

Savas, Berkant; Lindgren, David

Rank reduction and volume minimization approach to state-space subspace system identification. (English) [Zbl 1172.93400](#)

Signal Process. 86, No. 11, 3275-3285 (2006).

Summary: We consider the reduced rank regression problem

$$\min_{\text{rank } \bar{L}=n, L_3} \det(Y_\alpha - \bar{L}P_\beta - L_3U_\alpha)(Y_\alpha - \bar{L}P_\beta - L_3U_\alpha)^T$$

solved by maximum-likelihood-inspired state-space subspace system identification algorithms. We conclude that the determinant criterion is, due to potential rank-deficiencies, not general enough to handle all problem instances. The main part of the paper analyzes the structure of the reduced rank minimization problem and identifies signal properties in terms of geometrical concepts. A more general minimization criterion is considered, rank reduction followed by volume minimization. A numerically sound algorithm for minimizing this criterion is presented and validated on both simulated and experimental data.

MSC:

[93E10](#) Estimation and detection in stochastic control theory

[62G08](#) Nonparametric regression and quantile regression

Cited in **2** Documents

Keywords:

[reduced rank regression](#); [system identification](#); [general algorithm](#); [determinant minimization criterion](#); [rank reduction](#); [volume minimization](#)

Full Text: [DOI](#)