



Department of Decision Sciences

Statistics Seminar

Object oriented spatial statistics: four case studies

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Abstract

I will present four statistical analyses of complex and high dimensional data. The first deals with solar irradiance data and aims at investigating the possible exploitation of solar energy in different areas of the planet. The second considers Erlang data describing the use over time of the mobile-phone network in the urban area of Milan (Italy) and strives for the identification of sub-regions of the metropolitan area sharing similar patterns in terms of population density dynamics. The goal of the third case study is to predict the spatial field of particle size curves from a sample observed at a finite set of locations within an alluvial aquifer. Finally, the fourth case considers manifold valued data, in the form of positive definite matrices, and develops a kriging approach for spatial prediction. The four case studies share many issues: the functional structure of the spaces data belong to dictates the proper statistical environment for conducting the analysis, the high dimensionality of data requires suitable reductions of their dimension, and last but not least spatial dependence should be taken into account. I won't try to expound a unified theory, but I will illustrate the common methods and algorithms developed at MOX, the laboratory for modeling and scientific computing of the Politecnico di Milano, for providing satisfying answers to the problems raised by the four case studies.