

## Polynomially Adjusted Bivariate Density Estimates Based on the Saddlepoint Approximation

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**Abstract :** An alternative bivariate density estimation methodology is introduced in this presentation. The proposed approach involves estimating the density function associated with the marginal distribution of each of the two variables by means of the saddlepoint approximation technique and applying a bivariate polynomial adjustment to the product of these density estimates. Since the saddlepoint approximation is utilized in the context of density estimation, such estimates are determined from empirical cumulant-generating functions. In the univariate case, the saddlepoint density estimate is itself adjusted by a polynomial. Given a set of observations, the coefficients of the polynomial adjustments are obtained from the sample moments. Several illustrative applications of the proposed methodology shall be presented. Since this approach relies essentially on a determinate number of sample moments, it is particularly well suited for modeling massive data sets.

**Keywords :** density estimation, empirical cumulant-generating function, moments, saddlepoint approximation

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