Human Resources - Case Study

Submission

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Business Overview and Objectives

Business Objective:

- A large company faces a 15% annual attrition of employees and they would like to control the attrition rate

Key challenges for management

- Projects worked upon by former employees get delayed resulting in customer relations
- Recruiting new talent requires dedicated attention from the department employees
- Quite often new employees require training or large ramp-up time

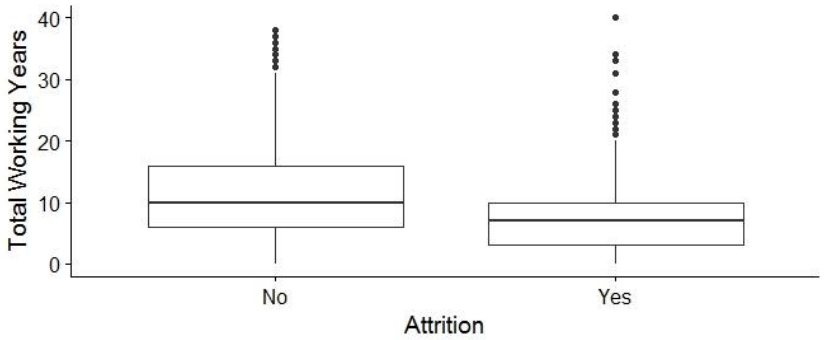
Methodology:

- Model the **probability of attrition** using logistic regression. Results obtained are expected to be used by the company management to introduce workplace changes to control the attrition rate

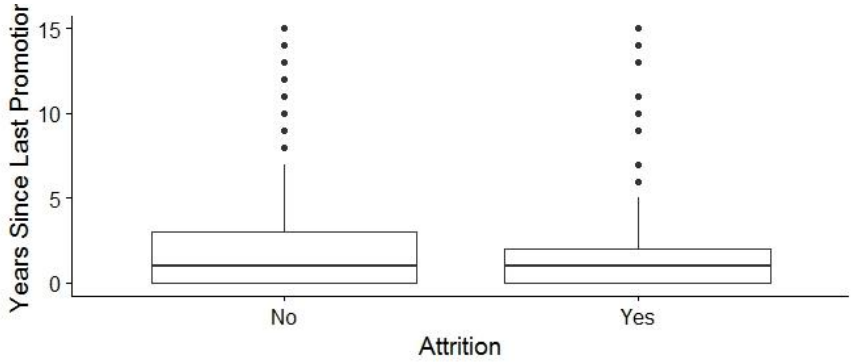
Data Cleaning and Preparation

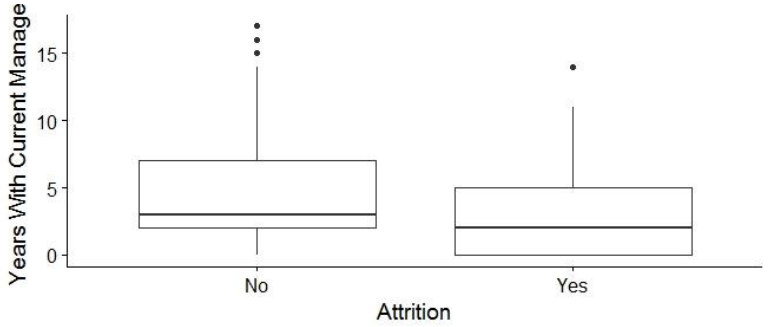
- Check for duplicate employee IDs
- Replace values of NA with median value for columns – NumCompaniesWorked, TotalWorkingYears, EnvironmentSatisfaction, JobSatisfaction, WorkLifeBalance
- Check for blank values across all variables
- Check for variables with single space character
- Check for variables with duplicate values
- Check for outliers across variables – MonthlyIncome, TotalWorkingYears, YearsAtCompany, YearsSinceLastPromotion, YearsWithCurrManager
- Convert character columns into dummy variables
- Remove columns with same value across all rows in the dataset
- Calculate mean working time for employees for whole period
- Merge the data sets with Employee ID as the common reference

