XploreIQ: Successfully Using Machine Learning in Mineral Exploration

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Keywords: list keywords here

# ABSTRACT

Exploration expenditure has significantly increased since 2010, as the industry has shifted its focus to deeper domains as readily available discoveries become progressively exhausted. However, during this period, the industry discovery rate has decreased by more than 50 percent, raising the question of whether our targeting process is fully optimised. In 2016, the SGS Geological Services team won the Integra Goldrush Challenge by employing an innovative combination of mineralised vector load in a block model, which was then filtered through machine learning algorithms to generate the next generation of exploration targets. This challenge has sparked interest among many explorers regarding the efficient use of new technologies for any type of deposit.

Over the past decade, the mining industry has adapted various types of algorithms, such as decision trees and stumps boosting enhanced with domain adaptation, for targeting purposes on different global projects. Phylogenetic algorithms have also been integrated into the toolbox to address questions related to geological uncertainties and rock classification using complex geochemical datasets. These applications are diverse in the mining industry, ranging from exploration targeting to block model ore classification to processing plant reconciliation. This presentation will primarily focus on exploration targeting, showcasing three successful case studies in the Gold, PGE, and Oil and Gas industries, utilising different algorithms and software. The discussion will also touch upon the limitations of the technique, the challenges that lie ahead and the importance of innovation in future mineral deposit discovery.