

# SAS<sup>®</sup> GLOBAL FORUM 2018

USERS PROGRAM

## HR ANALYTICS

WHY THE BEST EMPLOYEES LEAVE?

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**#SASGF**

# HR ANALYTICS

## Why the best employees leave?

By Ankita Khurana, MSBA, Oklahoma State University

### ABSTRACT

Over the last few years, companies have evolved in using their HR data. Today, companies do not just deal with gathering data on employees' efficiency or payroll, instead, they now aim to dive deep into making relevant decisions about recruiting process, on-boarding and training employees, predict attrition and forecast the suitable fitment of their employees. These days, HR analytics is used for recruitment, retention, training, compensation & benefits, performance & career management, and organization's overall effectiveness.

The study of HR Analytics has become very important and interest of companies have increased over time in the last 5 years. Still there is a lack of understanding of analytics software benefits in the field of Human Resource. According to published research papers, only 17% of HR professionals are using analytics technology, despite 73% admitting its importance.

This paper focuses on using HR data to predict the attrition rate of an employee. The objective of the paper is to help the organization to know beforehand which valuable employee could be thinking of leaving the organization and recommend pre-emptive actions, helping to control retention rate and increase retention levels of an employee. This is important for sustaining long-term growth and therefore getting a better return on investment. Various factors like average monthly hours, promotions, department work accident, last evaluation, time spend and salary have been considered to understand the churn of an employee. The data is taken from Kaggle website and it has 15000 observations. SAS Enterprise Miner is used to build and compare the different predictive models.

### DATA UNDERSTANDING

Variables	Description
Satisfaction Level	The value varies between 0.09 (lowest) and 1 (highest).
Last Evaluation	Employee rating- value varies from 0.36 (lowest) to 1 (highest)
Number Project	Number of projects the employee have been involved in.
Average Monthly hours	Total hours spend per month.
Time spend company	Time spent in years in the present company.
Promotion last 5 years	0 if employee has not been promoted in last 5 years, else 1.
Sales	Department of the employee.
Salary	Classification of salary in three ranges-low, medium and high.
Left (Target Variable)	1 if employee has left the organization, else 0.

### DATA PREPARATION AND ANALYSIS

The descriptive analysis include 3-scenarios. Employees that spend time in the company between 2-3 years, between 4-6 years and between 7-10 years.

