Lecture 5.4 (10:45-11:00)

Robust Parameter Estimation of State Space Models under Heavy Contamination

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The state space model (SSM), which describes the evolution of observations while considering latent variables, is widely applied in various fields. Although the maximum likelihood estimation is commonly used for parameter estimation, it is suffered from bias when outliers are present in the observations. Therefore, robust estimation methods are necessary to mitigate this problem In cases where observations are obtained from an IID distributed (i.i.d.) distribution, many robust estimation methods with guaranteed statistical properties have been proposed. On the other hand, in SSMs that involve latent variables with Markov properties, discussions about statistical properties are challenging, and valid robust estimation methods have been scarce. In this paper, we propose a robust estimation method for SSMs using γ-divergence. The proposed estimator has asymptotic normality under some assumptions, and allowing for valid parameter estimation even in cases with a high proportion of outliers.