WEIGHTS-OF-EVIDENCE SOLUTIONS TO SPATIAL MODELING PROBLEMS

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Classification of categorical data, analysis of proximity, and selection of thresholds are basic tasks in GIS modeling. For mineral exploration, classification of categorical data often involves questions about the age and lithology of geologic-map units. Analysis of proximity involves defining the area close to something, for example, skarns occur in limestone close to an intrusive rock. Selection of thresholds is needed to interpret anomalous versus background in continuous measurements such as geochemistry or geophysics. Weights of evidence is a spatial-analysis method that provides solutions to these tasks. Contrast is a weights-of-evidence measure of the spatial association between some spatial object and a point training set. Maximizing the contrast through the appropriate selection of spatial objects defines a solution to these tasks. A simple model for Carlin gold deposits demonstrates these three analyses tasks using an Arcview implementation of weights of evidence (http://gis.nrcan.gc.ca/software/arcview/wofe). The model uses categorical, threshold, and proximity data, for example, respectively, geologic maps, stream sediment geochemistry, and faults, as evidence for Carlin gold deposits. Combination of these three data sets provides a prediction of the spatial distribution of Carlin deposits that agrees well with expert analog estimates and is reproducible and easily understood.