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# A new algorithm of non-Gaussian component analysis with radial kernel functions

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**Abstract** We consider high-dimensional data which contains a linear low-dimensional non-Gaussian structure contaminated with Gaussian noise, and discuss a method to identify this non-Gaussian subspace. For this problem, we provided in our previous work a very general semi-parametric framework called non-Gaussian component analysis (NGCA). NGCA has a uniform probabilistic bound on the error of finding the non-Gaussian components and within this framework, we presented an efficient NGCA algorithm called *Multi-index Projection Pursuit*. The algorithm is justified as an extension of the ordinary projection pursuit (PP) methods and is shown to outperform PP particularly when the data has complicated non-Gaussian structure. However, it turns out that multi-index PP is not optimal in the context of NGCA. In this article, we therefore develop an alternative algorithm called *iterative metric adaptation for radial kernel functions* (*IMAK*), which is theoretically better justifiable

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within the NGCA framework. We demonstrate that the new algorithm tends to outperform existing methods through numerical examples.

**Keywords** Linear dimension reduction · Non-Gaussian subspace · Projection pursuit · Semiparametric model · Stein's identity