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Strict Positive Definiteness of a Product of Covariance Functions

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Edition/Format: Article : English

Publication: Communications in Statistics - Theory and Methods, v40 n24 (December 15 2011): 4400-4408

Peer-reviewed

Database: Taylor and Francis Journals

Other Databases: British Library Serials; Business Source Complete; Elsevier

Summary: Positive definiteness represents an admissibility condition for a function to be a covariance. Nevertheless, the more restricted condition of strict positive definiteness has received attention in literature, especially in spatial statistics, since it ensures that the kriging system has a unique solution. Most known covariance functions are isotropic but there are applications where isotropy is not appropriate,

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ISSN: 0361-0926

OCLC Number: 4839396257

DOI: 10.1080/03610926.2010.513790

Language Note: English

Awards:

Abstract:

Positive definiteness represents an admissibility condition for a function to be a covariance. Nevertheless, the more restricted condition of strict positive definiteness has received attention in literature, especially in spatial statistics, since it ensures that the kriging system has a unique solution. Most known covariance functions are isotropic but there are applications where isotropy is not appropriate, e.g., space-time covariance functions. One way to construct non-isotropic covariance functions is to use a product or a product-sum. In this article, it is given a necessary as well as a sufficient condition for a product of two covariance functions to be strictly positive definite. This result is extended to the well-known product-sum covariance model.

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