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Advances in Spatial Statistics for Large-Scale and Complex Domains

The proliferation of large-scale geospatial data from sources such as satellite remote sensing and cellular phone networks has created a need for new statistical methods capable of handling massive datasets and complex spatial domains, as classical techniques often face prohibitive computational burdens and restrictive assumptions. In this talk, I discuss recent advances that directly address some of these challenges, primarily through the development of a scalable model that reduces computational complexity from cubic to near-linear in the number of observations. Further, we explore some of its applications. Beyond scalability, progress has been made in tailoring methods for complex domains by defining a process using appropriate distance metrics. The synthesis of these scalable and geometrically aware methods empowers practitioners to extract meaningful insights from vast and intricate spatial data. Again, we revisit applications in other spatial domains. FAPEMIG and CNPq partially funded these works.