Relational Learning from Spatial Data: Retrospect and Prospect

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Summary

Learning from spatial data is characterized by two main features. First, spatial objects have a locational property which implicitly defines several spatial relationships (topological, directional, distancebased) between objects. Second, attributes of spatially related units tend to be statistically correlated. These two features argue against the assumption of the independent generation of data samples (i.i.d. assumption) underlying classic machine learning algorithms, and motivate the application of relational learning algorithms, whose inferences are based on both instance properties and relations between data. This relational learning approach to spatial domains has already been investigated in the last decade, and important accomplishments in this direction have already been performed. In this talk, we retrospectively survey major achievements on relational learning from spatial data and we report open problems which still challenges researchers and prospectively suggest important topics for incorporation into a research agenda.

Bibliography

Donato Malerba is a full professor at the Department of Informatics, University of Bari, where he teaches in the courses of "Algorithms and Data Structures", "Advanced Data Base Systems", and "Knowledge Bases and Data Mining". In 1992 he was assistant specialist at the Institute of Computer Science, University of California, Irvine. His research activity mainly concerns machine learning and data mining, in particular numeric-symbolic methods for inductive inference, classification and model trees, (multi-)relational data mining, spatial data mining, web mining, and their applications to intelligent document processing and digital map interpretation. He has published more than 150 papers in international journals and conference proceedings. He was in the Management Board of the European Coordinated Action FP6-021321 "KDUbiq - Knowledge Discovery in Ubiquitous Environments" (December 2005 - May 2008) and in the Management Board of the European project IST-2001-33086 "KDNet - European Knowledge Discovery Network of Excellence" (2002 - 2004). He participated to several European and National projects. He was responsible of the unit of Bari in the European project IST-1999-10536 SPIN (Spatial Mining on Data of Public Interest) and in two

MIUR COFIN projects (years 1999-2001, 2001-2003). He is responsible of a research unit of the strategic project PS121 "Telecommunication Facilities and Wireless Sensor Networks in Emergency Management" funded by Apulia Region. He has received the IBM Faculty Award for the year 2004. He has been in the executive board of the Italian Association for Artificial Intelligence (AI*IA) from September 2001 till September 2005. He has served in the program committee of many international conferences and workshops of machine learning and data mining, co-chaired seven international/national workshops and acted as guest-editor of six special issues of international journals (topics: machine learning in computer vision, mining official data, visual data mining, spatio-temporal data mining, artificial intelligence, multi-relational data mining). He was program co-chair of the 18th International Conference on Industrial & Engineering Applications of Artificial Intelligence and Expert Systems (IEA-AIE'05), Bari, June 2005, and of the 16th International Symposium on Methodologies for Intelligent Systems (ISMIS'06), Bari, September 2006. He is program co-chair of the conference ECML/PKDD which will be held in Athens, Greece, next September 2011. He is in the editorial board of Machine Learning Journal, Journal of Intelligent Information Systems, and International Journal of Data Mining, Modelling and Management.