

EXPERT SYSTEMS IN ELECTRONIC MAP DESIGN

Halugin E.I., Maidanich A.I.
Russia, Moscow, 107014, Popov proezd, 6.
Research Institute, Ministry of Defence.

The wide development of computer graphics means in solving the navigational and ecological problems caused the need in producing the specialized map displays based on general digital terrain data and adapted to the specialities of the particular tasks ("electronic maps"). The difficulties in forming the appropriate cartographic display is clear from the human's way of perception of the map as a whole, that is not equal to the summ of individual perceptions, produced by the parts of cartographic image (conditional signs, various text styles, colour areas, etc.).

The reason of this phenomena is in the presence of multiple space and logical relationships taking place between a number of map objects, which ranging and interpretation is made by the cartographer on the basis of his own knowledge and experience.

To preserve an important space and logical relationships while producing an "electronic map" we have designed a semiotic model of the cartographer's actions during the process of selection and generalization of map objects and, on the basis of problem field analyses, have defined the main set of the lexical units of the model language. The model syntax is formed by the syntax of known language for situation planning.

During the practical stage we have used an expert system for the model development and utilized suggested by Ross Quinlan method of "iterative dichotomy 3" (ID3) for the creation of the rule set.

The differences between the designed expert system and traditional ones are in the fact that both input and output information in our system are in graphical form. This caused are need in design of some software utilities which analyses the source digital terrain data and interprets it in the terms of model language.

The use of ID3 method, which could build rules automatically with a sets of positive and negative examples, allowed us to significantly reduce the difficulties in creating the inference rule set, because, as our experience shows, it is much easier for the cartographer to draw (describe in model language terms) some situations connected with a rule, than to explain this rule directly. Currently the designed expert system is on the stage of the "research prototype".