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Minisymposium 6 - Positive definite functions and applications

Real-world applications of positive definite functions: A diptych

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In this talk, I discuss two complementary applications of positive definite functions that address important real-world problems, yet are of mathematical interest by themselves.

A major human desire is to make forecasts for an uncertain future. There are strong arguments, philosophically, scientifically and economically, that forecasts should be probabilistic in nature, taking the form of probability distributions over future events. Scoring rules assess the quality of probabilistic forecasts, by assigning a numerical score based on the forecast and on the event or value that materializes. An elegant construction originally proposed by Eaton uses positive definite functions to construct scoring rules that encourage the forecaster to make careful assessments and to be honest. We study a generalization that is based on conditionally negative definite functions and generates rich classes of proper scoring rules.

The second part of my talk considers geostatistical models for spatio-temporal data. We use classical results in harmonic analysis to construct novel classes of positive definite, nonseparable space-time covariance functions, and fit them to wind data from Ireland.