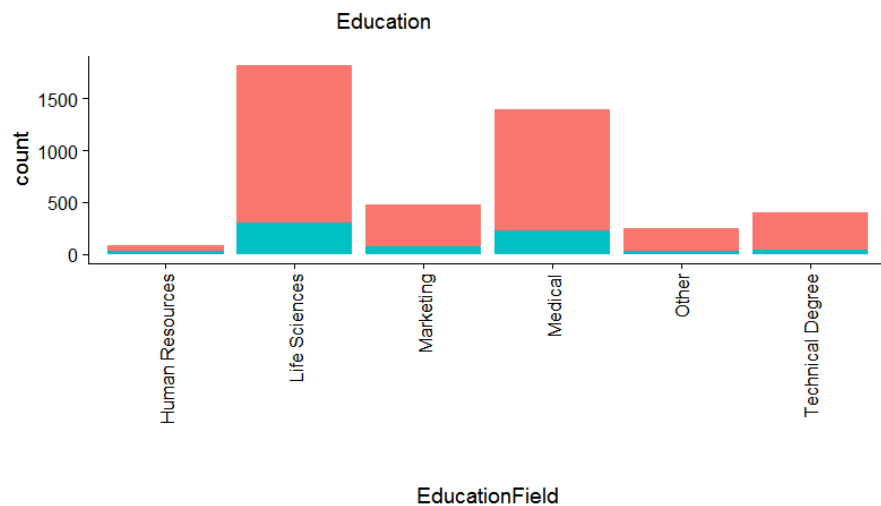
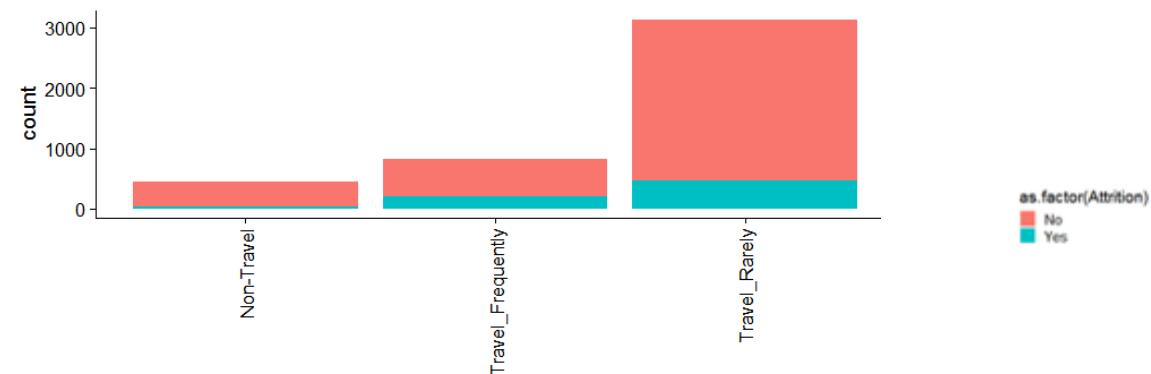
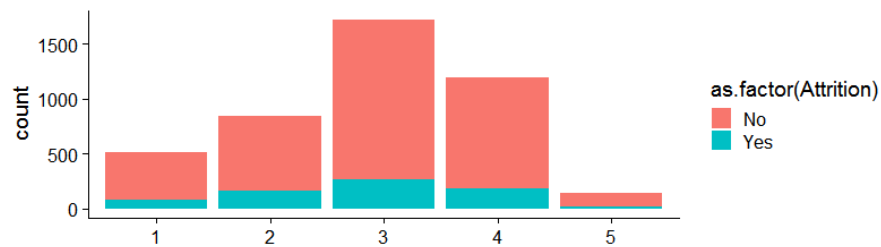
Flow Chart



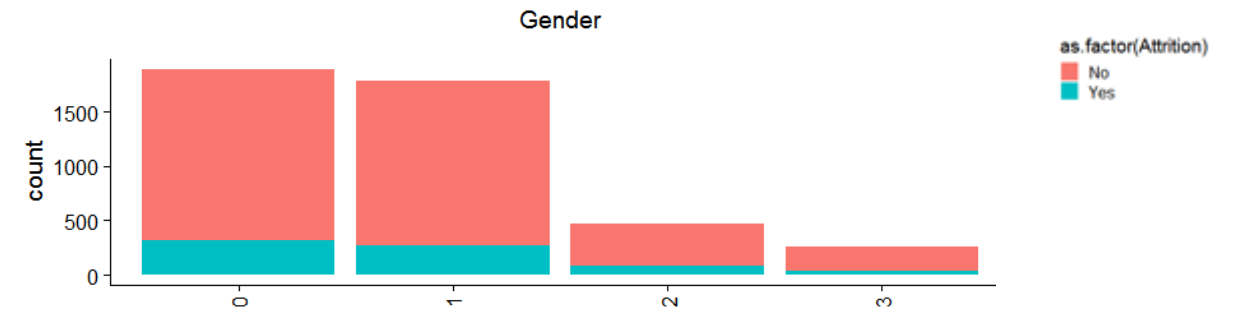
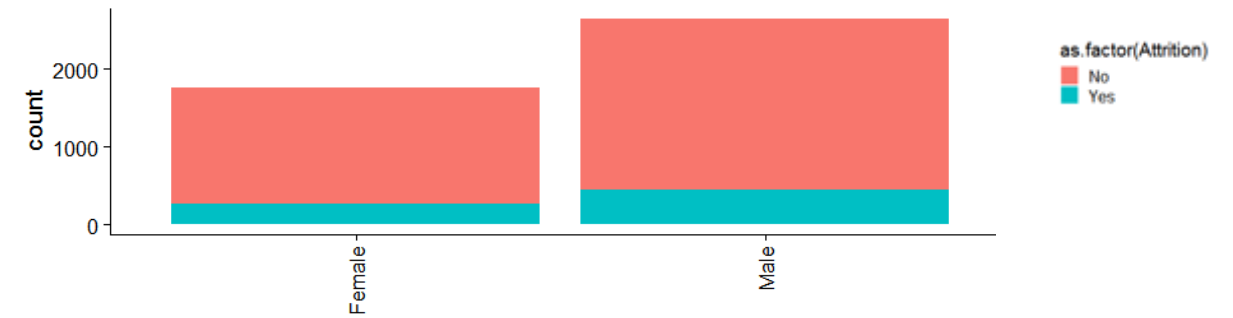
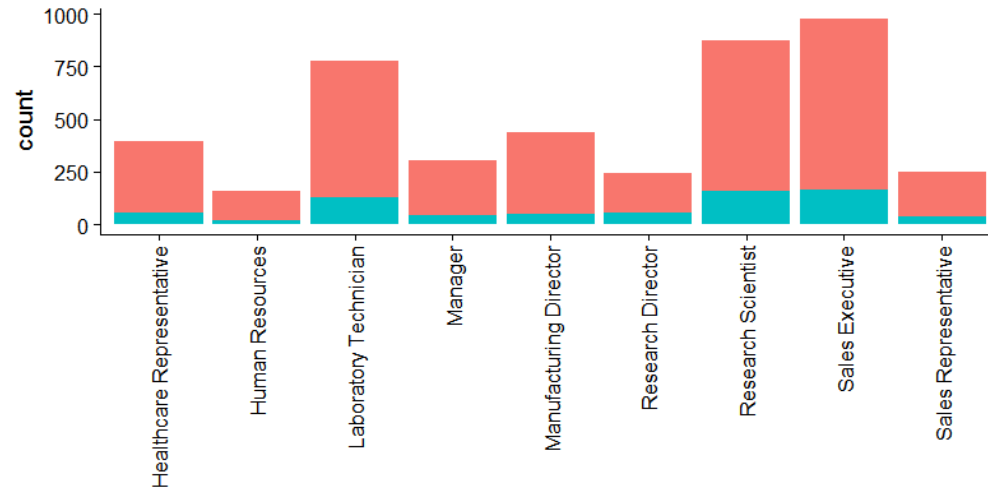
Data Preparation and EDA