Data Preparation – Plots for Outliers



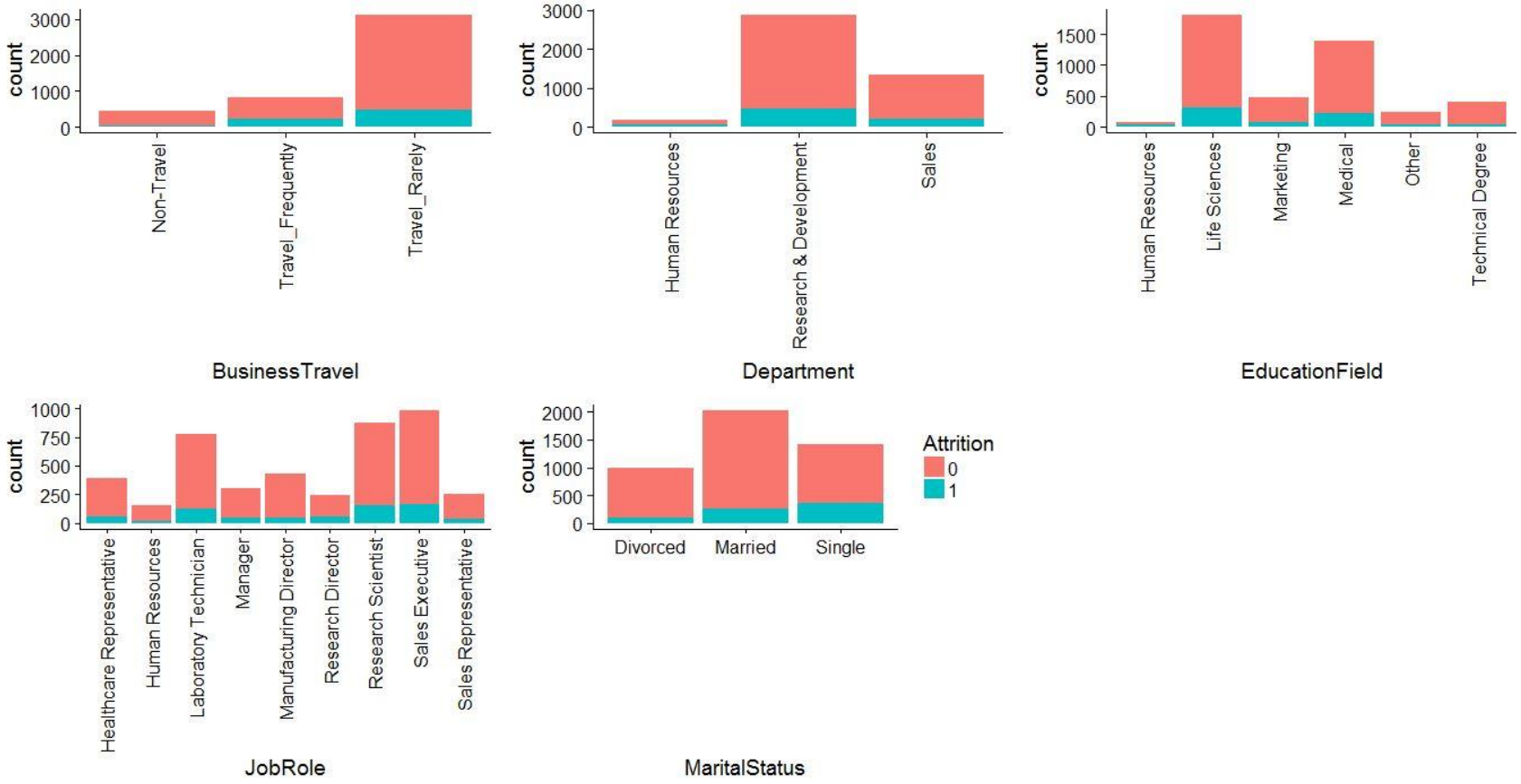
- The above plots indicate the employees with higher experience or with more years in the company tend to contribute less to the attrition rate