#### Scenario-1:

Time spent in company between 2-3 years

#### Scenario-2:

Time spent in company between 4-6 years

#### Scenario-3:

Time spent in company between 7-10 years

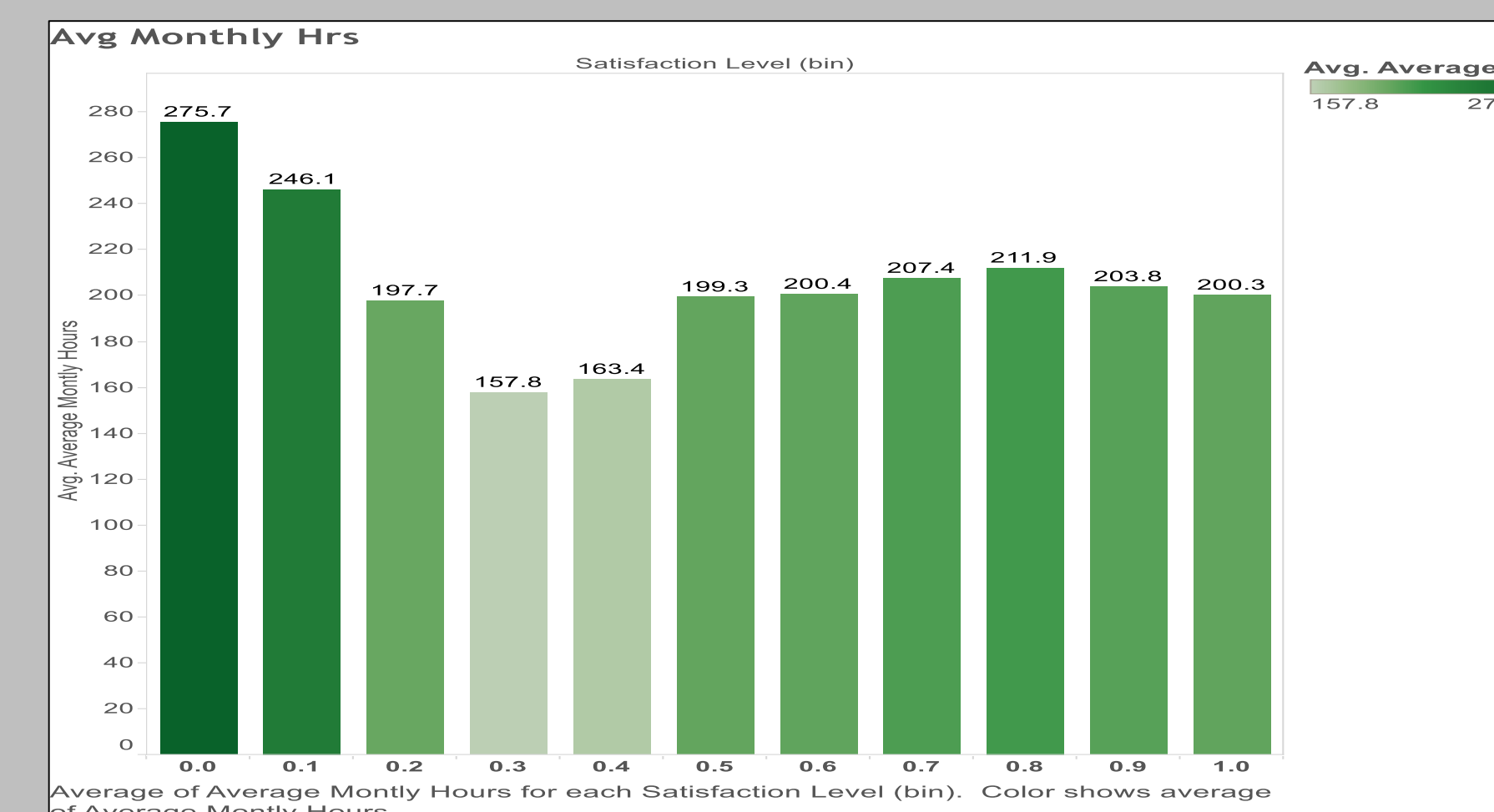
Employees who left the organization under 3 years have low satisfaction level, evaluation rating they achieved was less and the average monthly hours they work is 150 hours.

Employees who left the organization between 4-6 years were good performers with average evaluation rating of 88%. High average working hours, 256 hours per month, was the characteristic of employees under the category.

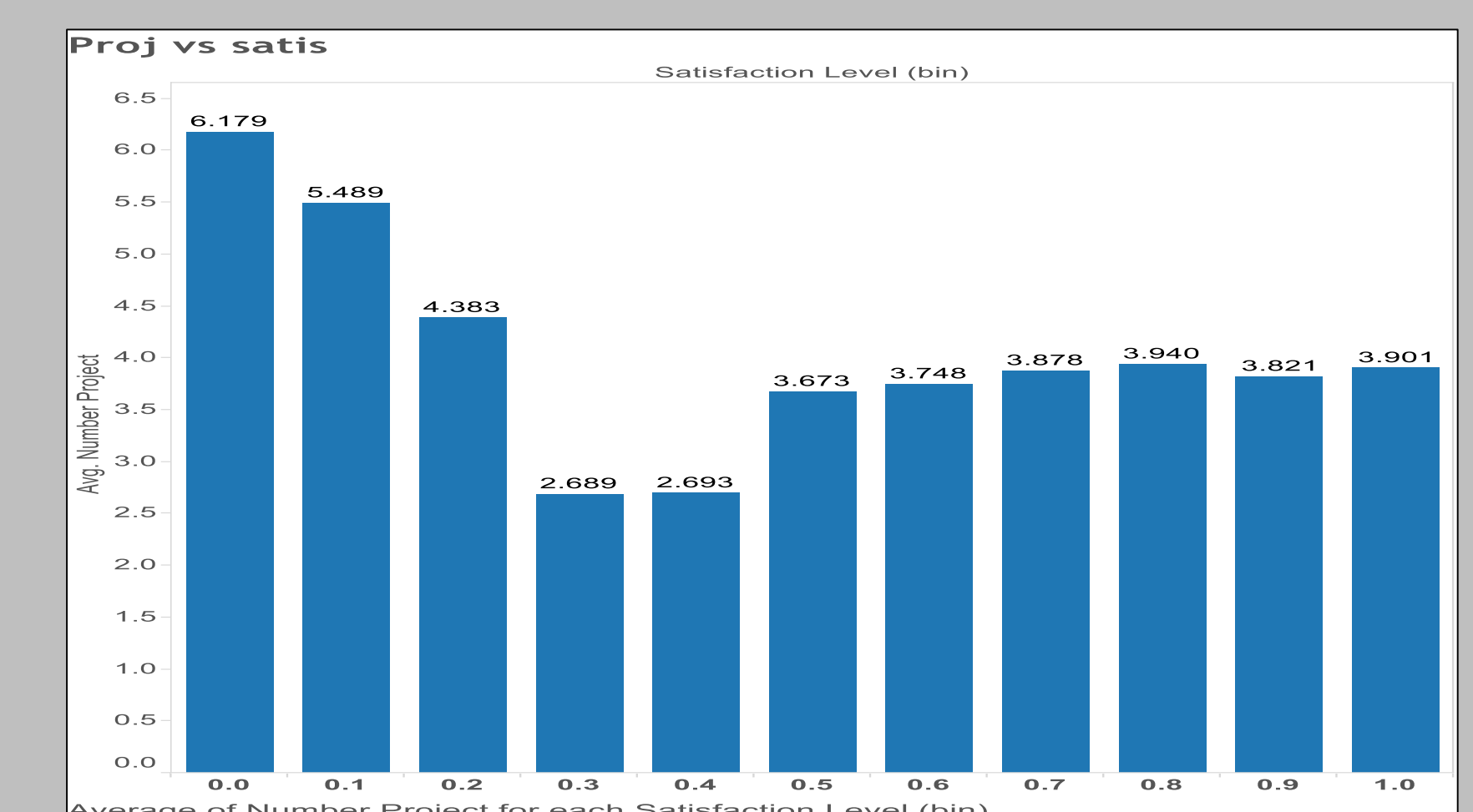
From the data it is observed, if an employee stays for more than 7 years, then he is not tend to leave the organization. Employees on an average work for 198 hours per month under this category.

