

# **Statistical Significance Tests in Weights-of-Evidence Modelling**

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Weights of evidence modelling is a GIS-based method to map the posterior probability of occurrence of discrete events (e.g., mineral deposits). Various evidential themes consisting of geological, geochemical, and geophysical data are weighted and incorporated, usually in the form of superimposed binary patterns.

It is attempted to create patterns which are conditionally independent of the discrete events considered. Various tests are available to test for conditional independence. These are of two types: (a) chi-square tests for model comparison, and (b) comparison of estimated and observed frequencies of occurrence of the discrete events.

Model comparison tests are similar to those commonly used for loglinear models in discrete multivariate analysis. However, because one of the patterns consists of points, these chi-squared tests have to be modified. For example, two binary patterns can only be tested for conditional independence at the points of occurrence of the discrete events.

Lack of conditional independence of evidential themes generally results in greater than expected posterior probabilities. If all evidential themes are conditionally independent, the total sum of the posterior probabilities is equal to total number of discrete events. This null hypothesis is accepted or rejected in the strict Kolmogorov-Smirnov (KS) test. In the relative KS test, total posterior probability is set equal to total number of events in order to verify whether or not conditional dependence is evenly distributed amongst pairs of evidential themes.