Optimization of Mining Machinery Maintenance in Modern Mining Enterprises through Text Mining and Machine Learning Techniques

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# ABSTRACT

The efficiency of planning processes is fundamental to the success of modern mining enterprises, especially in the context of maintaining competitiveness in the raw materials market. This paper addresses the critical challenge of optimizing production lines, which involves the strategic arrangement of mining fronts and the management of drilling, transport, and auxiliary machinery. Given the dynamic and often challenging conditions of underground mining, mitigating random disruptions that can lead to machine downtime is essential for maintaining productivity. This study highlights the importance of utilizing large volumes of diverse data to achieve situational awareness and facilitate informed decision-making under uncertainty. We explore how text mining and machine learning can extract valuable insights from unstructured data, such as equipment failure reports, which often contain complex and ambiguous information. By developing a classification system that categorizes failure descriptions into actionable insights, we aim to enhance data interpretation and support predictive maintenance strategies. Furthermore, we present an integrated approach that combines data from various sources, including downtime logs and repair records, to create a comprehensive database for analysis. The proposed methods not only streamline data management but also improve the accuracy of predictive models, ultimately enabling mining companies to optimize their operations and enhance overall productivity.