Automated classification of blast induced rock fragmentation in underground sublevel caving mine

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# ABSTRACT

In underground mining operations, blast-induced rock fragmentation provides the information that can be useful for downstream ore handling operations. Continuous information of the rock fragmentation is essential, especially for the efficient loading operations using semi-automated and automated LHDs. The manual work of classifying is a tedious task, therefore an attempt was made to develop a computer vision based model to automate the fragmentation classification. This paper presents a study to automate the fragmentation classification in Konslun mines, LKAB. A camera was installed on the roof of a ramp in the underground sublevel caving mine. The raw images of truck bucket transporting the ore from underground to surface were captured using that wide angle camera. The raw images were filtered and sorted manually. Around 25000 sorted images were manually labelled to compile a training dataset. The fragmented material was classified into five different classes: very fine, fine, medium, coarse, and very coarse. The labelled data was used to train the computer vision model for image classification. Output of classification model are image classification along with the percentage confidence. The developed model was validated with the news images from the same mines. Along with the model development, this paper also discusses the challenges of the data collection in underground mine environment, model training for low quality images collected from mines, model development and testing, and challenges in the adoption and scalability.