

Groenen, Patrick J. F.; Le Roux, Niël J.; Gardner-Lubbe, Sugnet
Spline-based nonlinear biplots. (English) Zbl 1414.62209
Adv. Data Anal. Classif., ADAC 9, No. 2, 219-238 (2015).

Summary: Biplots are helpful tools to establish the relations between samples and variables in a single plot. Most biplots use a projection interpretation of sample points onto linear lines representing variables. These lines can have marker points to make it easy to find the reconstructed value of the sample point on that variable. For classical multivariate techniques such as principal components analysis, such linear biplots are well established. Other visualization techniques for dimension reduction, such as multidimensional scaling, focus on an often nonlinear mapping in a low dimensional space with emphasis on the representation of the samples. In such cases, the linear biplot can be too restrictive to properly describe the relations between the samples and the variables. In this paper, we propose a simple nonlinear biplot that represents the marker points of a variable on a curved line that is governed by splines. Its main attraction is its simplicity of interpretation: the reconstructed value of a sample point on a variable is the value of the closest marker point on the smooth curved line representing the variable. The proposed spline-based biplot can never lead to a worse overall sample fit of the variable as it contains the linear biplot as a special case.

MSC:

62H25 Factor analysis and principal components; correspondence analysis

Cited in **1** Document

Keywords:

biplot; multidimensional scaling; principal components analysis; splines

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