- ✓ Inserted missing EmployeeID column name in in_time and out_time data set.
- ✓ Standardized date columns to Date Time Type in in_time and out_time data set.
- ✓ Removed columns which has single value or only NAs in all the rows.
- ✓ Handling Missing data points: In total 111 NAs were noticed and this number is quite low in comparison to the 4410, hence removed them.
- ✓ Converting variables to appropriate type for analysis.
- ✓ Treating outliers for variables where a sharp increase/decrease in variable value is observed.
- ✓ Attrition percentage is around 16% after removal of NA values.
- ✓ Converted factors with 2 levels to numerical variables.
- ✓ Created dummy variable for categorical variables having more than 2 levels.
- ✓ Normalized continuous features.

Variable Analysis



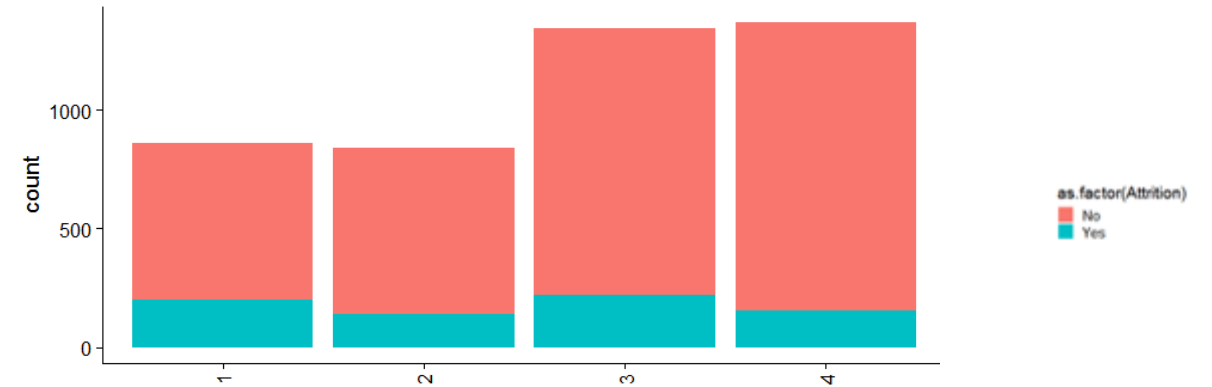
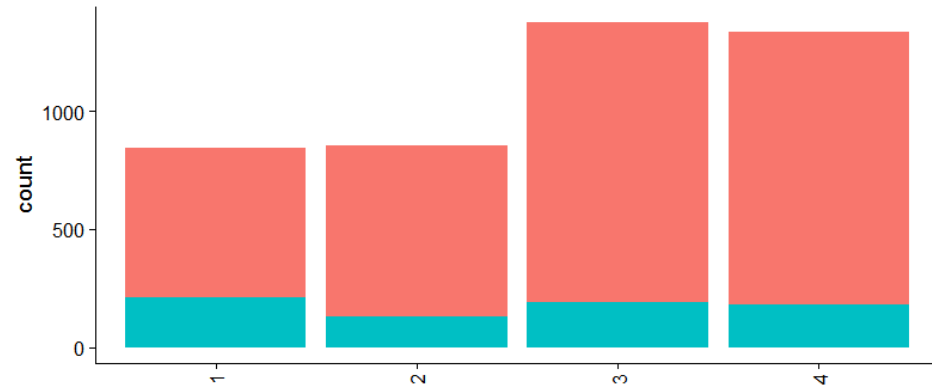
Variable Analysis