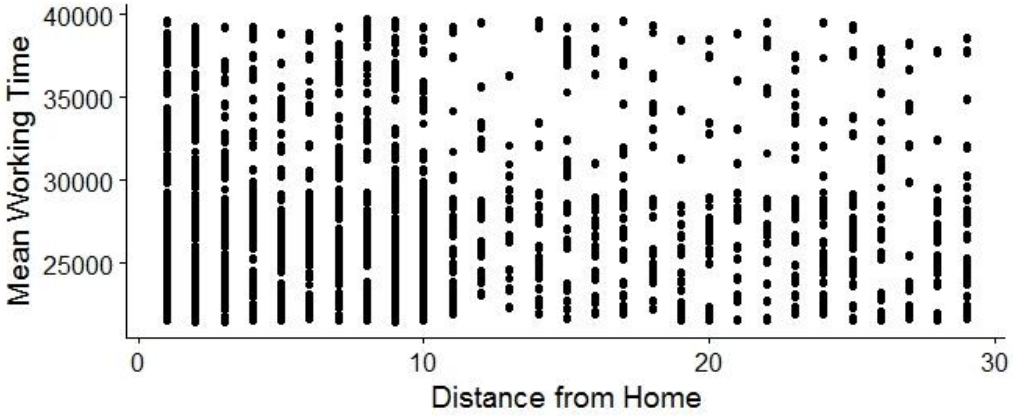
- These plots were plotted to identify and remove outliers

Analysis – Grid Plots

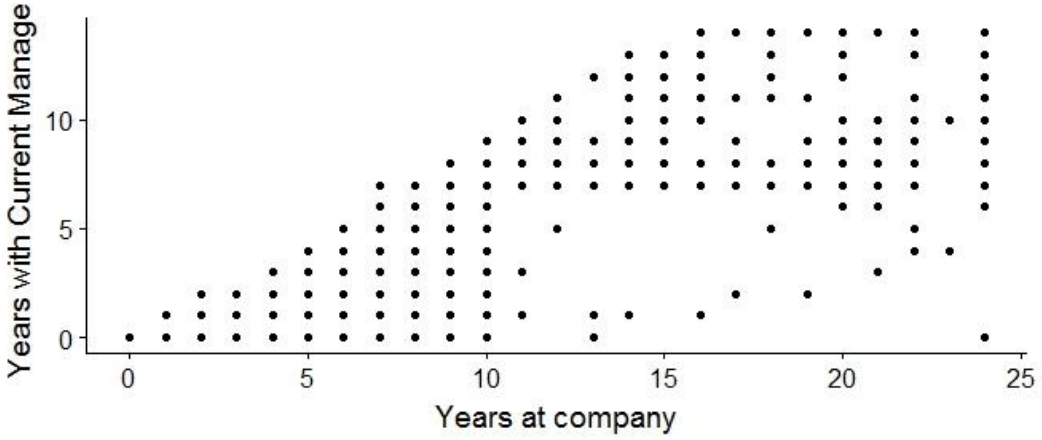


- Check relationship between key variables like Business Travel, Department, Education Field, Job Role, Marital Status

Analysis Graph Plots



The above plot indicates Mean working time decreases as Distance from home of employee increases

