

EMPLOYEE ATTRITION DATA ANALYSIS

Inter-IIT Tech Meet - 2019

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I. INTRODUCTION

In the present day scenario of rapid development and cut-throat competition, there are lots of avenues and opportunities available for Human Resource departments. One of the biggest challenges that organizations are facing today is not only managing these resources but also retaining them. Securing and retaining skilled employees play an essential role in any organization because employees' knowledge and skills are central to companies' ability to be economically competitive. Besides, continuously satisfying the employees is another challenge that the employers are facing today. Considering the importance and sensitivity of the issue of retention to any organization, our data analysis tries to analyze the given data set of Employee attrition, and we have come up with some solutions to decrease the employee attrition rate.

II. OBJECTIVES OF THE STUDY

- To analyze the social and demographic profile of the employees who are leaving and find important inferences.
- To analyze the challenges faced by the organization and provide solutions.
- To create models that predict the expected tenure, value of an employee, and the reason for leaving the company.
- To treat each employee as an individual entity and suggest preventive attrition measures at an individual level.

III. DATA AND METHODOLOGY

The data set provided consists of features of 327 employees who left the company from April 2012 to April 2013. We adopt the methodology which aims at reducing attrition since losing employees through staff attrition and turnover is costly. Between costs associated with separation, loss of productivity, recruitment, interviewing, training, and on boarding, the loss of a single employee is estimated to cost the company one-third of that individual's annual salary[1]. Replacement costs can be lower for entry-level roles, while replacement costs are significantly higher for professional, technical, and supervisory positions. Also, to develop and justify heuristics we have referred to studies detailing the productivity of married vs. unmarried men.[2]

While devising the model we have kept in mind the three R's of Employee Retention respect, recognition, and rewards. RESPECT is esteem, special regard, or particular consideration given to people. Recognition is defined as "special notice or attention" and "the act of perceiving clearly." Rewards are the extra perks you offer beyond the basics of respect and Recognition that make it worth people's while to work hard, to care, to go beyond.[3]

IV. USE CASE

The data science use case is to maximize employee retention by:

- 1) **Employee Tenure Prediction** - Predicting the tenure of an employee working in the company and taking appropriate measures at the predicted time to retain the employee.
- 2) **Attrition Reason and Employee Value Prediction** - Predicting the reason for an employee to leave the company by

classifying the employees into clusters and assigning a value to each cluster. The predicted value of the employee to the company will then dictate the efforts to be taken by the company to retain the employee.

Once we have the expected tenure, the reason for leaving, and the value of the employee to the company, steps to maximize retention can be taken.

V. MODELLING

1) **Tenure Prediction Model:** A predictive regression model is trained using the relevant features(remarks and leaving date excluded) of the employees from the data set. The predicted tenure combined with the predictions from the Value-Based Reason model gives essential insights into the attrition trends of the employees.

2) **Value Based Reason Model:** The employees are clustered into 10 clusters using the K Means algorithm, and each cluster is assigned a value point denoting the value of the employee to the company. The grade of the employee(7 classes) is given more significant weight in the formation of the cluster since employees at a higher grade are much more valuable to the company(losing an employee costs a company one-third of the employees' annual income).[1] The rest of the clusters explore the differences in the individual grade classes. Different heuristics are applied to hierarchically rate the employees in the same grade class like - Preferring clusters with a high rating, Married employees more valued over single since married people are more productive for the organization.[2] Once the clusters are formed, and values are assigned, the reasons for leaving of each class can be found and used to predict the reason for leaving for a test employee.

The models combined together give us the predicted tenure, the value of employees for the company, and the distribution of reasons for leaving.

Insights from the Models:

Gender	0-1 yrs	1-2 yrs	2-3 yrs	Above 3 yrs
Female	16	27	16	38
Male	43	20	14	21

Table: Gender vs Tenure(in yrs.)

Grade	0-1 yrs	1-2 yrs	2-3 yrs	Above 3 yrs
CXO	0	100	0	0
E1	43	25	17	12
E2	8	8	2	79
M1	40	0	9	50
M2	74	14	3	7
M3	40	0	20	40
M4	0	0	33	66

Table: Grade vs Tenure(in yrs.)

Zone	0-1 yrs	1-2 yrs	2-3 yrs	Above 3 yrs
Central	46	25	17	10
East	34	29	10	25
North	50	19	16	13
South	34	14	17	33
West	52	27	5	13

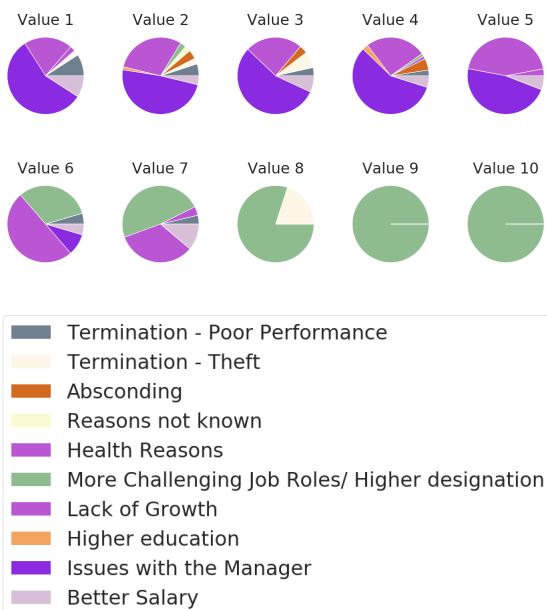
Table: Zone vs. Tenure(in yrs.)

