

Recent Progress on the Nearest Correlation Matrix Problem*

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Abstract

In many practical applications involving data analysis or statistical modelling it is required to adjust an empirically obtained correlation matrix that fails to be a true correlation matrix because it has negative eigenvalues. A popular method for adjustment is to replace the matrix by the nearest correlation matrix (NCM). I first came across the NCM problem in 2000, when it was presented to me by a finance company. The alternating projections method that I developed was the first method guaranteed to solve the problem. Although finance was an early application, the NCM problem has since proved to be ubiquitous, with applications including dietary intakes, wind farms, insurance, wireless networks, oceanography and horse breeding. I will briefly summarize the history of the problem, which goes back to the 1980s and includes the important (and nontrivial) construction of a Newton method by Qi and Sun in 2006. My main focus will be on two recent developments:

- Anderson acceleration of the alternating projections method,
- shrinking as an alternative way of restoring definiteness.

The work on the latter two topics is joint with Nataša Strabić and, for shrinking, Vedran Šego.

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