CO-284

A WORLD OF INTERSTICES: A FUZZY LOGIC APPROACH TO THE ANALYSIS OF INTERPRETATIVE MAPS

DIDELON C.(1), RUFFRAY (DE) S.(2), BOQUET M.(3), LAMBERT N.(4)

(1) Université du Havre - UMR IDEES-CIRTAI, LE HAVRE, FRANCE ; (2) Université de Rouen - UMR IDEES-MTG, ROUEN, FRANCE ; (3) Université de Metz - CEGUM, METZ, FRANCE ; (4) UMS RIATE, PARIS, FRANCE

This paper experiments an analysis and cartography method based on the fuzzy logic theory to deal with mental maps at world scale. It is applied to a particular type of mental map – that we called interpretative maps. The realization of those maps is characterized by the instructions given to the respondents. Here they were asked to divide the world in regions (up to 15) from a polar projection map and to name each of them. That allows interpreting how people define a phenomenon in space from their own spatial representations. The knowledge level of respondents is then less important than their interpretation of space.

Mental maps at all scales and especially at world scale raise specific issues. The first one is related to the imprecision of the drawing. The morphology of the regions obtained is likely to be quite deformed. The second and most important one is the uncertainty linked to the object drawn. Setting the border of regions it is by itself an exercice that implies vagueness (Montello, 2003). The reasons are related to capabilities of the respondent to manage with various information according to its education, its character, its culture, its history. The uncertainty is also related to the doubts or hesitations when doing the exercise.

The interpretative dimension when building regions reinforce both the uncertainty and imprecision. Thus, the synthetic interpretative mental map of a group of people can be characterised as a fuzzy geographical space (Rolland-May, 2000). The fuzzy set theory (Zadeh, 1965) is therefore a good base to analyze interpretative maps. It formalizes the imprecision and the uncertainty. Moreover, it introduces gradual transitions between regions. Although fuzzy logic could help us to analyze building world regions, we focus on the world regions limits. The choice among the regions to study was made by a toponymy approach based on the most frequently quoted names. Some fuzzy logic operators were used, as the Zadeh T-norm or the probabilistic T-norm, to obtain world maps where the interstice areas – the areas belonging to two or more regions – appears. It allows providing cartography of the vagueness of regions borders.

This method seems really promising, in particular to identify “soft” and “hard” continents (Grataloup, 2010) and to localize indetermination areas. It is also usefull to compare the world regions built with other regional patterns.

REFERENCES:

Grataloup, C. (2010). L'invention des continents. Paris: Larousse.

Montello D. R., (2003). Regions in geography : Process & contents. In M. Duckham, M.F. Goodchild & M.F. Worboys (Eds), Foundations of geographic information science (pp. 173-189). London Taylor & Francis.

Rolland-May, C. (2001). Périphériques, bordures, marges territoriales : sous les mots, les concepts. Dans G. d. RITMA, Regards croisés sur les territoires de marge(s) (pp. 39-60). Strasbourg: Presses universitaires de Strasbourg.

Zadeh, L. A. (1965). Fuzzy sets. Information and controls, 8, 338-353.