

## Predicting Developer Burnout and Enhancing Team Performance through Multi-Modal Workload Analysis from Jira and GitHub Activity

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Developer burnout has become a critical challenge in agile software development, as faster delivery cycles, high task-switching demands, and sustained cognitive load affect mental well-being and gradually reduce productivity. Although existing studies reveal that nearly 80% of software developers tend to face burnout symptoms, burnout detection methods are often reactive and solely rely on traditional surveys or isolated metrics. This study addresses this limitation by proposing a proactive, all-in-one, datadriven framework that combines task management data from Jira and code contribution activity from GitHub to predict burnout in agile teams. The research problem is derived from the necessity for a unified system capable of detecting early indicators of workload imbalance in an organization, answering stakeholder queries regarding employee burnout, and supporting real-time intervention. The study extracts multi-modal metrics from the Mozilla–Apache dataset, which consists of issue-tracking and version control data collected from Jira and GitHub. Several types of machine learning models were trained and evaluated to predict developer burnout. The Artificial Neural Network (ANN) revealed superior predictive performance, obtaining 98.48% accuracy with a F1-score of 97.41%. Moreover, correlation analysis indicated that factors such as commit count, total lines changed, issues handled, and off-work time commits show the strongest associations with burnout risk.

**Keywords:** *Developer Burnout, Multi-Modal Analytics, Jira, GitHub, Machine Learning*