Estimators uniformly shrinking on subspaces

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Abstract

It is well established that some classes of biased estimators are often preferable to ordinary least squares estimators in linear regression when the explanatory variables are highly correlated. Examples are Ridge regression , principal component regression (PCR), partial least-squares regression . To understand the behaviour of these estimators, many authors have investigated their shrinkage properties from two different points of view. From a global point of view, it has been established that RR, PCR and PLSR estimators have a lower Euclidean norm than the OLS estimator (see De Jong, 1995 or Goutis,1996 for PLSR). From a directional point of view, Frank and Friedman (1993) Butler and Denham (2000) and Lingjaerde and Christophersen (2000) have shown that shrinkage factors on the principal directions, i.e. those given by PCR, are between 0 and 1 for RR, PCR but not for PLSR. Druilhet and Mom (2008) have shown that shrinkage factors on the directions given by PLSR are between 0 and 1 for RR and PLSR but not for PCR.

We characterize regression on components such that the resulting estimators shrink uniformly on the subspace spanned by their weight vectors and we propose a new regression on components based on both PLSR and PCR criteria having this property.

Keywords

Biased regression, Regression on components, Shrinkage.

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