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Spatial Dimensions of Multi-Criteria Analysis

Claus Rinner
Ryerson University, crinner@ryerson.ca

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Spatial dimensions of multi-criteria analysis

Claus Rinner, Department of Geography, University of Toronto

Multi-criteria decision making (MCDM) has been introduced to GIS about 15 years ago. Decision rules that have been implemented in the GIS environment include weighted linear combination, analytical hierarchy process, ideal point analysis, concordance-discordance analysis, and ordered weighted averaging. The spatial dimensions of MCDM include spatially distributed decision-makers and decision alternatives, decision objectives relating to geographical objects, and a non-uniform weighting across space. However, few (if any) MCDM methods incorporate spatial relationships in the decision rule itself. This presentation suggests using geographical weighting to influence the calculation of aggregated suitability scores. Inverse distance-based weights are used to adapt the suitability of locations to their neighbours' scores. This method was implemented in the thematic mapping package CommonGIS, and applied to a site selection problem to demonstrate the usefulness of geographically weighted MCDM. Through its interactive cartography, CommonGIS supports the application of geographical weighting in conjunction with other spatial dimensions of multi-criteria analysis.