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# Probability density estimation by linear combinations of Gaussian kernels- generalizations and algorithmic evaluation

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## Abstract:

This paper examines parametric density estimation using a variable weighted sum of Gaussian kernels, where the weights may take positive and negative values. Various statistical properties of the estimator are studied as well as its extensions to multidimensional probability density estimation. Identification of the estimator parameters are computed by a modified EM algorithm and the number of kernels are estimated by information theoretic approach, using the Akiake Information Criterion (AIC). This paper provides empirical evaluation of the estimator with respect to window-based estimators and the classical linear combinations of Gaussian estimator that uses only positive weights, showing its robustness (in terms of accuracy and speed) for various applications in image and signal analysis and machine learning.

## Keywords:

Gaussian processes , expectation-maximisation algorithm , probability , statistical analysis

## Published In:

IEEE Computer Society: Proceedings of International Conference on Multimedia Technology , , 6491-6494