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Extended Abstract
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Data Mining 2016: Application of rough sets and Dempster-Shafer s evidence theory in spatial data mining- Iftikhar U Sikder - Cleveland State University

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This paper presents a novel approach to spatial classification and prediction of land cover classes using rough set and evidence theory. In particular, it presents an approach to characterizing uncertainty in multisource supervised classification problem. The evidential structure of spatial classification is founded on the notions of equivalence relations of rough set. It allows expressing spatial concepts in terms of approximation space wherein a choice class are often approximated through the partition of boundary region. A key advantage of this approach is that it allows incorporating the context of spatial neighborhood interactions and the combination of multiple spatial evidences. The empirical result demonstrates that the model classifier's predictive performance significantly improves the accuracy of classification. A comparison of the predictive performance of the model with the radial basis function-based artificial neural network algorithm shows that the predictive performance of the proposed model is significantly better than neural network model.

A growing attention has been paid to spatial data processing and knowledge discovery (SDMKD). This paper presents the principles of SDMKD, proposes three new techniques, and provides their applicability and examples. First, the motivation of SDMKD is briefed. Second, the intension and extension of SDMKD concept are presented. Third, three new techniques are proposed during this section, i.e. SDMKD-based image classification that integrates spatial inductive learning from GIS database and Bayesian classification, cloud model that integrates randomness and fuzziness, data field that radiate the energy of observed data to the universe discourse. Fourth, applicability and examples are studied on three cases. The first is remote sensing classification, the second is landslide-monitoring data processing , and therefore the third is uncertain reasoning. Finally, the whole paper is concluded and discussed. The technical progress in computerized data acquisition and storage leads to the expansion of vast databases. With the continual increase and accumulation, the large amounts of the computerized data have far exceeded human ability to completely interpret and use. These phenomena may be more serious in geo-spatial science. In order to understand and make full use of these data repositories, a few techniques have been tried, e.g. expert system, management system, spatial data analysis, machine learning, and AI . In 1989, knowledge discovery in databases was further proposed. In 1995, data mining also appears. As both data mining and knowledge discovery in databases virtually point to the same techniques, people would like to call them together, i.e. data mining and knowledge discovery (DMKD). As 80% data are geo-referenced, the need forces people to think about spatial characteristics in DMKD and to further develop a branch in geo-spatial science, i.e. SDMKD (Li, Cheng, 1994; Ester et al., 2000). Spatial data are more complex, more changeable and larger that common affair datasets. Spatial dimension means each item of knowledge features a spatial reference (Haining, 2003) where each entity occurs on the continual surface, or where the spatial-referenced relationship exists between two neighbor entities. Spatial data includes not only positional data and attribute data, but also spatial relationships among spatial entities. Moreover, spatial data structure is more complex than the tables in ordinary relational database. Besides tabular data, there are vector and raster graphic data in spatial database. And the features of graphic data aren't explicitly stored within the database. At an equivalent time, contemporary GIS have only basic analysis functionalities, the results of which are explicit. And it's under the idea of dependency and on the idea of the sampled data that geostatistics estimates at unsampled locations or make a map of the attribute. Because the discovered spatial knowledge can support and improve spatial data-referenced decision-making, a growing

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attention has been paid to the study, development and application of SDMKD.

Biography

Iftikhar U Sikder is an Associate Professor jointly appointed in the Department of Information Science, Department of Electrical Engineering and Computer Science at Cleveland State University, USA. His research interests include soft computing, granular computing, data mining and collaborative decision support systems. His papers appeared in the Journal of Risk Analysis, Expert Systems with Applications, International Journal of Mobile Communications, Information Resources Management Journal, International Journal of Management & Decision Making, and International Journal of Aerospace Survey and Earth Sciences. He has authored many book chapters and presented papers in many national and international conferences.

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