

Sparse estimation within Pearson's system, with an application to financial market risk

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Pearson's system encompasses a broad spectrum of classical univariate distributions. It comprises all continuous densities arising as solutions to a differential equation involving four parameters. The estimation of a Pearson density is challenging as small variations in the parameters can induce wild changes in the shape of the corresponding density. I will discuss how to estimate the vector of parameters and the corresponding density effectively through a penalized likelihood procedure involving differential regularization. The approach combines a penalized regression method and a profiled estimation technique. Simulations and an illustration with S&P 500 data suggest that this method can improve market risk assessment substantially through value-at-risk and expected short-fall estimates that outperform those currently used by financial institutions and regulators.