

The Digital Empathy Engine: An AI-Driven Framework for Automated Burnout Detection and Intervention in HR Analytics

Seelam Dikshitha

School of Business, Woxsen University, Hyderabad, India

Harshini PJ

School of Business, Woxsen University, Hyderabad, India

Deeksha Gottapu

School of Business, Woxsen University, Hyderabad, India

Chamakura Saisree

School of Business, Woxsen University, Hyderabad, India

Lakshman Raj Lokesh

School of Business, Woxsen University, Hyderabad, India

Vinodhkumar S

School of Business, Woxsen University, Hyderabad, India

Abstract:

Burnout amongst employees has been recognized as an emerging challenge for organizations in remote/hybrid work settings, but current solutions to this problem are limited by their dependence on self-reported measures, making it difficult to capture early stage burnout and also by inequities inherent in the use of these self-report based approaches in culturally diverse workforces. In this paper, we propose Digital Empathy Engine, an artificial intelligence framework which uses passive analysis of digitally created information, culturally normalized risk scoring, and personalized Just-In-Time Adaptive Interventions (JITAs) to mitigate the challenges presented by the issues. Digital Empathy Engine analyzes employee metadata extracted from regular workplace communications such as after-hours email volume, meeting schedule, lag time, network density, and weekend work behavior, normalizing these inputs with respect to country-specific baselines derived using datasets collected from six different national contexts namely, India, USA, Germany, UK, China, and Japan. Four supervised machine learning classifiers such as Logistic Regression, Decision Tree, Random Forest, and Gradient Boosting were tested and validated against 5,000 daily records of employees. All four classifiers yielded ROC-AUC scores above 0.95, with the latter achieving an F1-score for the burnout-class prediction task of 0.9355. An extensive ablation analysis was conducted which proves cultural normalization's superior performance compared to raw feature representation in terms of increasing burnout-class F1 score by 7.8 percentage points, thereby confirming our primary novelty proposition. The JITAs engine component generates culturally sensitive recommendations for employees, supervisors, and HR personnel.

Keywords:

Burnout detection, cultural normalisation, digital exhaust, gradient boosting, HR analytics, just-in-time adaptive intervention, machine learning, remote work.