

Employee Attrition: A Classic Problem revisited via Machine Learning

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High Turnover Rates

- Employee turnover is a natural part of business in any industry. Excessive turnover decreases the overall efficiency of the company and comes with a high price tag. The monetary cost of such high turnover is enormous. Turnover not only affects the bottom line but also affects the company's morale.
- We are analyzing the problems within the company that are causing the employees to leave the company. We are going to predict if a particular individual is at the risk of leaving the firm or not. If yes, why is he/she leaving and take necessary actions accordingly.
- Make the cost estimates of the turnover before and after our solutions are implemented. Without understanding the negative impacts of turnover, a company may be placing itself in a position that will ultimately lead to their demise.

Motivation of the Work

Employee retention is a challenge for nearly every organization. Even the best leaders have a hard time keeping top talent. Some of the surprising statistics that caught our eye are

- According to Towers Watson 2014 Global Workforce Study more than one-quarter of employees are in a high-retention-risk category. More than 70 percent of high-retention-risk employees say they have to leave their organization to advance their careers.
- The Glassdoor semi-annual Employment Confidence Survey, conducted online by Harris Poll in March among more than 2,000 U.S. adults (ages 18+) shows that more than half of American employees believe that if they lost their current job, they would be able to replace it in the next six months. Several years ago, when the global economy was in considerably worse shape, employees weren't nearly as confident that they'd be able to find a new position at the same level if they had to start searching for one. (cont.)

Motivation of the Work

(cont.) That apprehension was enough to keep many employees from leaving their current position, even if they weren't happy or fulfilled in it. It's important to understand that apprehension and fear of joblessness gradually faded throughout the past years.

- Dices Salary Survey Report for 2014 backs up glassdoor findings . Their research suggests an even higher number of employees are not just confident in finding a position they're confident they'll find an even better position than their current one. Their research also suggests that salary satisfaction among tech professionals declined in recent years.

Although some of these employee retention statistics may seem alarming, it's not all bad news. Understanding what drives employee behavior, and cultivating a great work environment and employee value proposition, will go a long way in helping your organization beat the odds.



- Field literature review shows that these general causes affecting voluntary turnover intention could be grouped in the following broad categories:
 - 1) organizational causes, related to: Human Resource Management (HRM), organizational culture, job structure and content, leadership style and internal marketing strategies, policies and practices;
 - 2) extra organizational causes, related to: individual characteristics and labor market aspects.
- Organizational culture was found to have an effect on organizational behavior and may be proposed as a potential moderator of voluntary turnover. Tziner et al., 2012, in their study hypothesized the moderating effects of the dimensions of organizational culture on the relationship between Organizational Citizenship Behavior (OCB) and turnover intentions.

- In another study organizational culture dimensions only partially met the initial requirement for a variable to be defined as moderator, where the variable was linearly uncorrelated to the predictor variable and was also uncorrelated to the criterion variable (Ibid and in Zedeck, 1971; Keppel and Zedeck,1989).
- In addition results from a sample of 102 employees showed solid support for the interactive effects of the dimensions of organizational culture and OCB in relation to turnover intentions (Cohen and Zaidi, 2002; Tang and Wang, 2005). In addition, there is evidence that perceptions of organizational politics, which can be highly salient aspects of organizational culture, were positively related to turnover intentions (Chang et al.,2009).

Features (Data Visualization and Exploration)

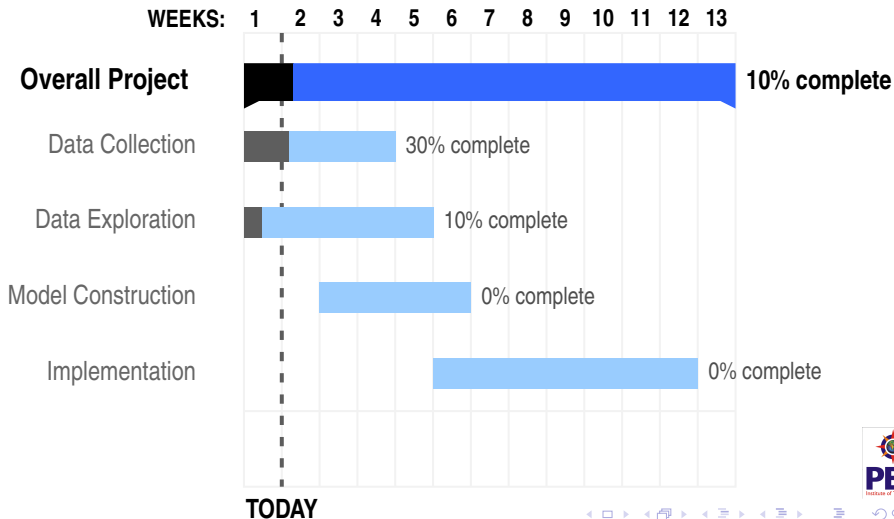
- The Performance Variable
- The Role Variable
- The Age Variable
- The Male/ Female Variable
- The Area Variable
- The Area X Sex Interaction Variable

Ensemble Clustering:

- Attrition prediction is a scenario that takes historic employee data as input to then identify individuals that are inclined to leave. The basic procedure is to extract features from the available data that might have previously been manually analyzed and to build predictive models based on a training set with labels relating to the employment status.
- Normally it can be formalized as a supervised classification problem, while the uniqueness is that population of employees with different employment status may not be equal.

- Training such an imbalanced data set requires re-sampling or cost-sensitive learning techniques. For sentiment analysis on unstructured data such as text, preprocessing techniques that extract analysis-friendly quantitative features should be applied.
- Algorithms for building the model depend on the data characteristics. In case a specific algorithm does not yield the desired results, we have found that ensemble techniques can be deployed to effectively boost model performance.
- clustering can develop persona profiles based on the types of employees who tend to have a higher risk of leaving, and their reasons for leaving. A clustering analysis can be used to identify cohorts of employees based on demographics, hire date, type of position, salary, and relative risk for leaving, to better understand employee turnover.

Time line of completion of project from Nov 2017-10th April 2018(Gantt Charts).



Expected Outcome/ Results

1.Impact Analysis

The costs of employee attrition ranges from quantifiable numbers to hidden costs.We intend to compute monetary loss for hiring new employees, training and the decreased productivity.

2.Causality between two different time series data- Attrition and Company Turnover

Business profitability depends upon retention of customers. Employee attrition can sometimes lead to client attrition there by hampering the company revenue.

3.Identifying key features

Understanding why an employee is leaving is important to take corrective measures and suppress lurking features. We aim to get to root cause of quitting rather than just predicting if an individual is going to leave or not.

References

 Zheng WeiBo1*, Sharan Kaur and Tao Zhi (2010)

A critical review of employee turnover model (1938-2009) and development in perspective of performance

African Journal of Business Management Vol. 4(19), pp. 4146-4158, December Special Review, 2010.

 Ladelsky Limor Kessler

The Effect of Organizational Culture on IT Employees Turnover Intension in Israel

 Anders Frederiksen (2015)

Job Satisfaction and Employee Turnover: A Firm-Level Perspective

IZA Discussion Paper IZA DP No. 9296

Data

- IBM Watson HR Employee Attrition and Performance
- Kaggle HR Data Set
- U.S. Bureau of Labor Statistics

The End