Computing a Nearest Correlation Matrix with Factor Structure

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Abstract

In many practical applications involving statistical modelling it is required to adjust an approximate, empirically obtained correlation matrix so that it has the three required properties of symmetry, positive semidefiniteness, and unit diagonal. Lack of definiteness can result from missing or asynchronous data, or, in the case of financial modelling, stress testing. We consider the problem of finding the nearest structured correlation matrix to a given matrix, concentrating on the case of factor structure. Factor structure arises in modelling collateralized debt obligations (CDOs) and also in factor models of multivariate time series. Some underlying theory is described along with practical algorithms and software solutions using the NAG Toolbox for MATLAB.

Reference