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Letter to Editor
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Application of Artificial Intelligence to Rock Mechanics: An Overview

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Introduction

Different artificial intelligence methods have been applied to various aspects of rock mechanics, but the fact that none of these methods have been used as a standard implies that doubt as to their generality and validity still exists. For this, a literature review of application of AI to the field of rock mechanics is presented [1]. Comprehensive studies of the researches published in the top journals relative to the fields of rock mechanics, computer applications in engineering, and the textbooks were conducted. The performances of the AI methods that have been used in rock mechanics applications were evaluated.

The quest for construction of heavy structures, underground space, resources and security over the recent decades is an inevitable demand and trend of the modernization and development of the countries around the world. High-quality development and sustainable utilization of underground space have become an international consensus. The utilization of the underground space can basically be classified into two purposes.civil engineering application and mining engineering application

Based on the degree of disturbance, surface and underground excavations can pose a major threat to the safety of personnel and equipment in and around such an excavation[2-5].Hence, the stability of surface and underground excavations has always been a great concern to geotechnical engineers.

It is acknowledged that many rock mechanics problems are due to the availability of limited data, resulting in insufficient information on the behavior of the subsurface. This scenario can be described using the Holling classification as presented. In there are four regions. The first region indicates where there are good data but limited understanding. In region 2, there are limited data and good understanding; while in region 3, there are enough data and good understanding. In the fourth region, there are neither enough data nor good understanding.

The analytical equations for some rock mechanics problems are not available, and most of the available models cannot accommodate all the influence parameters and therefore simplified assumptions are generally used. When the design engineers are supplied with incomprehensive information, their design or judgment using prior experiences on similar geological terrain would be limited. The advent of has abated the rock mechanics problems as it can simulate the mechanical behavior of the rock engineering structures, but there is a huge disparity between the in situ measurements.

Considering the inherent limitations in the traditional analytical approaches in solving rock mechanics problems and the prediction using the numerical methods, the use of data mining techniques becomes indispensable. Many data mining methods, such as statistical methods, classification and regression symbolic learning, case-based learning, and artificial intelligence, have been used to obtain useful knowledge from the organization and analysis of raw data in civil engineering

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Conflict of Interest

The authors declare that they are no conflict of interest.

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