



Employee Satisfaction Project Report

Supervision

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1 Introduction

The Employee Satisfaction Project (ESP) is a project aimed at predicting employee turnover and job satisfaction in order to improve retention and satisfaction within a company. This project is designed to provide companies with a comprehensive solution to employee retention and satisfaction through data analysis and employee engagement strategies. The ESP can help companies predict whether an employee is likely to leave and take necessary actions to keep them satisfied, which may lead to an overall increase in employee retention and satisfaction within the company, resulting in increased productivity and reduced recruitment and training costs.

2 Problem Identification

Employee satisfaction and attrition are major concerns for companies, as high turnover rates can lead to a number of negative consequences. One of the biggest problems that companies face when dealing with employee satisfaction and attrition is the increased recruitment and training costs. When employees leave a company, the company must spend money and resources to recruit and train new employees to fill the open positions. This can be a significant cost for companies, especially when attrition is high.

Employees may leave because of complex underlying issues within the business, that can be caused by a variety of factors, or personal reasons which are out of the control of the work environment. Companies need to take a holistic approach to addressing these issues, by considering factors such as diversity and inclusivity, communication and transparency, problems with compensation and benefits packages, work-life balance and employees feeling overworked, company culture that is not aligned with personal values, and other less obvious factors. By identifying and addressing these issues, companies can improve employee satisfaction, reduce turnover rates, and ultimately increase efficiency.

2.1 Financial Impact

Financially, it is cheaper to maintain an employee happy and not leaving, than to hire somebody new in that position. Employees who are happy and satisfied with their job are less likely to leave the company. This can save the cost of recruiting and training a new employee. Additionally, when employees are happy and satisfied, they are more likely to be productive and engaged in their work. Companies might face a potential problem: decreased productivity and morale among remaining employees, as they may feel overworked and undervalued. This can decrease performance and can harm the company's objective. Also, when employees leave a company, they often take their knowledge and expertise with them and can impede maintaining the same level of performance, innovation, and competitiveness. This may be perceived as having poor management or a toxic work environment, harming the company's image and making it difficult to attract new employees and customers.

2.2 Diversity, Inclusivity and Communication

Another important issue is a lack of diversity and inclusivity within the workplace. A company with a homogeneous workforce can lead to a lack of diversity in thought and perspective. This can make it difficult for the company to innovate and adapt to changing market conditions. Additionally, a lack of diversity can lead to a toxic work environment, where certain employees feel marginalized or excluded. So, attrition increase and job satisfaction decrease may be consequences of a diversity issue, which could render diversity issues properly manageable with correct prediction. At the same time, when the issue is poor communication and a lack of transparency, employees feel that they are not being kept informed about company developments or that their input is not valued. This can lead to the same decrease in employee satisfaction and an increase in attrition. Poor communication can also lead to a lack of trust between employees and management, which can further contribute to a decrease in employee satisfaction. Therefore, predicting job satisfaction is key to better communication between high-level management and employees.

3 Business Research

All relevant scripts can be found in the github repository, along with usage instructions. [1]

3.1 The Prediction Model

Finding the best classifier for the problem was done using a grid search algorithm on 32 selected models. Grid search is a technique used to optimize the hyperparameters of a neural network. Hyperparameters are the parameters that are set before training a neural network and they control the architecture and behavior of the model. Examples of hyperparameters in a neural network include the number of hidden layers, the number of neurons in each layer, the learning rate, and the regularization strength. Grid search automates the process of selecting the best combination of hyperparameters by training the network with different combinations of hyperparameters and evaluating their performance on a validation dataset.

The process of grid search involves specifying a range of values for each hyperparameter and a metric for evaluating the performance of the network. For example, if the number of estimators is a hyperparameter, the range of values could be from 1 to 10. The metric used to evaluate the performance of the network could be the accuracy or f1 score.

Once the range of values and the metric have been defined, the network is trained and evaluated for each combination. The set that yields the best performance according to the chosen metric is selected as the optimal set of hyperparameters.

The search was computationally expensive as it required training models multiple times with different hyperparameter settings, however, it has been proven to be one of the most effective ways to optimize the hyperparameters of a neural network. In total,

312903 possible models were considered, using up 15.41 hours of pure computation time. Other alternatives are Random search, Bayesian optimization, and Genetic Algorithm. A comparison of some of the most performant models can be observed in Fig. 1.



Figure 1: Accuracy of best found classifiers

Finally, a random forest classifier was chosen for the prediction model. A Random Forest Classifier is an ensemble machine learning algorithm that uses decision trees as its base estimator. It creates multiple decision trees using a technique called bootstrap aggregating (bagging) and then combines the output of each tree to make a final prediction. This combination of decision trees is what makes random forests more robust. They are useful in classification problems with high dimensionality and a large number of features. With our 1500 samples, the classifier should have a good performance. Due to the averaging and combination of multiple decision trees, the random forest classifier is less likely to overfit to the data.

