

Speaker: Paddy O'Toole (University of Bath)

Date: 21/11/2025 at 13:15 in 4 West 1.7 (Wolfson Lecture Theatre)

Title: Clustering of multivariate tail dependence using conditional methods

Abstract:

The conditional extremes (CE) framework has proven useful for analysing the joint tail behaviour of random vectors. However, when applied across many locations or variables, it can be difficult to interpret or compare the resulting extremal dependence structures, particularly for high dimensional vectors. To address this, we propose a novel clustering method for multivariate extremes using the CE framework. Our approach introduces a closed-form, computationally efficient dissimilarity measure for multivariate tails, based on the skew-geometric Jensen-Shannon divergence, and is applicable in arbitrary dimensions. Applying standard clustering algorithms to a matrix of pairwise distances, we obtain interpretable groups of random vectors with homogeneous tail dependence. Simulation studies demonstrate that our method outperforms existing approaches for clustering bivariate extremes, and uniquely extends to the multivariate setting. In our application to Irish meteorological data, our clustering identifies spatially coherent regions with similar extremal dependence between precipitation and wind speeds.