Statistica Sinica Preprint No: SS-2018-0347	
Title	Determining the signal dimension in second order source separation
Manuscript ID	SS-2018-0347
URL	http://www.stat.sinica.edu.tw/statistica/
DOI	10.5705/ss.202018.0347
Complete List of Authors	Joni Virta and Klaus Nordhausen
Corresponding Author	Joni Virta
E-mail	joni.virta@outlook.com
Notice: Accepted version subject to English editing.	

for $\mathbf{x}_t \in \mathbb{R}^p$ is through the additive noise model,

$$\mathbf{x}_t = \boldsymbol{\Omega}\mathbf{z}_t + \boldsymbol{\epsilon}_t, \quad t = 1, \ldots, T, \tag{6.4}$$

where $\boldsymbol{\Omega} \in \mathbb{R}^{p \times q}$ is a non-square mixing matrix, $\mathbf{z}_t \in \mathbb{R}^q$ consists of $q < p$ signal components and $\boldsymbol{\epsilon}_t \in \mathbb{R}^p$ is a noise process. This problem is considered in the case of i.i.d. data in Virta and Nordhausen (2018) where the authors use the PCA-transformation to estimate the $p - k$ principal components with smallest variances. Hypothesis testing can then be used to pin-point the correct dimension $k = q$ for which these components consist of pure noise. It seems likely to us that a modification of this idea could be utilized also in the context of time series data and model (6.4), and this will be considered in future work. Note, however, that in such a model only the signal dimension and the mixing matrix can be consistently estimated but not the signals itself, contrary to the model proposed in the current work.

Acknowledgements

The authors would like to express their gratitude to the anonymous referees whose comments and suggestions helped greatly to improve the manuscript quality.

Klaus Nordhausen acknowledges support from the CRoNoS COST Action IC1408.