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Detecting Employees at Risk of Leaving with Prediction Models Based on Machine Learning Algorithms

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Abstract

Attracting and retaining talent is a challenging task since well qualified individuals have high expectations and require new challenges to stay constantly motivated. For organizations, the leaving of valuable employees might involve not only the loss of know-how but also the cost of recruiting and training another person. This research is focused in the construction of prediction models to detect employees at risk of leaving. The research was carried out in 4 phases: analysis, design, development, and validation. During the analysis, approximately 12,000 records of employees were preprocessed. Training, testing and validation datasets were prepared during the phase of design along with the selection of an appropriate machine learning algorithm. The construction of the prediction models was carried out entirely using data mining software. The validation was completed with fresh data and, lastly, predictions were compared to actual values. The results revealed that models based on decision trees were able to classify the employees that and the ones that continued in the organization with a correction rate of 83.39% over 2,069 records. In conclusion, the prediction models presented in this work can be useful to detect employees at risk of leaving and, therefore, they can help Human Resources Department implement retaining plans.

Keywords
Retaining Talent, Risk of Leaving, Machine Learning, Decision Tree, Human Resources.

Biographies
Carlos Hernández is an industrial engineer and university professor. He earned Master of Sciences in Engineering and Doctor of Engineering from Technische Universität Braunschweig, Brunswick, Germany. He has taught lectures in Discrete Event Simulation, Engineering Economics, Corporate Finances, Data Mining and Machine Learning for engineering students. He has developed a professional career working for large multinational companies (PricewaterhouseCoopers, BHP Billiton, and Merck Sharp & Dohme). He also worked as a scientific researcher in the Institut für Produktionsmesstechnick at TU Braunschweig, Germany. His research interests include manufacturing process simulation, supply chain design and simulation, and machine learning for finances.

Valentina Cabezas is an industrial engineer. She earned Licentiate in Engineering Sciences from Universidad Católica de Temuco, Chile. She has developed research in machine learning applied to human resources management in mining industry.