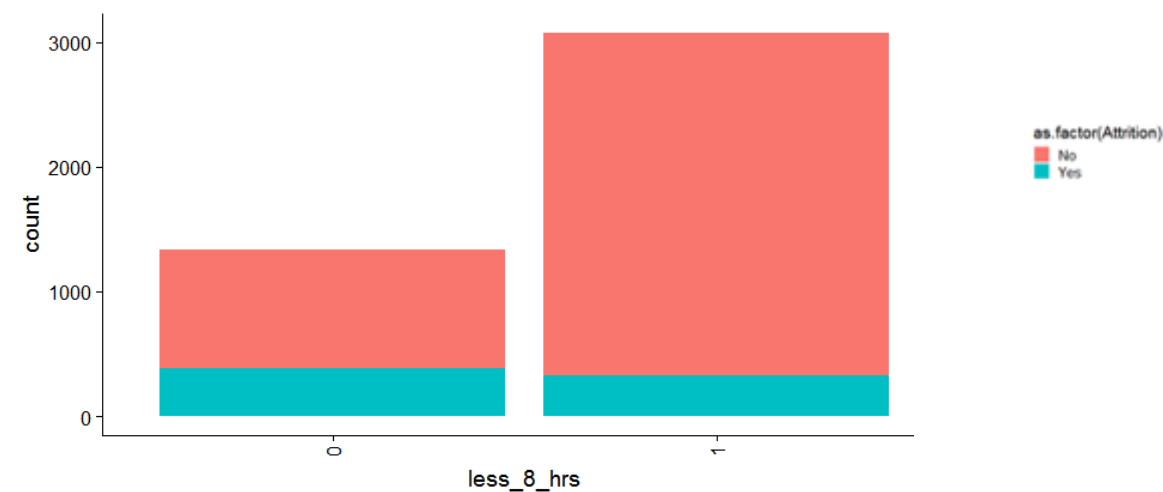
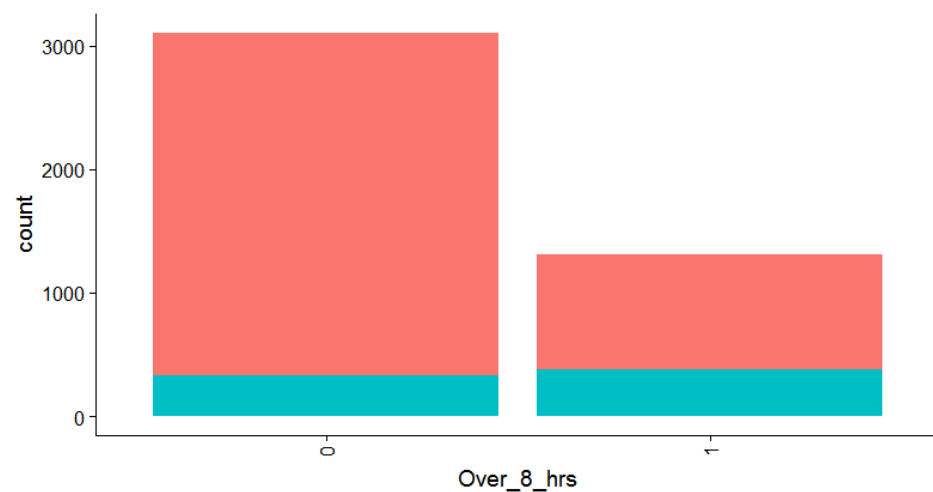
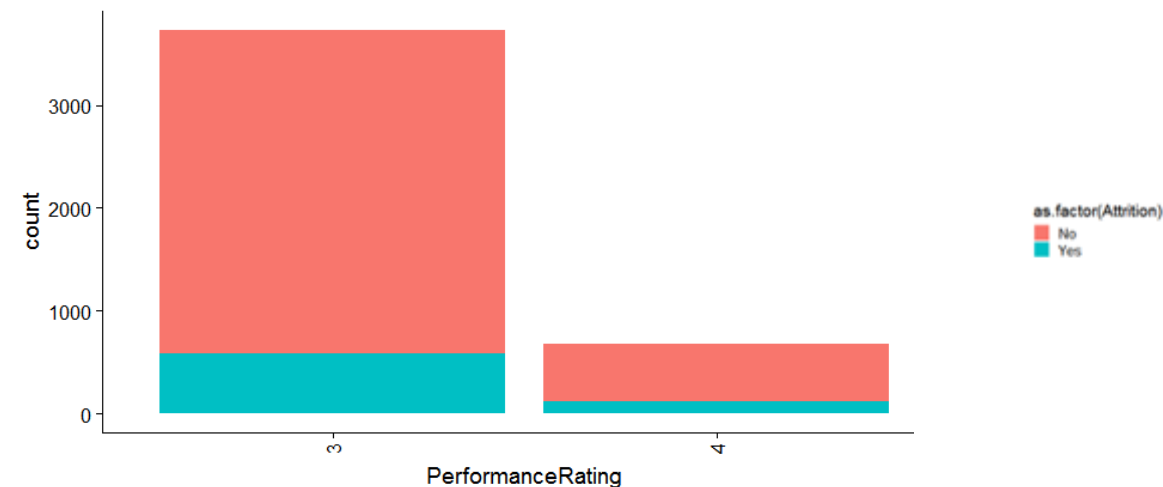
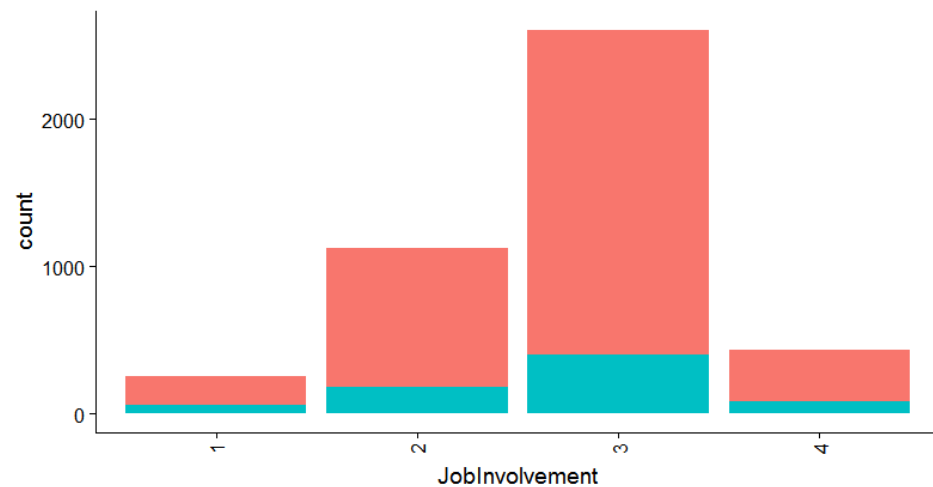
JobLevel

