



Mine Geological Environment Evaluation Based on Machine Learning in Fujian Province [U+FF0C] China

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Evaluation of mine geological environment is based on the investigation and research of mine geological environment. It needs to find proper factors and to use proper evaluation principles to establish a mathematical system to rate the environment of mines. Thus, the environment problems can be identified by the evaluation. In this article, the mines in Fujian province of China are taken as the study objects, and a rating system for evaluating the geological environment of mines is established by considering the information of 4 aspects: geography, geology, resource damage, and mining environment. The information are extracted from remote sensing images by both human-computer interactive interpretation methods and computer automatic extraction methods. Based on the rating system, an evaluation procedure is proposed as following: (1) Selection of optimal evaluation scale. The optimal evaluation scale is selected by carrying multi-scale evaluations on the study area and analyzing the effects of the scales. (2) Using a proper mathematical analysis method to evaluate the geological environment. In this paper, Quantum Particle Swarm Optimization (QPSO) is used to optimize the parameters of Least Square Support Vector Machine (LSSVM) to get an improved algorithm called QPSO-LSSVM. Compared with Back Propagation (BP) neural network and Analytic Hierarchy Process (AHP), the improved algorithm can eliminate subjective factors and is more efficient. (3) Results verification. Compared with ground investigation, the evaluation results are reasonable. and more accurate than the results from BP and AHP. Therefore, the evaluation results can provide the basis for the mine management and future planning in Fujian province, China.