

OPTIMIZING EMPLOYEE CAREER PATHWAYS USING NETWORK ANALYSIS AND MACHINE LEARNING AT SCALE

Sushira Somavarapu¹ & Anand Singh²

¹Louisiana State University, Baton Rouge, LA 70803, United States

²Assistant Professor, IILM University, Uttar Pradesh, India

ABSTRACT

Optimization of employee career paths is one of the most important focuses for organizations to enhance talent retention, foster employee satisfaction, and drive organizational performance. This paper tries to discuss the integration of network analysis and machine learning (ML) techniques in scaling and enhancing career pathway optimization. Network analysis allows for mapping complex interconnections between roles, skills, and organizational hierarchies, uncovering hidden career opportunities and synergies. This is complemented by machine learning, which provides predictive insights into employee progression, skill development needs, and role suitability based on historical data and dynamic organizational trends.

Through the use of large-scale organizational datasets, this study uses graph-based models to analyze employee transitions and identify optimal pathways tailored to individual aspirations and business requirements. It further uses ML algorithms to provide personalized recommendations, predict turnover risks, and ensure that long-term organizational goals are met. A case study approach is used to show the scalability and effectiveness of this combined methodology in real-world settings, with an emphasis on its adaptability across diverse industries.

The findings highlight that integrating network analysis and ML fosters a data-driven approach to talent management, improving decision-making for HR teams and empowering employees with clearer growth trajectories. This innovative framework paves the way for organizations to dynamically adapt to workforce challenges, nurture internal talent, and maintain a competitive edge in an evolving market landscape.

KEYWORDS - Employee Career Pathways, Network Analysis, Machine Learning, Talent Optimization, Workforce Analytics, Predictive Modeling, Graph-Based Models, Skill Development, Organizational Performance, HR Decision-Making

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