StockOptionLevel

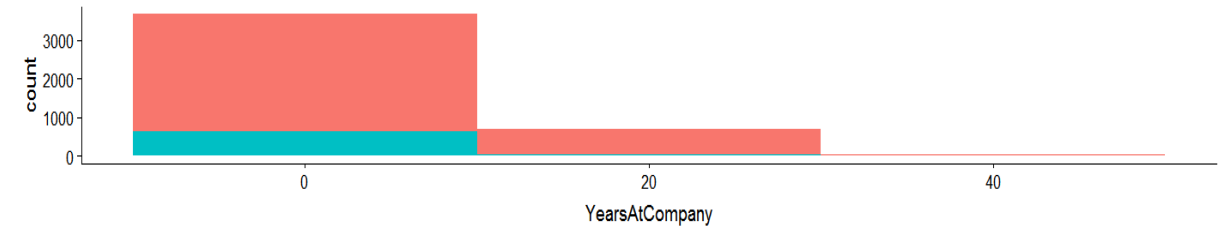
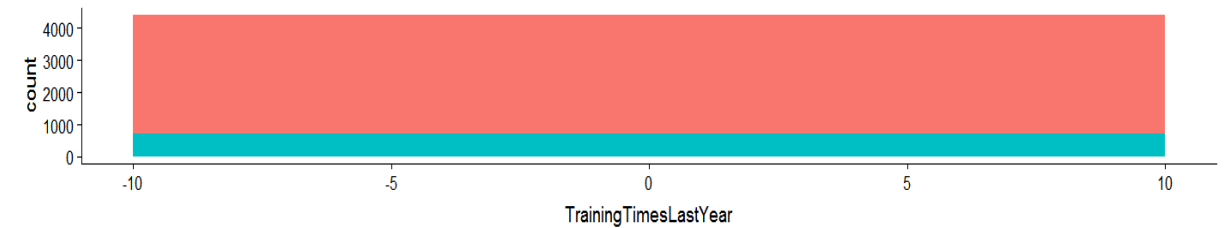
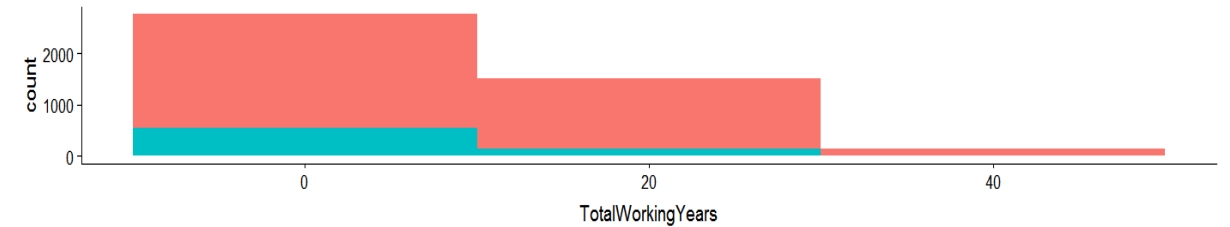
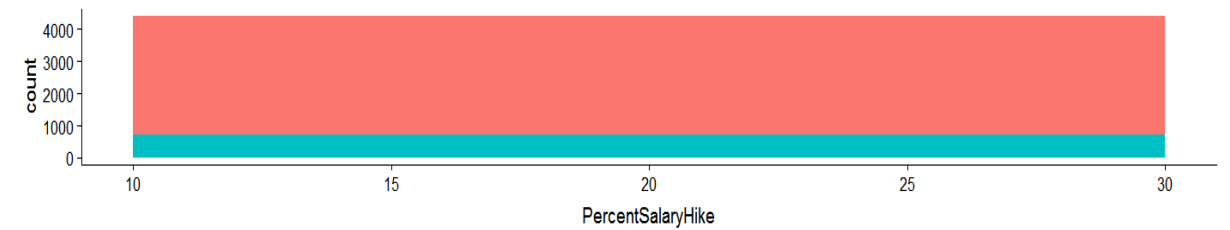
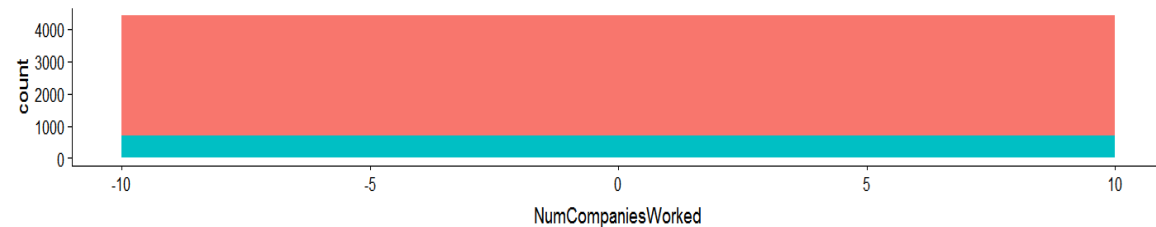
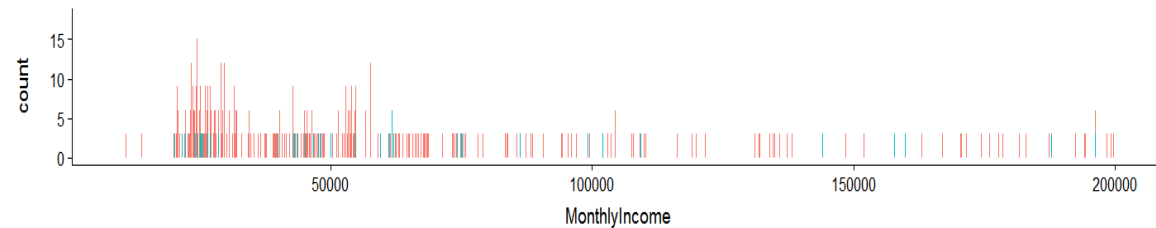
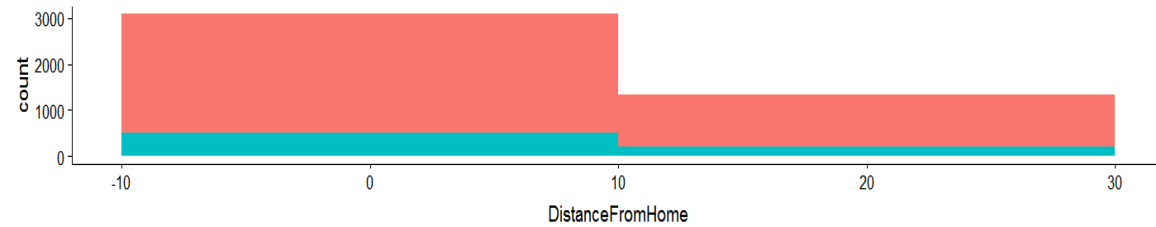
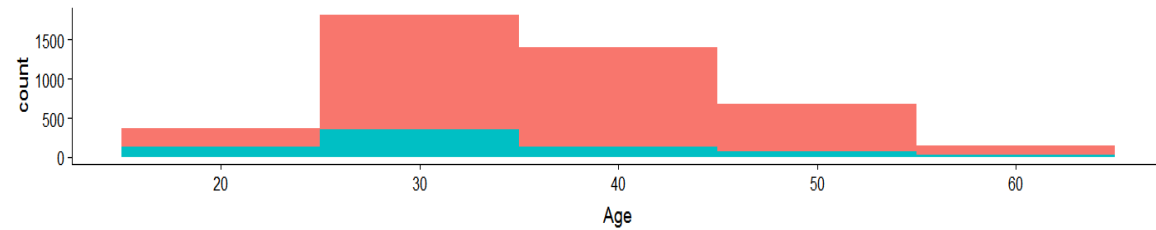
Variable Analysis



