

## VISUALIZATION OF UNCERTAINTY WITH A FUZZY COLOR SYSTEM

B. Jiang and A. Brown  
Department of Geoinformatics  
International Institute for Aerospace Survey and Earth Sciences(ITC)  
P.O. Box 6, 7500 AA Enschede, The Netherlands  
Email: {bin, brown}@itc.nl

F.J. Ormeling  
Department of Cartography  
P.O. Box 80115, 3508 TC Utrecht, The Netherlands  
Email: ormeling@frw.ruu.nl

### ABSTRACT

GIS user interfaces in the future are likely to make use of natural language queries, for use by high level decision makers who may have little experience with a GIS. Generally, a query may be a concatenation of atomic terms which may be divided into four categories-- primary terms, negation and connectives, and hedges. Thus quantitative data may, for example, be classified as a set of primary terms like {low, moderate, high} and operations applied on it.

Such linguistic classes are fuzzy, and their relationship to the data is not fixed. The paper presents graphic interactive techniques by which the linguistic classes can be related to the data by means of 'standard points' and membership functions, in contrast to the tradition method by clearcut interval and binary characteristic functions. The methods produce fuzzy class boundaries.

According to the theory of cartographic semiology, the visual variable value can be used to represent classified quantitative data on a single map (or layer). The authors present a different approach in which separate maps (or sublayers) are made for each class. In this case, the variables value or saturation can be used to express the fuzziness of the class, related to the class standard points and the membership functions used. A fuzzy color system is described. Several alternative color schemes are presented and discussed, based on experiments with map examples on a computer screen.