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Spatial predictive mapping using artificial neural networks

S. Noack, A. Knobloch, S. H. Etzold, A. Barth, and E. Kallmeier
Beak Consultants GmbH, 09599 Freiberg, Germany

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Abstract. The modelling or prediction of complex geospatial phenomena (like formation of geo-hazards) is one of the most important tasks for geoscientists. But in practice it faces various difficulties, caused mainly by the complexity of relationships between the phenomena itself and the controlling parameters, as well by limitations of our knowledge about the nature of physical/ mathematical relationships and by restrictions regarding accuracy and availability of data.

In this situation methods of artificial intelligence, like artificial neural networks (ANN) offer a meaningful alternative modelling approach compared to the exact mathematical modelling.

In the past, the application of ANN technologies in geosciences was primarily limited due to difficulties to integrate it into geo-data processing algorithms. In consideration of this background, the software advangeo® was developed to provide a normal GIS user with a powerful tool to use ANNs for prediction mapping and data preparation within his standard ESRI ArcGIS environment. In many case studies, such as land use planning, geo-hazards analysis and prevention, mineral potential mapping, agriculture & forestry advangeo® has shown its capabilities and strengths. The approach is able to add considerable value to existing data.

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