Variable Analysis



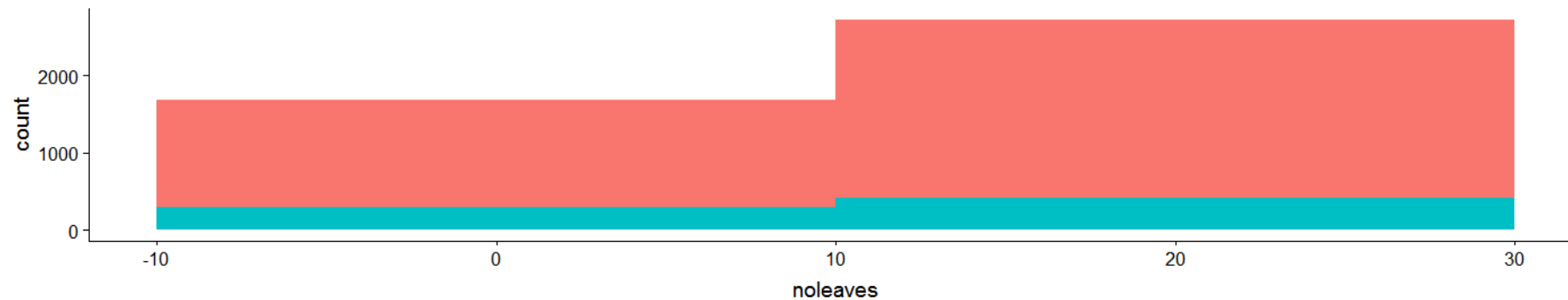
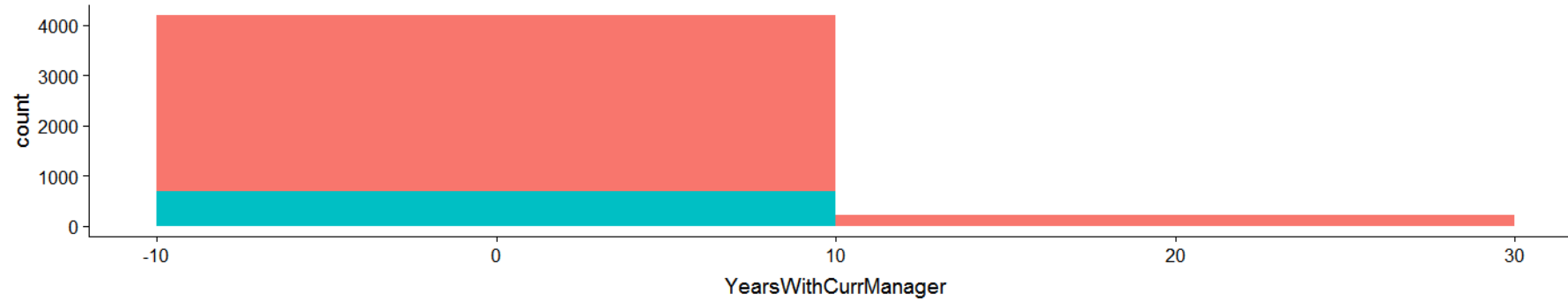
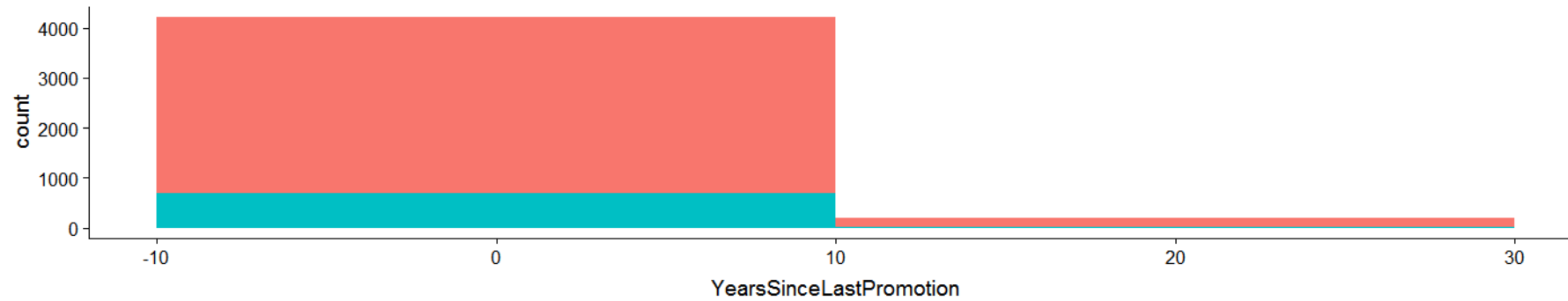
Variable Analysis



as.factor(Attrition)



Variable Analysis

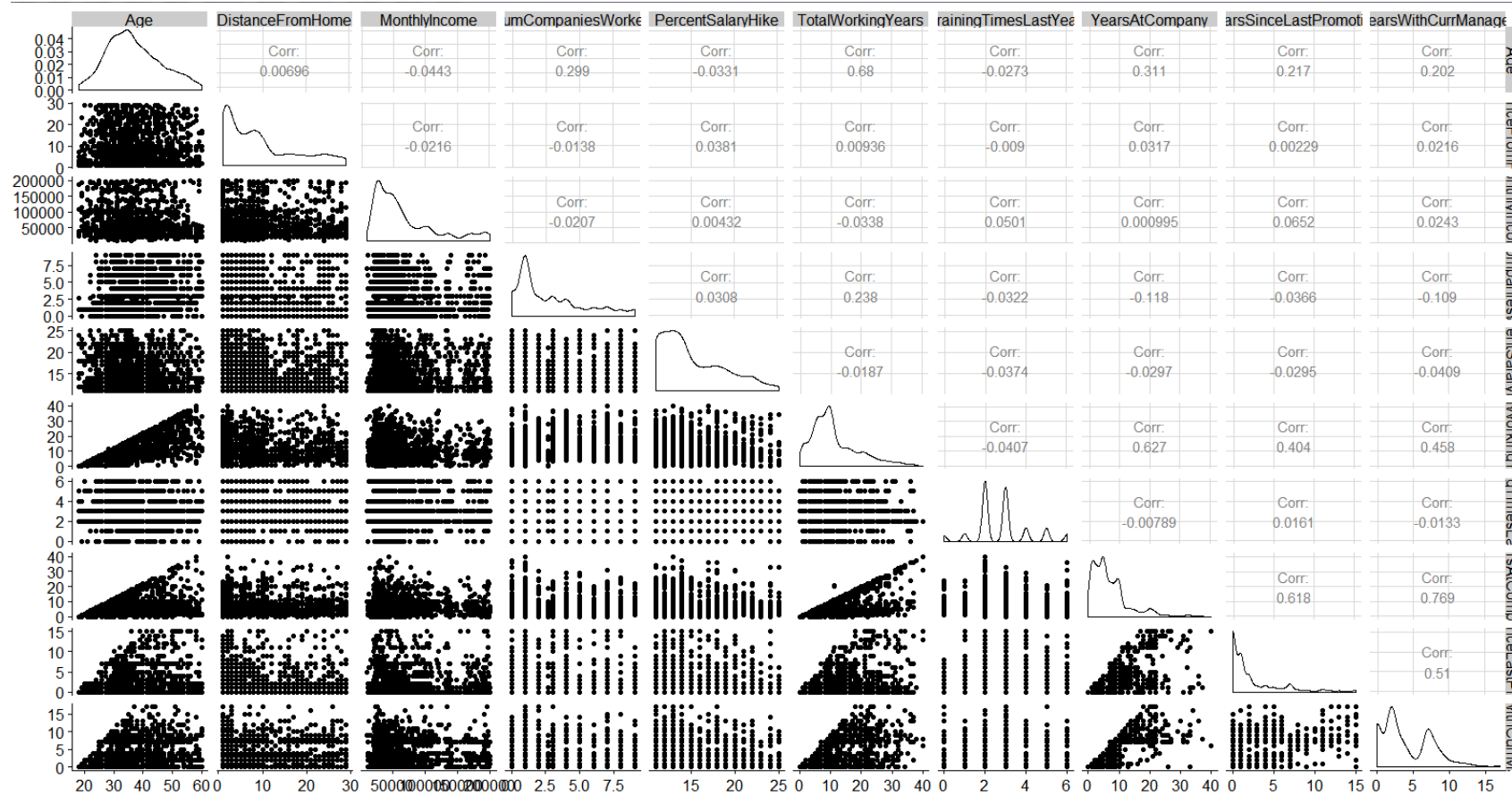


as.factor(Attrition)

