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Cost sensitive neural network-based method for mapping mineral prospectivity

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Mineral prospectivity mapping (MPM) can be regarded as a classification. Since in the study area, a specific area is classified as either prospective or non-prospective. The traditional methods of MPM assume that the cost of type I error is the same as the cost of the type II error. However, in practice, the cost of type II error differs from the cost of type II error because the type II errors lead to wasting much more financial and material resources than that of type I errors. The traditional machine learning algorithms are designed to minimize the total errors of classifications and thus ignore the cost sensitive effects. In this study, the cost-sensitive back-propagation neural network (CS-BPNN) method which minimizes the amount of misclassification costs was applied for mapping mineral prospectivity in southwestern Fujian metalorganic belt (SFMB) (China). The receiver operating characteristic (ROC) curve and cost curve were used to exam the performance of MPM. In the training process, CS-BPNN was implemented with n-fold cross-validation in each iteration. The result of CS-BPNN was compared with that of BPNN for mapping Fe polymetallic prospectivity in SFMB. The results demonstrate that the CS-BPNN method is useful for mapping of mineral prospectivity when an appropriate cost ratio reaches. The targets can be used to guide further exploration for undiscovered deposits in the study area.