

Incorporated Fuzzy Robust Principal Component Analysis with Context-Dependent Data Envelopment Analysis for an Advanced Decision Making Process

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Abstract

One of the critical challenges of traditional data envelopment analysis (DEA) is a lack of discriminant ability, particularly if there is a relatively large amount of variables with respect to observations. To overcome this problem and uncover some essential messages behind successful business operations, this research introduces an advanced decision making scheme that combines fuzzy robust principal component analysis (FRPCA) and context-dependent data envelopment analysis (CD-DEA) to handle the performance measurement task. FRPCA condenses a large amount of information into some essential and manageable elements, while CD-DEA derives the learning path of each observation to reach an assessable benchmark. The introduced scheme not only yields a precise performance evaluation outcome, but also equips it with forecasting capability via artificial intelligence (AI) adoption. The introduced scheme, examined by real cases, is a promising alternative for performance forecasting and evaluation.

Keywords

Decision making, context-dependent data envelopment analysis, performance evaluation, forecasting

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