

Predicting employee dismissal risks
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Introduction. In the dynamic realm of human resource management, accurately predicting employee dismissal risks stands as a cornerstone to enhance resilience and efficient operation of an organization. Companies need to deal with the challenges of keeping their teams stable. And knowing ahead the time when someone might leave is the key to avoid problems with a company's performance and the right strategy to help employees feel satisfied about their jobs. This paper looks into the tricky task of figuring out the risk of employees leaving, which involves understanding of people's behavior, economic factors and staff management. The significance of addressing employee dismissal risks cannot be overstated. Beyond the immediate financial implications of recruitment and training replacements, unanticipated dismissals can erode workplace morale and disrupt team dynamics, casting long shadows over productivity and organizational culture. Despite the critical nature of this endeavor, the existing body of research presents a fragmented landscape. Current methodologies, ranging from statistical analysis to machine learning algorithms, offer a glimpse into the potential of predictive analytics in human resource management. This study has two goals: to create a smart employee dismissal prediction driven by various factors, and to test it on available data before using it on actual company data. By fixing what's missing in current research and using ideas from both our own country and others, this study aims to offer a new method of employee dismissal prediction, thereby enhancing organizational decision-making and strategic human resource management.

Main part. The core of our research introduces a pioneering method of employee dismissal prediction designed to accurately predict employee dismissal risks. This model distinguishes itself by integrating a multifaceted array of predictors, including both quantitative metrics, such as performance data, and qualitative assessments, such as employee engagement levels.

1. Our solution is characterized by its originality, employing a combination of traditional and non-traditional data sources.
2. The economic efficiency of our predictive model lies in its ability to significantly reduce the costs associated with employee turnover. By accurately identifying at-risk employees, organizations can implement targeted retention strategies, thereby avoiding the expenses of recruiting, hiring, and training replacements. Moreover, our model aids in the optimal allocation of HR efforts, ensuring resources are focused where they can have the greatest impact on retention and morale.
3. Our model stands at the forefront of HR analytics by incorporating the latest research [3] methodologies. It employs advanced machine learning algorithms such as Logistic Regression, Decision Trees, Random Forest, Gradient Boosting Machines (GBM), Support Vector Machines, Neural Networks etc, capable of processing complex datasets to identify dismissal predictors.
4. The practical application of our predictive model is designed for seamless integration into existing HR systems. The model's user-friendly interface and actionable insights enable HR professionals to easily interpret its predictions, facilitating strategic decisions regarding employee retention and engagement.
5. Compared to existing solutions, our predictive model offers a more holistic and nuanced understanding of dismissal risks. Whereas traditional models primarily focus

on performance metrics and historical turnover data, our approach encompasses a broader spectrum of predictors such as education level, age, gender, marriage status, job industry, salary etc, offering a deeper insight into the dynamics of employee engagement and satisfaction. Model not only considers immediate performance metrics but also delves into demographic, socio-economic, and job-related factors that contribute to an employee's likelihood of leaving. For example, salary is a critical factor in employee satisfaction and retention. Employees who perceive their salary as below market rate or not reflective of their contribution may exhibit a higher risk of leaving. Additionally, discrepancies in pay equity across gender and roles can further exacerbate dismissal risks.

Conclusion. In conclusion, this research introduces a predictive model designed to accurately predict employee dismissal risks, addressing a critical gap in the field of human resource management. Key aspects of our research underscore the importance of a holistic analysis in human resource management. By acknowledging and analyzing the multifaceted nature of employee experiences and motivations, our model enables organizations to preemptively address issues that could lead to dismissal, thereby enhancing employee retention and satisfaction. Looking ahead, the potential applications and refinements of this model are vast. Future research could explore the integration of additional predictive factors, such as psychological well-being or the impact of remote work arrangements, further refining its predictive capabilities. Additionally, the adoption of machine learning and artificial intelligence technologies could enhance the model's ability to learn from new data, adapt to changing workforce dynamics, and provide even more precise predictions.

References:

1. Francesca Fallucchi, Marco Coladangelo, Romeo Giuliano and Ernesto William De Luca, *Predicting Employee Attrition Using Machine Learning Techniques*, 3 November 2020. Retrieved from <https://www.mdpi.com/2073-431X/9/4/86>.
2. Salah Al-Darraji, Dhafer G. Honi 1, Francesca Fallucchi, Ayad I. Abdulsada, Romeo Giuliano and Husam A. Abdulmalik, *Employee Attrition Prediction Using Deep Neural Networks*, 25 September 2021. Retrieved from <https://www.mdpi.com/2073-431X/10/11/141>.
3. Ali Raza, Kashif Munir, Mubarak Almutairi, Faizan Younas and Mian Muhammad Sadiq Fareed, *Predicting Employee Attrition Using Machine Learning Approaches*, 12 May 2022. Retrieved from <https://www.mdpi.com/2076-3417/12/13/6424>.