No

Yes

Correlation Analysis



High Correlated Variables :

- Years at company & Year with Current manager

Medium Correlated Variables :

- Years at company & total Working Years

Data Modelling

Key Variables affecting Rate of Attrition

Number of Companies Worked

Total Work Years

Year since last promotion

Years with Current manager

Average Work Hours per day

Job Satisfaction Very High

Business travel frequently

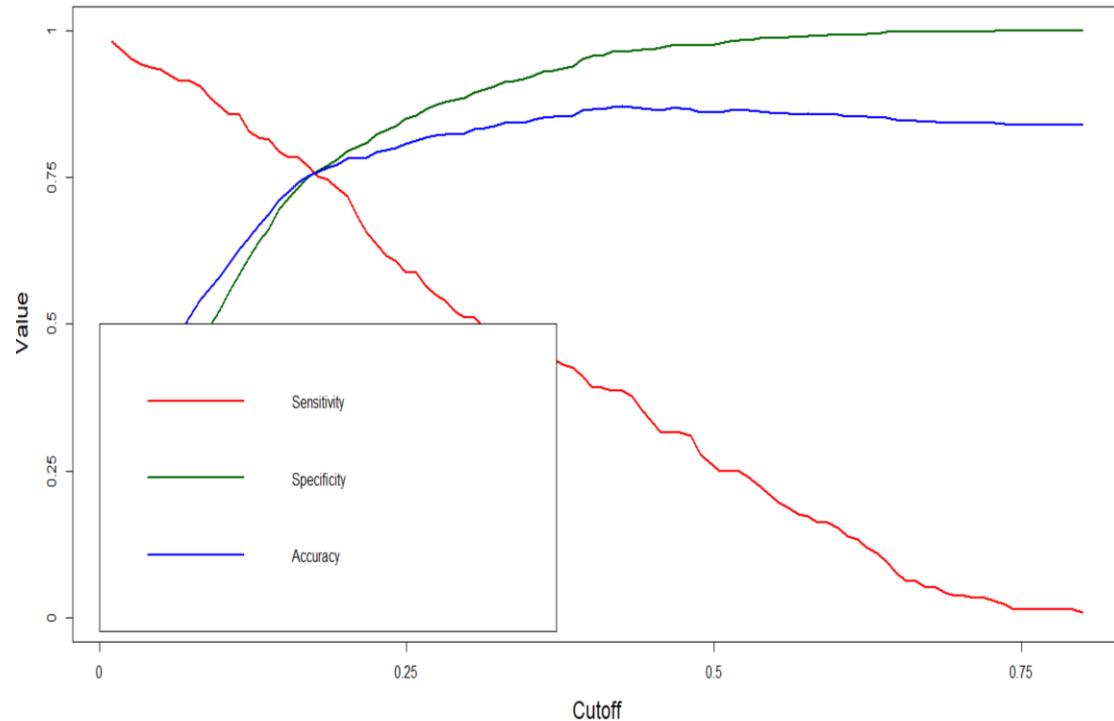
Marital Status Single

Low Environment Satisfaction

Low Job Satisfaction

- An Iterative process of removing insignificant variable based on VIF and p-values
- Took 26 iterations to finalize the model.

Model Evaluation



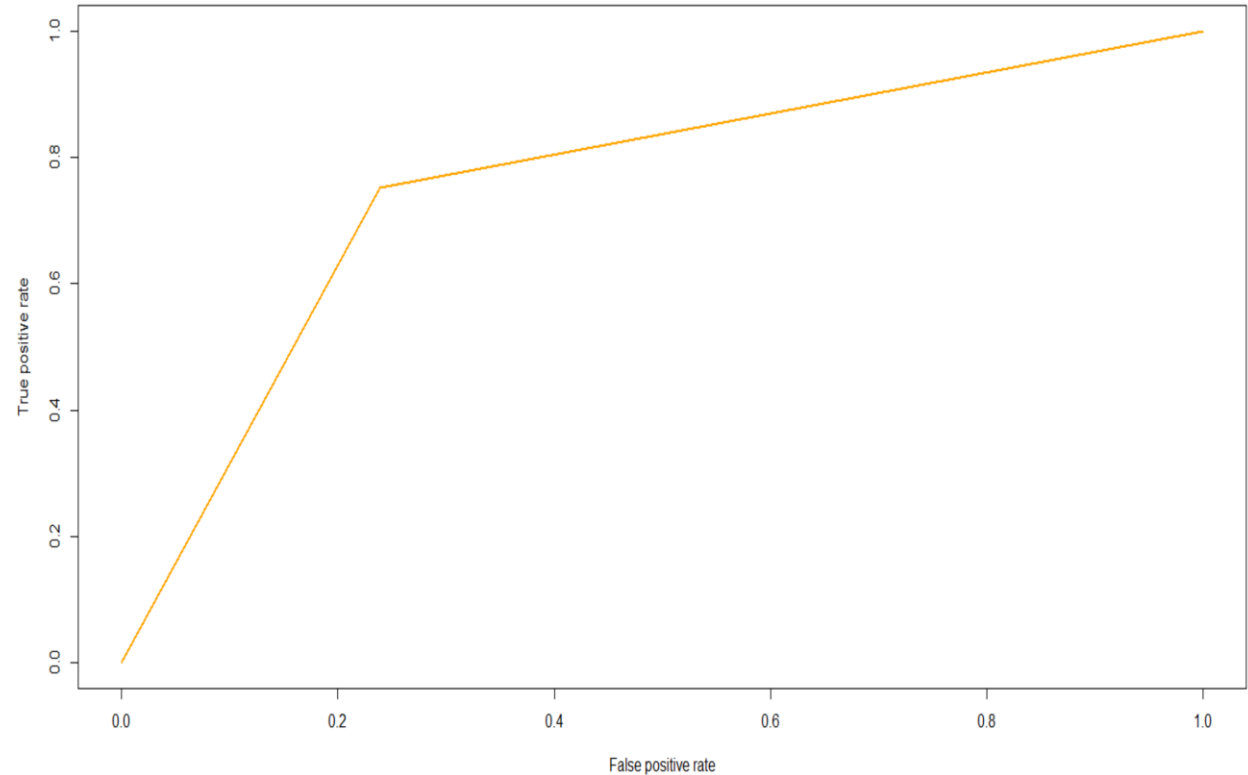
✓ 0.1776 is selected as probability cut-off for optimal value of sensitivity, specificity and accuracy.