3.2 Risks

A risk associated with predicting job satisfaction and attrition is the potential for inaccurate predictions: if the data used to predict attrition is not up-to-date or does not consider all of the relevant factors and biases. Similarly, if the data is only collected from employees who have already left the company, it can lead to bias. As a consequence, companies may not fully understand the predictions made by the model, or be generally confused and misinterpreted. This can result in the implementation of ineffective solutions and a lack of progress in improving employee satisfaction. Also, the predictions may be overly general and not take into account the unique characteristics of the specific company or workforce.

Another risk is that of privacy and data security. If the data gets into the wrong hands it may damage the company's reputation. Also, it may be that the suggestions provided may not be actionable. Companies may also become overly reliant on this

prediction. This can lead to a lack of human oversight. These predictions also run the risk of unintended consequences and disgruntle employees that do not receive any bonus because they were not classified as at risk to leave.

It is recommended that these risks be subjected to a thorough inspection on a case-by-case basis with the company that wants to buy the product, to avoid potential lawsuits and maximize the impact of the ESP.

4 Business Proposal

The Employee Satisfaction Project is a comprehensive solution that utilizes neural network technology (specifically random forests) to predict employee turnover and job satisfaction. By analyzing 32 employee features including survey data, the solution can help companies identify potential issues with employee satisfaction and take necessary actions to improve retention and satisfaction for specific employees within the company. This is based on a few assumptions, such as employee satisfaction being a significant predictor of employee turnover, and the data collected from surveys and the HR department being an accurate representation of employee satisfaction. Additionally, it is assumed that the neural network technology will be able to accurately predict employee turnover and job satisfaction.

4.1 Hypothesis

The hypothesis is that the neural network technology will help companies improve employee retention and satisfaction, leading to increased productivity and reduced recruitment and training costs by identifying potential issues with specific employees and suggesting necessary actions. Through this, companies will be able to minimize and overcome attrition. This will ultimately help the company save money.

4.2 Desirability and Feasibility

In terms of desirability, the project is suitable for companies looking to keep their employees happy and cut costs. It can provide them with a comprehensive list of steps or options to take in order to maintain their current employees. Additionally, this solution can help companies improve their reputation through internal perception changes, such as an employee attitude of "the company cares about me". This attitude will ultimately radiate into the industry and impress customers, partners, and potential employees.

The project also must be feasible. As it utilizes a random forest classifier, enormous amounts of data are not only supported, but encouraged. The data collection and analysis required for the project is already mostly present in companies, and the initial accuracy of the model will drastically improve as more companies start implementing the ESP. An important note to make is that, in order for the ESP to be an effective predictor, survey data must be accurate. An idea is to assign a professional psychologist to conduct company-wide surveys, and in the process also provide access to mental health-care

through all of that saved money from employee retention. All the data and privacy concerns will be met through a cloud infrastructure, as the model should be run only on authorized ESP servers. The data should be stored internally in the customer company, to avoid any security breaches and avoid lawsuits. It should be sent over to the ESP server encoded.

5 Conclusion and Recommendations for Next Steps

In conclusion, the Employee Satisfaction Project is a powerful service that has the potential to significantly improve employee retention and satisfaction within a company. By analyzing employee data and predicting which employees are likely to leave the company, it allows companies to take proactive steps to retain them and improve overall satisfaction and reduce costs.

Predicting job satisfaction and attrition can come with a variety of risks such as lack of motivation from employees, lack of understanding of the predictions, dependency on the model, limited scope, over-generalization, regulatory and environmental issues, discrimination, and unintended consequences. These are not overlooked in the implementation of the service.

5.1 Roadmap and the recommendation for next steps:

The Employee Satisfaction Project (ESP) over the next financial year:

In Q1: Finalize the data collection and cleaning process to ensure that all employee data is accurate and up-to-date. Begin pilot testing of the ESP within the company to gather feedback and identify any areas for improvement. Complete the initial predictive modeling and testing of the tool using a sample dataset. Develop a plan for obtaining consent from employees for the collection and processing of their data.

In Q2: Obtain consent from employees for the collection and processing of their data. Develop a training program for employees on how to use the tool.

In Q3: Begin offering the ESP to a small group of select customers as a beta test. Gather feedback and make any necessary adjustments to the tool based on customer feedback. Begin developing a mobile application version of the ESP.

In Q4: Launch the ESP to the general market and begin actively promoting it to potential customers. Continue to gather feedback and make any necessary adjustments to the tool based on customer feedback. Release the mobile application version of the ESP.

Next year: Continuous monitoring and improving the tool's performance based on customer feedback and industry trends. Explore new industries and expand the target market for the ESP. Incorporate new features such as sentiment analysis into the tool to make it more comprehensive. Conduct more research on the industry trends and customer feedback to improve the ESP.

Appendix: Business Model Canvas

References

- [1] C. Siman-Chereches.
<https://github.com/callmechristian/ESP>.