



Statistics and Actuarial Science Seminar

Title: Beyond point estimation: explaining the posterior in Bayesian cluster analysis

Speaker: Sara Wade (University of Edinburgh)

Date: Thu 5th November 2026 at 11:00AM

Location: (See abstract)

Abstract: JOINT UCD AND TCD SEMINAR – HELD AT TRINITY COLLEGE DUBLIN, NOT AT UCD. Time: 11:00 am to 12:00 noon. Venue: Room 1.20, Lloyd Institute, Trinity College Dublin.

The Bayesian approach to clustering is often appreciated for its ability to provide uncertainty in the partition structure. However, summarizing the posterior distribution over partitions remains challenging, due to its discrete, unordered and extremely high-dimensional nature. Existing approaches typically focus on a single representative clustering, which can obscure important features of the posterior, particularly in the presence of multimodality. To address this limitation, we propose a Wasserstein Approximation for Bayesian Inference (WASABI), which represents the posterior distribution using a small number of weighted clustering solutions (“particles”), each capturing a distinct region of substantial posterior mass. The approximation is obtained by minimizing the Wasserstein distance defined on the space of partitions, equipped with a suitable metric. This formulation naturally leads to a k-means–like algorithm on the partition space that divides posterior samples into representative groups, each represented by one of the clustering solutions. Through synthetic and

real-data applications, we demonstrate that WASABI provides an interpretable and computationally efficient low-dimensional summary of the posterior, particularly in settings with overlapping clusters or model misspecification. Finally, we outline further extensions of WASABI to summarize posterior and predictive distribution defined on non-standard spaces. In particular, we showcase an extension for noise-aware clustering, based on martingale posterior defined over sub-partitions that are constructed from a predictive Bayesian perspective.