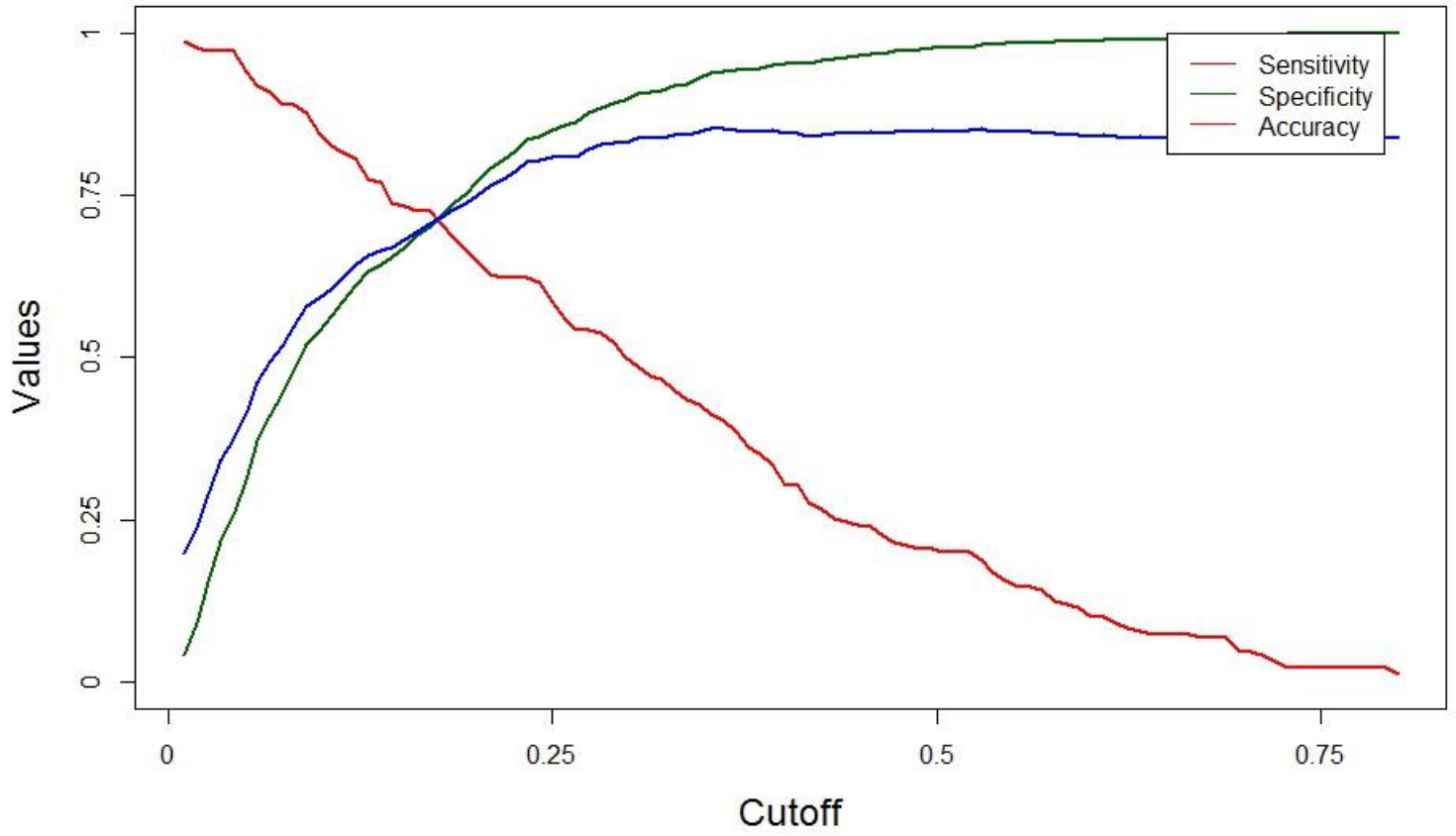


The above plot indicates relationship between Years with current manager and Years with company

Analysis – Final Model

- Following final attributes that were found to be significant
  - Variables with positive coefficient in relation to attrition :
    - NumCompaniesWorked, YearsSinceLastPromotion, meanWorkingTime, BusinessTravelTravel_Frequently, EducationFieldHuman Resources
  - Variables with negative coefficient in relation to attrition:
    - Age, TotalWorkingYears, TrainingTimesLastYear, YearsWithCurrManager, JobSatisfaction, WorkLifeBalance, MaritalStatusDivorced, MaritalStatusMarried
- Employees having higher positive coefficients of above attributes indicate they have a higher tendency to leave the company

