VECTOR BASED EPIDEMIC MODELLING

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Keywords: GIS, agent based modelling, vector, epidemics;

Abstract:

Geographic Information Systems (GIS) can be defined as a tool to reveal caracteristics otherwise invisible, in geographic information (Longley, P. ET AL, 2001).

Althought raster model has been widely used in modeling, once it is faster and the algorithms are easier to implement, today several models use vector format; this data model is more efficient in terms of storage and produces more realistic maps and with more quality.

Due to its structure, cellular automata (CA) can be easily incorporated in raster models, while agent based models (ABM) apply very well to vector model.

In this paper, are presented some advantages and disavantadges of these models on the scope of spatial modeling of infectious diseases.

It is presented a epidemic model that incorporates a movement model and a infection model.

The model was first implemented in raster format, using site exchange cellular automata (SECA) and then in vector format, as agent based. In both cases, the model was programmed from scratch, using libraries to provide some GIS

functionalities (fig. 1).

The implementation in vector format using irregular polygons to define the geometry of the model, has lead to optimization techniques to improve its efficiency; an example of this is the programming of a quadtree.

Finally, some considerations are made relatively to this kind of approach, on the scope of epidemic modeling, in particular and spatial modeling of dynamic systems, in general.

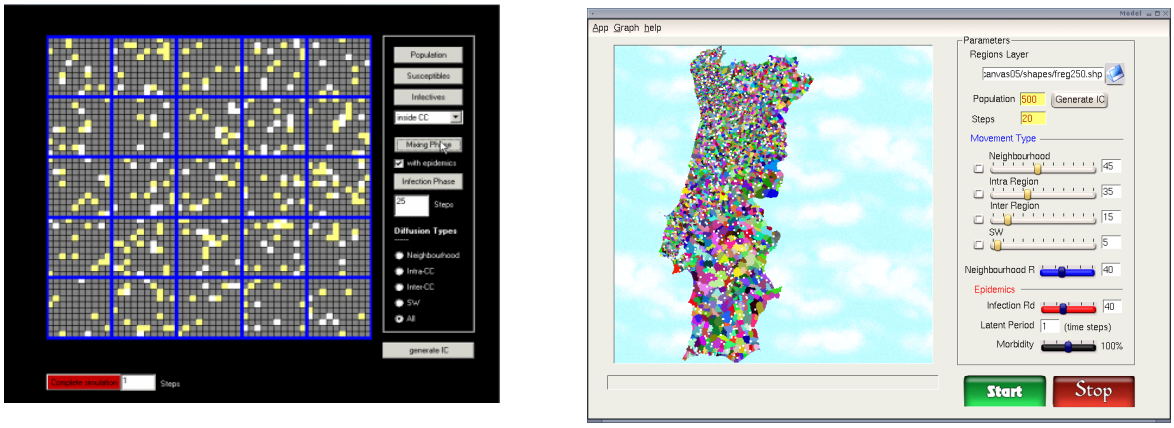

Figure 1 - Screenshots of the raster and vector versions of the epidemic model.

References:

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