A. Tenure Prediction Model

- This model can be used to calculate the expected tenure of the employees presently working in the company. The data can be analyzed grade-wise, zone wise, gender-wise to understand the predicted attrition trend of the employees. For the current data set, it is observed that females have a more significant tenure as compared to males, which might be due to the fact that females apply for lesser jobs as compared to men.

B. Value Based Reason Model

- The value and the reason for leaving(if and when they do) of the employees presently working in the company can be predicted by this model. This gives the company a fair idea of worth of an employee and the resources to be spent on the retention of that employee. For instance, in the current data set, the employees at higher grades(M3, M4, CXO) are leaving the company for more challenging roles. If predicted, the company can use that employee to his/her potential, enhancing the productivity of the company as well as retaining the employee. Another instance to note is for the employees with grades E1 and E2. A significant number of these employees leave the company because of issues with the manager and lack of growth. The issues with the manager are found to be correlated with the office location. Prediction of the employees in that location will land up in the corresponding cluster, and preventive measures can then be taken like transferring the manager/decreasing the workload or providing better training since some of the employees are terminated due to poor performance.

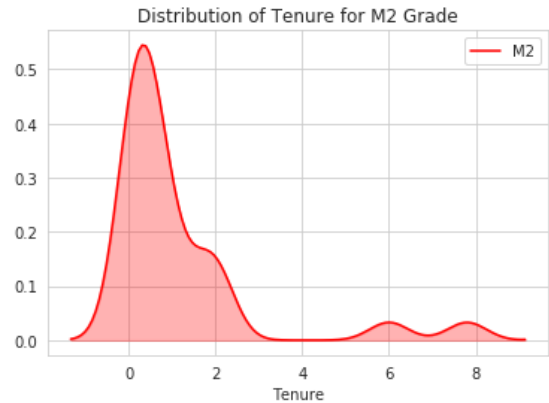


The predictions of both these models give the company a reasonable prediction of the tenure, value, and the reason for the attrition of an employee. This insightful data of the people presently working in the company suggests the relevant measures and resources should be spent on individual employees rather than taking collective measures. This approach of treating the employees as unique entities and working on maximizing the retention rate is bound to achieve the objective.

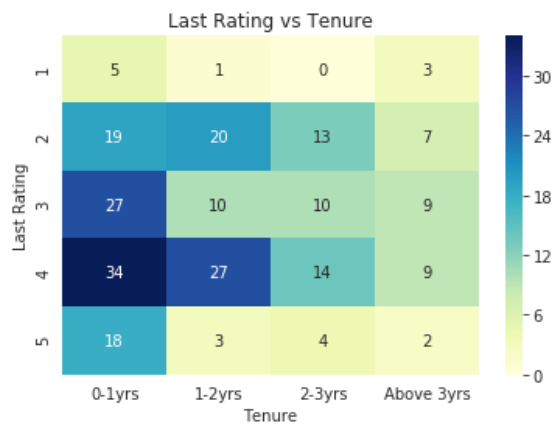
VI. INFERENCE FROM DATA

- The reason for leaving for the employees in the highest positions(M4, CXO) is 'More Challenging Job roles/Higher Designation.' One solution could be to increase the KPI (Key Performance Index) of M4, M3, CXO to make them responsible for the weaker areas of the company and hence contributing to the company's growth.

- Whereas the low ranked sales executives are having a high workload (Inferred from Data). Thus we see a disparity in the actual work done and position in the company. One possible solution to this problem is to divide the work appropriately between the members of the company such that the more critical parts of the job are done by the employees at a higher level. The sales executives should do the work according to their potential.[4]
- 18 people out of 27 of M2 Designation leave in their very first year. This can be related to the fact that their work is not according to their expectations. Although they are able to get the work done(inferred from the ratings), they seem to dislike their job profile and thus leave the job. (Inferred as the reasons are - 'More challenging Jobs', 'Better salary', 'Lack of growth').