Final Model Selection

Probability Cutoff Value	0.1776
Accuracy	76%
Sensitivity	75.11%
Specificity	76.13%
KS Statistics	51.25%
Gain	At 4 th Decile 80.4% attritions are predicted.
Lift	2 times at the 4th decile

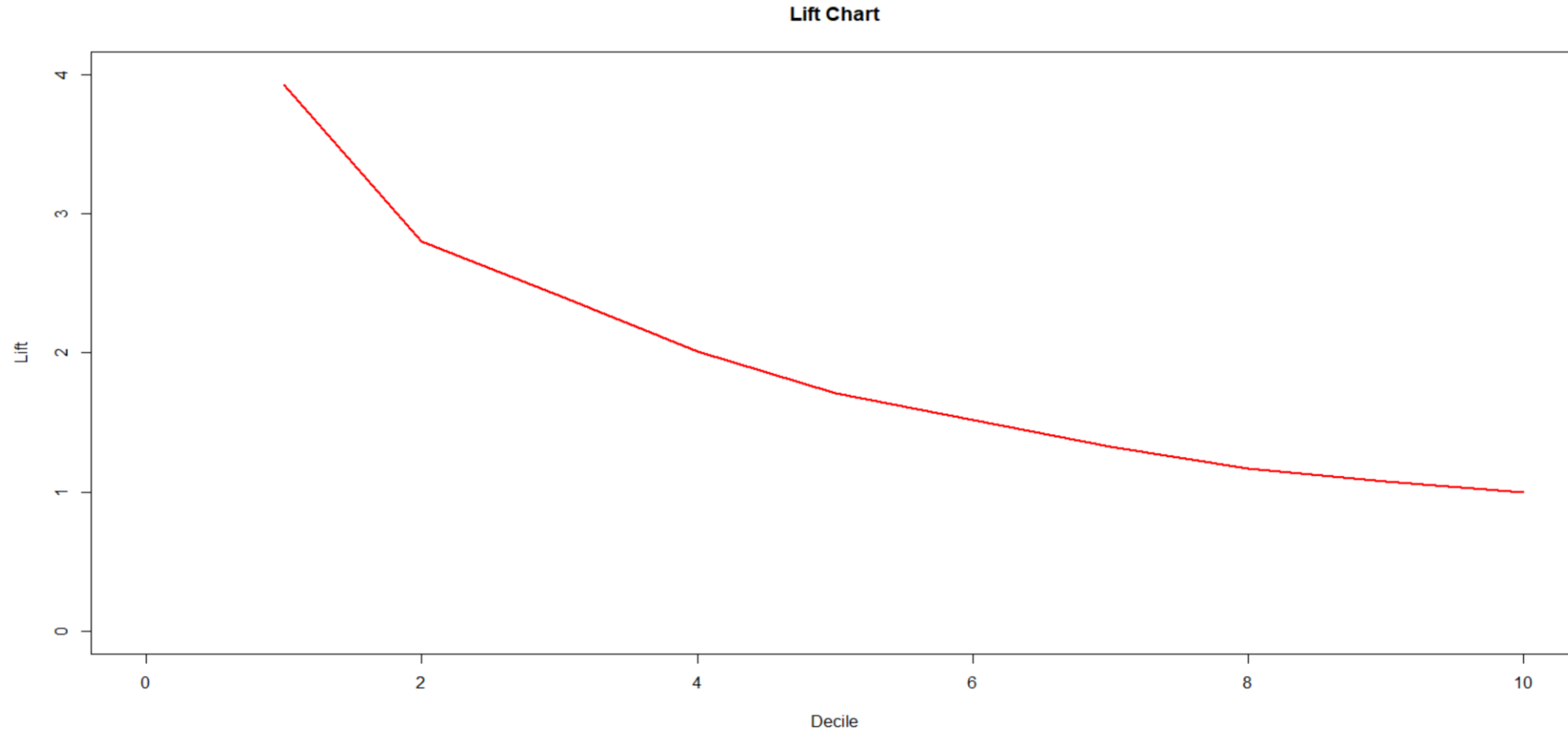
Gain Analysis

bucket	total	totalresp	Cumresp	Gain	Cumlift
1	129	82	82	39.23445	3.923445
2	129	35	117	55.98086	2.799043
3	129	34	151	72.24880	2.408293
4	129	17	168	80.38278	2.009569
5	129	11	179	85.64593	1.712919
6	129	11	190	90.90909	1.515152
7	129	4	194	92.82297	1.326042
8	129	2	196	93.77990	1.172249
9	129	6	202	96.65072	1.073897
10	129	7	209	100.00000	1.000000



- ✓ Out of 1290 employees 209 employees left the company. By 4th decile, the model could predict 168 employees, i.e., 80.4% out of 209 employees who left the company.
- ✓ KS statistics for the model is 51.25 % (max value at 4th decile) and the model is considered very good as the value is more than 40%.

Lift Plot Analysis



- ✓ By the end of the 4th decile the model's gain is 2.01 times that of a random model's gain at the end of 4th deciles. i.e., the model catches 2.01 times more attrition than a random model would have caught

Final Model Conclusion

Coefficients:

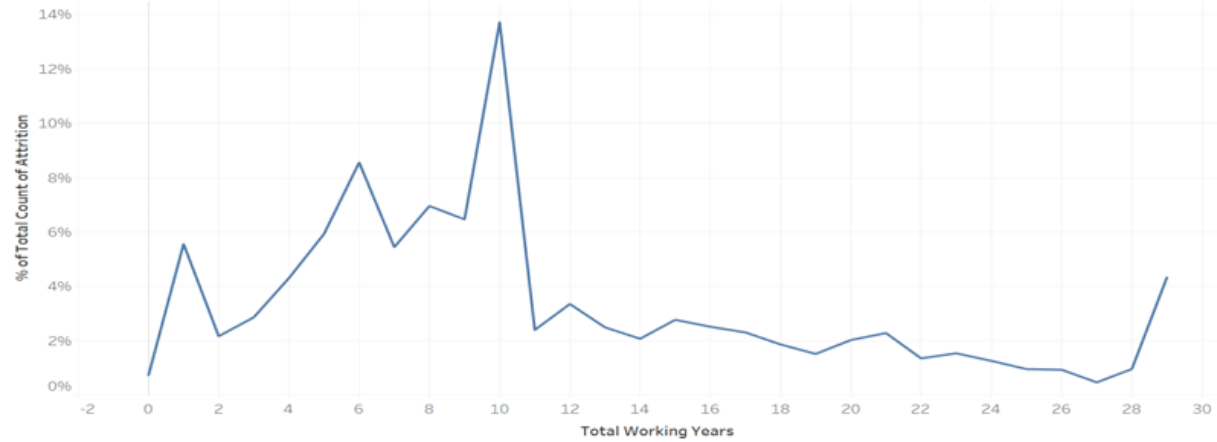
	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-2.63447	0.11229	-23.462	< 2e-16	***
NumCompaniesWorked	0.27348	0.05757	4.750	2.03e-06	***
TotalWorkingYears	-0.71886	0.08483	-8.474	< 2e-16	***
YearsSinceLastPromotion	0.54490	0.07259	7.507	6.07e-14	***
YearsWithCurrManager	-0.46078	0.08619	-5.346	9.00e-08	***
avg_work_hours	0.64400	0.05217	12.344	< 2e-16	***
BusinessTravel.xtravel_frequently	0.62753	0.12952	4.845	1.27e-06	***
MaritalStatus.xsingle	0.91813	0.11228	8.177	2.90e-16	***
EnvironmentSatisfaction.xlow	0.84911	0.12931	6.567	5.15e-11	***
JobSatisfaction.xlow	0.52388	0.13552	3.866	0.000111	***
JobSatisfaction.xvery.high	-0.52323	0.13467	-3.885	0.000102	***

