Title

Data Mining Analytics to Prevent Incidents in Mining Operations

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Abstract

Many mining companies are aiming for zero incidents in their operations which can only be achieved with careful analysis of both post- and pre-mortem data as well as with proactive action based on real-time data analytics. In this study, we describe techniques and technologies that can contribute to increase safety and reduce operations risks by leveraging on advanced analytical technologies, such as data mining, visual analytics, complex event processing, proactive management and rules, location awareness solutions, smart sensors, optimization and specialized frameworks.

Specifically, we describe an approach to discover unsafe patterns – such as those leading to collision risks, lack of compliance with procedures, equipment abnormal conditions (e.g., higher temperatures or pressures, etc.) – in order to identify their root causes and prevent risk by alerting on potential safety exposures events and allowing for action before they actually occur. In this sense, while a thorough examination of the data related with incidents may provide key information to map the chain of events that eventually resulted in an accident, the analysis of data from pre-mortem or near misses events can also be very valuable as they indicate conditions and behaviors that almost caused an incident and lead to insights on precautionary measures and procedures. Time and location are integral parts of these events which can be occurring everywhere. However, there is currently no end-to-end solution that handles spatiotemporal events and, as a matter of fact, the spatiotemporal visualization, spatiotemporal analytics, or spatiotemporal proactive event processing are not well established in the industry.

In this presentation, we plan to discuss the concepts and preliminary results of an environment that is aimed at safety officers and operations officers instead of statisticians and computer science graduates. We describe a multi-component system which addresses the end-to-end problem, which includes: receiving the events from different sensor systems, exploration via visualization, predictive and proactive event management, optimized decision making, perform actions in a central system and on equipment, and real-time monitoring. This environment is designed to enable a dynamic and proactive approach, for example, redefining safety targets according to changing external conditions (e.g., weather) and alerting on safety hazards even before the event occurs.