Comparison of decisional maps on different territories

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Abstract

In her PhD thesis (2017), Valérie Brison proposed and characterized several models for comparing different decisional maps on the same territory. Decisional maps represent the state of a territory, with respect to a criterion such as land-use sustainability, risk of land degradation, etc. It is assumed that the scale of the assessment criterion has finitely many degrees in these models. This scale may also consist of labels of ordered categories (such as these obtained when applying Electre Tri). The models developed allow one to compare the state of a territory at intervals in time or its evolution according to different scenarios.

In this work we address the problem of comparing decisional maps representing the state of different territories with respect to the same criterion. We develop and characterize two simple models based on the distribution of criteria values on each territory. One model is intensive, in the sense that maps comparisons do not depend on the area of the compared territories. It only depends on the distribution of criteria values. The second model, actually a parameterized family of models, can be called extensive since it depends of the area of the territories.

We provide a characterization of the two models based on expected utility theory and we discuss the applicability of these models and the elicitation of their parameters.

Of course, such models can be applied not only to land maps but also to sea maps or ocean maps.

Keywords

maps comparison; expected utility theory; geographic information systems; spatial decisions