From the final Model Coefficient sign below points are inferred:

- Attrition rate is higher for employees who have lower work experience or has worked lesser number of years under his manager or has less Job Satisfaction.
- Attrition rate is higher with employees who has worked in higher number of companies, who's promotion is due since long, who works for long hours above 8 working hours, who's business travel frequency is Higher.
- Attrition rate is higher with employees who are single & low environment satisfaction.

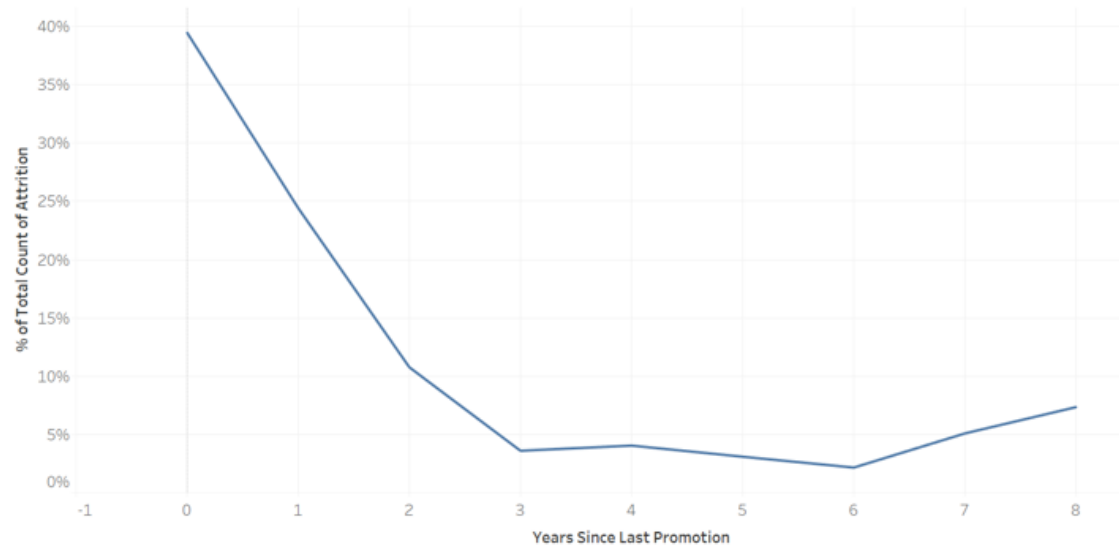
Analysis Conclusion

Total Working Years



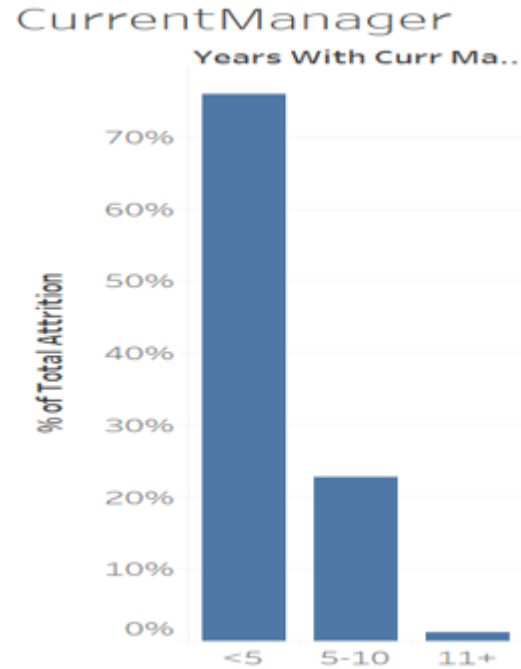
Attrition is higher in employee with 6-10 years experience

Last Promotion

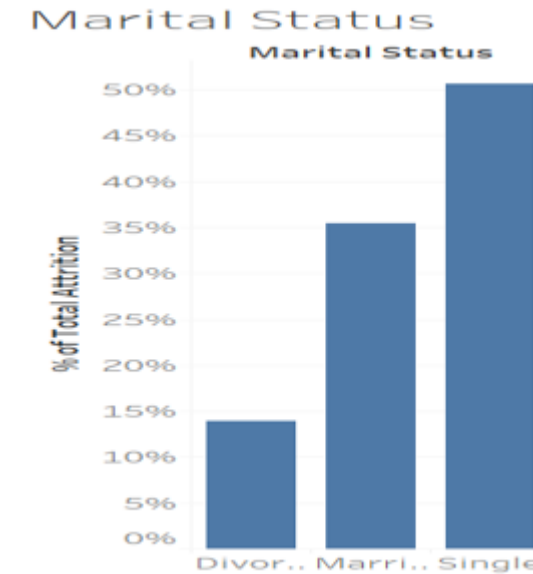


Attrition is higher in employee promotion within 2 years

Analysis Conclusion



Attrition is High among employees with Current Manager for less than 5 years.



Attrition is higher among employees with marital status as Single

Recommendations

- Employees with total Work Experience 6-10 years could be given Loyalty Recognition Rewards or motivate them with skill up gradation Trainings.
- Employees whose last promotion happened less than 3 years , should be provided necessary trainings to make them ready for a Promotion.
- Employees whose Last promotion happened more than 6 years should be reviewed for their Promotions.
- Employees who are travelling rarely may want to travel more and Employees who are travel Frequently may want to reduce travelling due to Personnel reasons.
- Company could encourage married employees and set example for Single Employees so that they can see their personal as well as professional growth in the same company.
- For the Employees whose average working Hour per day is more than 8 Hours , the Managers should be notified and necessary Actions should be taken.
- Frequency of changing Managers for an Employee should be reduced.

Thank You!