SOME CONSIDERATIONS ON MODELLING ROAD NETWORKS IN A GIS

BOGAERT, Peter, DE MAEYER, Philippe

Cartography & GIS, Department of Geography, Ghent University, Krijgslaan 281, S8, B-9000 Gent (Belgium), {Peter.Bogaert; Philippe.DeMaeyer}@UGent.be

When data of the real world is stored on a computer, abstractions of real-life concepts have to be made. The data, necessary to store these concepts, needs to be minimised. On the other hand, the real world needs to be represented as accurate as possible. Ideally, an information system could answer a question in its virtual world that coincides with an exact answer in the real world. Networks – such as road networks – can easily be modelled as a graph. Spatial problems on these networks can then be translated to graph-theoretical problems. The way in which the graph is modelled, is of the uttermost importance, since this describes how close the model reflects real life.

Different approaches have been used to model turn costs or restrictions. Kirby and Potts used an expanded representation of the network. Each intersection is split into dummy nodes, being connected by dummy edges. The turn costs are assigned to the dummy edges. Jiang et al. suggested a link-based data structure, where a link-node table is used to represent the connectivity of the road network and a link-link table is used to represent turning restrictions. Anez et al. and Winter introduced the concept of the line graph, in which connections between intersections or endpoints are modelled as nodes, and the links between these connections are modelled as edges. For specific turns such as U-turns this approach has the drawback of modelling each direction of movement as a node. Therefore we suggest a new data structure which combines the advantages of the line graph and the link-based approach.

REFERENCES: