Pair-Perturbations on Influence Functions and Local Influence in PCA

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Abstract

The essential part of sensitivity analysis in principal component analysis (PCA) is to compute the influence functions which measure the changes in eigenvalues and eigenvectors corresponding to some small change of a covariance or correlation matrix. The perturbation theory of eigenvalue problems provides a useful mathematical tool for this purpose. It is well known that single-perturbation diagnostics can suffer from a form of masking. Thus in this talk, we derive the influence functions and local influence of pair-perturbations. In addition, we examine the relationships and make comparisons among these influence functions and local influence. Finally, an example to these approaches to illustrate the results is provided.