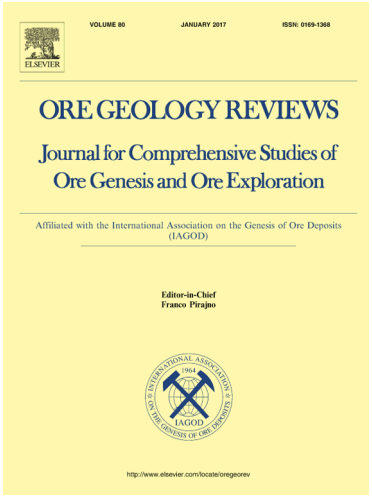

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Yihui Xiong, Renguang Zuo

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Effects of misclassification costs on mapping mineral prospectivity

Yihui Xiong, Renguang Zuo*

State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, China

*E-mail: zrguang@cug.edu.cn

Abstract

Mineral prospectivity mapping is a classification process because in a given study area, a specific region is classified as either a prospective or non-prospective area. The cost of false negative errors differs from the cost of false positive errors because false positive errors lead to wasting much more financial and material resources, whereas false negative errors result in the loss of mineral deposits. Traditional machine learning algorithms using for mapping mineral prospectivity are aimed to minimize classification errors and ignore the cost-sensitive effects. In this study, the effects of misclassification costs on mapping mineral prospectivity are explored. The cost-sensitive neural network (CSNN) for minimizing misclassification costs is applied to map Fe polymetallic prospectivity in China's southwestern Fujian metalorganic belt (SFMB). A CSNN with a different cost ratio ranging from 1:10 to 10:1 was used to represent various misclassification costs. The cross-validation results indicated a lower misclassification cost compared to traditional neural networks through a threshold-moving based CSNN. The CSNN's predictive results were compared to those of a traditional neural network, and the results demonstrate that the CSNN method is useful for mapping mineral prospectivity. The targets can be used to further explore undiscovered deposits in the study area.