The orthogonal pivoting transformation for detecting collinearity problems in linear regression

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Abstract

Given a nonsingular square matrix $\mathbf{A}$, the orthogonal pivoting transformation (Castillo et al., 2000) applied successively to each column of $\mathbf{A}$ allows us to compute $\mathbf{A}^{-1}$. For an arbitrary $\mathbf{A} \in \mathcal{M}_{n\times m}$, $n \leq m$ the procedure allows us to compute its rank, to determine which rows and columns of $\mathbf{A}$ are linearly independent (in order to obtain a generalized inverse $\mathbf{A}^{-}$, (Gómez et al., 2007) and to determine the coefficients of the linear dependencies of the rows of $\mathbf{A}$.

We propose to apply this orthogonal pivoting transformation to detect collinearity problems in a linear regression model. This methodology allows us to identify the subsets of explanatory variables involved in each collinear relation, and the form of the near exact linear dependencies.

Keywords

Linear regression, Orthogonal decomposition, Collinearity.

References

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