Title: On densities, modes, and antimodes

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Abstract:

We begin this talk with illustrating, using Durham University Observatory data, why the estimation of modes for continuous data necessarily requires a population-level perspective, and hence relates to the problem of estimating the density function of the underlying continuous distribution. We will then illustrate that the density modes can be estimated directly through the "mean shift", an iterative technique conceptually based on the estimated density (but not requiring its estimation), which is well known in the computer science literature. The novel contribution of this talk is the extension of this methodology towards the estimation of "antimodes" – that is, local minima of the data density, or points "where the likelihood of observing data increases in any direction you move away from it". It is shown how estimation of antimodes can be achieved through an inverse version of the mean shift procedure. The methodology is illustrated through univariate and bivariate real data.