Looking at the overall trend, employees who leave the organization, work on an average of 208 hours monthly.

### DESCRIPTIVE ANALYTICS



**Relationship between Average Monthly hours spent and Satisfaction level**



**Relationship between Average Number of projects and Satisfaction level**



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### MODEL APPROACH AND RESULTS

Target variable is “left”, which is a binary variable with 1 and 0 indication the employee will leave the organization and not leave the organization respectively.

3-models built in Enterprise Miner- Decision Tree, Logistic Regression and Neural Network.

#### **Model 1: Decision Tree**

Most important variables are Satisfaction level, time spend in the company, last evaluation of the employee, average monthly spend in the company and number of projects handled.

#### **Model 2: Logistic Regression**

Most important variables came out to be average monthly hours, last evaluation, number of projects, no promotion in last 5 years, high salary and low salary.

Equation for the regression model is-

$$\text{Logit(left)} = -1.0597 + 0.004 * \text{average\_monthly\_hours} + 0.61 * \text{last\_evaluation} - 0.3 * \text{number\_projects} + 0.73 * \text{promotion\_last\_5\_years(0)} - 1.05 * \text{salary(high)} + 0.7 * \text{salary(low)} - 0.45 * \text{sales(RanD)} + 0.32 * \text{sales(HR)} - 3.6 * \text{sales(management)} + 0.13 * \text{sales(support)} + 0.22 * \text{time\_spend\_company}$$

#### **Model 3: Neural Network**

Average squared error for the validation and the test model came out to be 0.039 and 0.034 respectively.

### MODEL COMPARISON

- Three models were compared in Enterprise Miner using Model comparison node.
- Comparison was made based on average squared error (ASE) for the three models.
- Decision tree was the best model with lowest ASE value.
- Cumulative Lift chart also shows the Decision tree to be the best model with highest lift.

### FINDINGS

#### **Findings based on Decision tree model and descriptive analysis:**

- The likelihood of an employee leaving the organization increases when the salary is low and decreases with high Salary.
- The departments where attrition rate is the most is HR, followed by Management and Support.
- None of the employees who were working for moderate number of hours per month (175-225) left the organization if they have been promoted in the last 5 years.
- Employees with very less monthly working hours (in the range of 125 to 150) or with very high monthly working hours (225 hours/ month or more) tend to leave the organization. In fact, those who work around 300 hours per month, none of them stayed back with the organization.

### CONCLUSION

In our analysis, we found that the most important factors contributing to the attrition rate are high working hours, low working hours, promotions, salary and departments. We have considered various factors to analyze and answer several questions related to the attrition of employees. However, there might be several other factors like location, company’s culture and other social organizational factors that we have not considered in this study due to non-availability of data. In future, we plan to continue this study by including these factors.

### ACKNOWLEDGEMENT

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