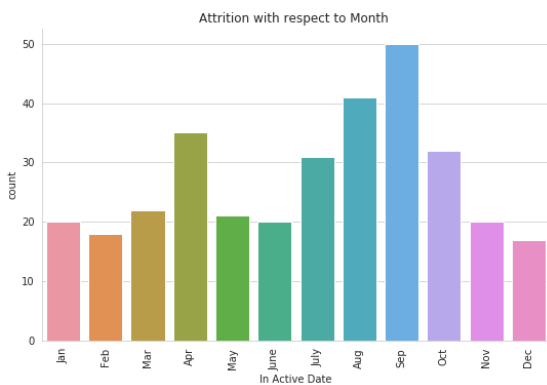
- Only from Delhi, Trivandrum, Kolkata, more than ten people (E1 Designation) left due to issues with the manager(Inferred from Data). The general policy for the managers should be taken into the review.
- Exactly, 98 out of 235 employees of E1 designation left in the first year of tenure. Also, 111 employees were also there with greater than 4 rating maximum with the Manager issue or growth issues. The manager issues can be easily solved by reviewing the general manager policy and introducing an upward feedback system. To target the growth issues, promotion interviews must be conducted across cities to retain potential candidates considering all feedback available.



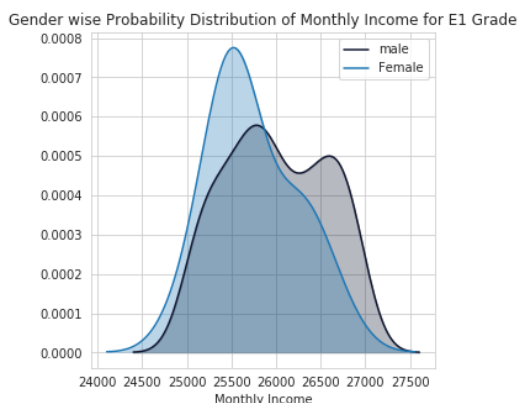
- All Higher Education reasons came from E1 grade people. They all have relatively good ratings. We can retain good rating employees by signing a contract with them by paying some percentage of their college fees in exchange for which they will return to work after post-graduation. Work from home can also be introduced to tackle this issue.
- Employees at Ranchi and Chennai are getting better ratings than their counterparts. KPIs of the managers here and the

employees should be made coherent, thus ensuring the most efficient use of human resources.

- The inactive date for employees is given for the year 2012 and early 2013. A significant lot of employees leaving in this period can be **attributed to the retail reforms in January 2012 and FDI opening in multi-brand retail in September 2012** which created many job opportunities in the market during that period.[5]
- There are people having high Last ratings and good satisfaction scores, which left due to health reasons. All employees in this category are male and are from Tier 2 cities. The medical leave policy must be reviewed to ensure that there is an optimum amount of flexibility in taking medical leaves. This will aid in retaining valuable employees.
- More than 40 percent of E1 and E2 employees leave the firm due to issues with the manager. This issue could arise due to disparity in work distribution where E1 and E2 have to work more despite their less experience. The company needs to decrease the workload from the E1 and E2 staff or train them properly and create a healthier work environment to tackle this problem.
- The number of workers leaving reach the maximum around September (September and October). We can introduce a Diwali bonus before this duration to retain them.



- Females at the E1 designation are getting less pay than their male counterparts as shown in the graph. Proper insentivisation can be useful to solve this problem.



- Supplementary Models and Graphs have been provided in IPython Notebooks.

VII. STEPS TO CONTROL ATTRITION RATE

- Orientation programs are mandatory, even for experienced employees. An employer should not assume that the employees know what they have to do or what the employer is expecting out of them. Aspects of history, vision, service, departmental roles, performance expectations, and many more should be shared with all the employees and occasionally elicited.

- It was noted that one of the primary reasons for attrition was "Issues with the manager". An upward feedback system can be put in place. Before promoting employee of any grade, the feedback of the employees subordinate to him must be taken into consideration. This will help reduce disparity and help the company formulate optimal KPIs.
- The HR needs to be more pro-active in taking employee feedback and pushing it to relevant administration channels.
- Companies should provide work from home facilities, more flexible vacation offerings, and performance bonuses, which will lead to employee retention for those employees who are leaving because of reasons like "Higher education" and other reasons like the distance between home and workplace.
- One of the most common Attrition reasons is "Better salary". The Company can add in paid time off, stock options, and even educational assistance. To give your employees a better idea of what they are receiving from the company, you can include an annual statement of compensation they received, that will also include the added benefits they received like contributions to benefits premiums and retirement accounts, and others.
- The company can optimize its recruitment process by starting with clear and specific requirements. Set goals for hiring for a position and list the tasks and responsibilities, and what value the position will bring to your business.
- The retention strategies should be assessed and updated annually.
- Extra effort like providing e-cards (with points) to the employees or e-buttons to make employees feel appreciated can prove to be less costly and efficient

VIII. LIMITATIONS

To assess the employee attrition causes in a better way, it would require studying some other crucial factors like Distance from home, Working hours, No of projects an employee is working on, Work demand, local labor availability and market demography. Also, since the data comprises only details of employee who have left, we could not make a model which predicts whether an employee would leave given its features[6]. This study is only focused on studying probable reasons for employee attrition given employee features and how beneficial it is for a company to retain an employee. Also, we have analyzed the socio-demographic inferences of employee attrition. The summary message is that the majority of the practices are present theoretically in the majority of organizations, regardless of their employee turnover. However, they need to be emphasized into action in the order of their importance and effectiveness from the employee attrition point of view.

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