A Semiparametric Approach to Estimate the Mode of Continuous Multivariate Data

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Abstract : Mode estimation is an important task, because it has applications to data from a wide variety of sources. We propose a semi-parametric approach to estimate the mode of an unknown continuous multivariate density function. Our approach is based on a weighted average of a parametric density estimate using the Box-Cox transform and a non-parametric kernel density estimate. Our semi-parametric mode estimate improves both the parametric- and non-parametric- mode estimates. Specifically, our mode estimate solves the non-consistency problem of parametric mode estimates (at large sample sizes) and reduces the variability of non-parametric mode estimates (at small sample sizes). The performance of our method at practical sample sizes is demonstrated by simulation examples and two real examples from the fields of climatology and image recognition.