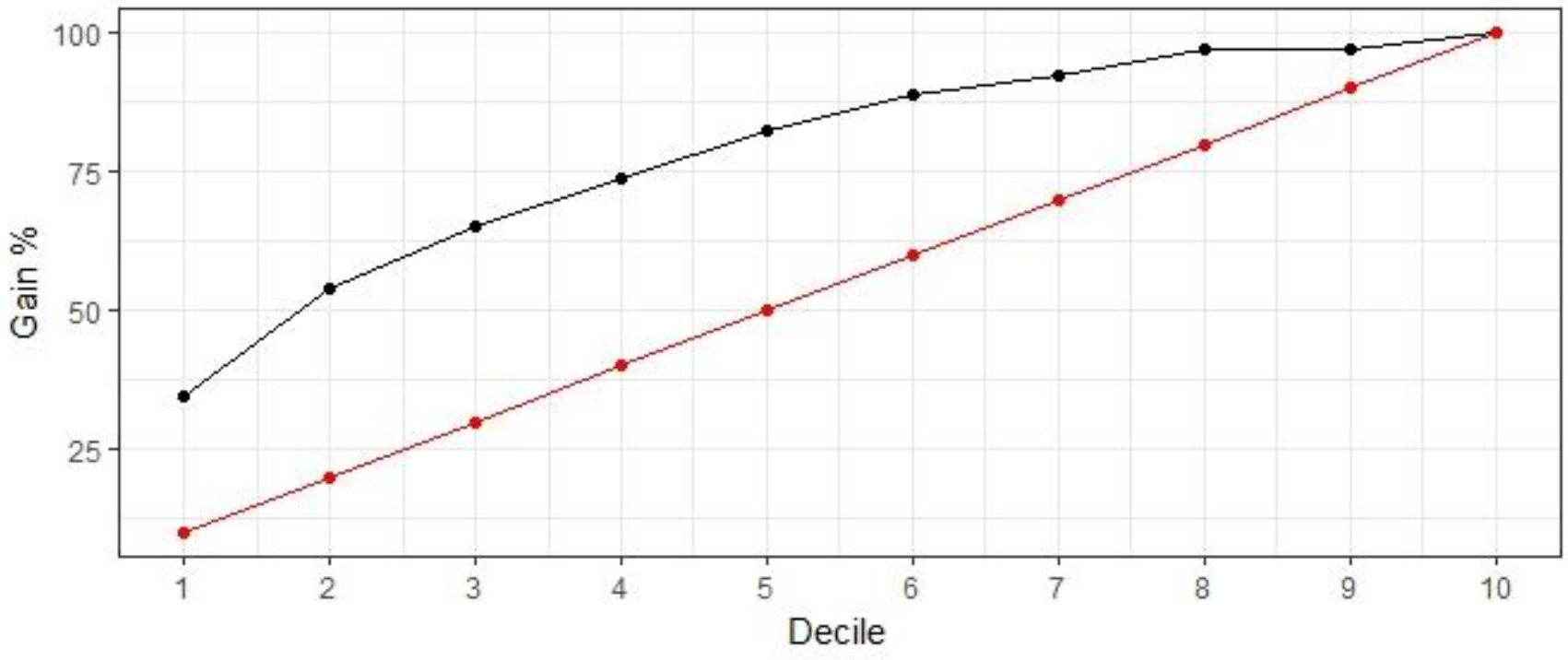
Analysis – Optimal Probability Cutoff



Note:

