

ABSTRACT

This study aims to improve the accuracy of heavy equipment failure prediction at Grand Indo Perkasa, a coal mining company in South Sumatra. Heavy equipment failures often pose critical issues that can hinder operations, increase costs, and reduce productivity. To address these challenges, this research developed a web-based application utilizing the Decision Tree C4.5 algorithm, designed to analyze historical failure data and accurately predict potential issues.

The research process included data collection through observation, interviews, and literature studies, as well as system modeling using UML tools. The data comprised information on five types of heavy equipment, totaling 58 series, 9 brands, and 16 models. The C4.5 algorithm was applied to identify patterns from failure attributes, resulting in a decision tree that forms the basis of the prediction system. Gain calculations identified the 9th attribute as the root node, serving as the foundation for further decisions.

The results indicate that this application enhances heavy equipment management efficiency by reducing downtime and accelerating diagnostics. The web-based implementation provides high accessibility, allowing technicians and managers to monitor equipment conditions in real-time and take timely preventive actions. This study demonstrates that integrating the Decision Tree algorithm into a web-based application is an effective solution to support operations in the coal mining sector.

Keywords: Decision Tree, failure prediction, C4.5, coal mining.