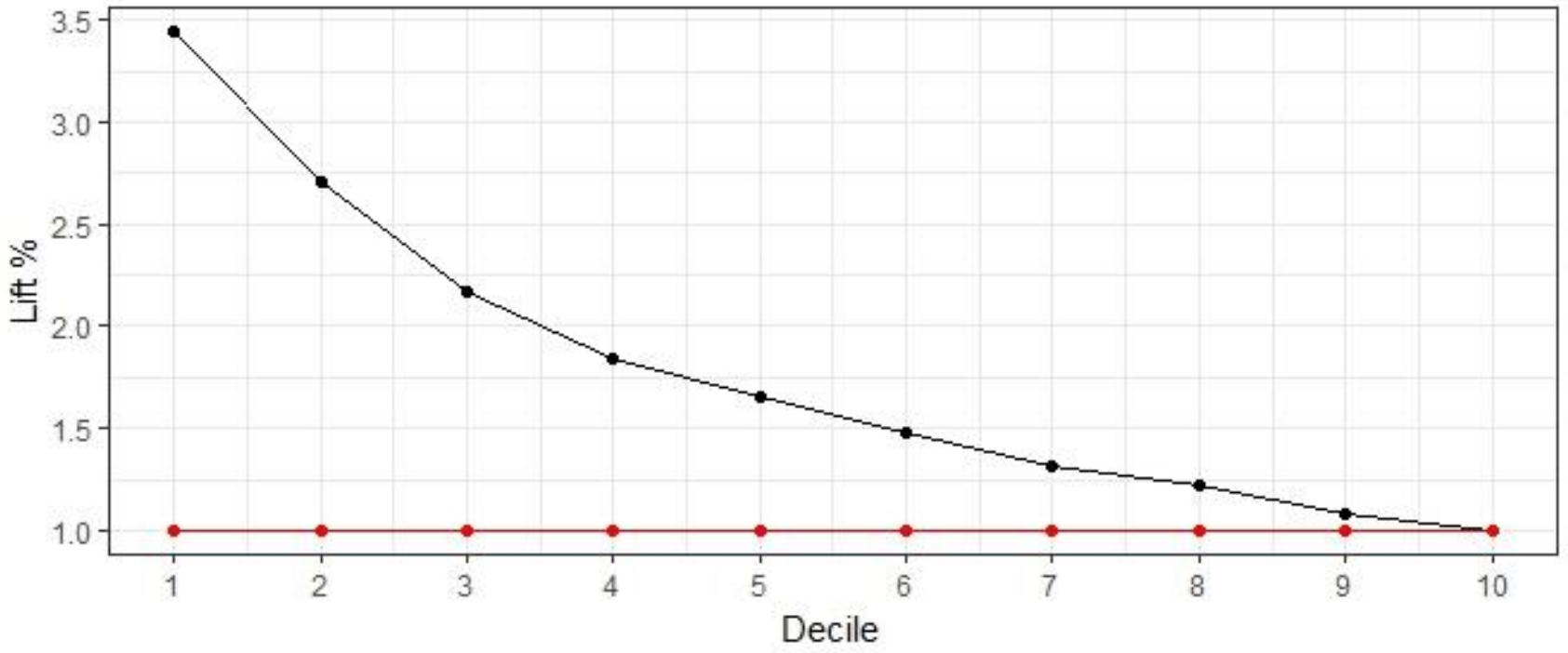
- This graph shows the relation Specificity, Sensitivity and Accuracy
- It also shows the optimal probability cutoff value where all there lines meet (0.1775758)

Analysis – Gain Chart



- This graph shows the relation between Gain and Decile
- It primarily indicates if the employees were sorted according to probability, then among the top 40% employees of this sorted list, we would find about 74% of them to leave the company

Analysis – Lift Chart



- This graph between Lift and Decile primarily indicates the factor by which this model outperforms a random model
- The model catches 2.2 times more attrition rates than a random model (by the 3rd decile)

Final Inferences

The company must strongly consider the following four points to contain the attrition rate of employees:

- Provide incentives to the employees with human resources background
  - As the employees with human resources background have positive coefficient for attrition
- Reduce the frequency of Business Travels
  - Higher frequency of travel may impact employee's work life balance
  - 'Frequent travel' variable has positive coefficient for attrition
- Reduce the mean working time
  - By balancing the workload of the employees
  - Encourage employees to stick to official working hours
- Provide timely opportunities for deserving employees to avail periodic promotions
  - 'Year since last promotion' variable has a positive coefficient for attrition
  - Increase training opportunities for those employees who missed out on promotion

Additional Inferences

In addition, it should also consider the following as well:

- Provide facilities to improve work-life balance like flexible working hours
  - 'Work-life balance' variable has a negative coefficient for attrition
- Avoid frequent organizational changes
  - Frequent changes in reporting manager may result in employee dissatisfaction
  - 'Years with current manager' variable has a negative coefficient for attrition
- Increase hiring of lateral employees
  - 'Total working years' variable has a negative coefficient for attrition
- Be cautious in hiring employees with Marital status as 'Single'
  - Married and Divorced employees are less inclined to leave the company