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Kalman filtering for spatio-temporal statistics

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Abstract

We propose a kalman filter algorithm to provide a formal statistical analysis of space-time data with an autoregressive structure. The kalman filter technique allows to capture the temporal dependence as well as the spatial correlation structure through state-space equations, and it is aimed to perform statistical inference in terms of both parameter estimation and prediction at unobserved locations. We present the kalman filter technique, and analyze it via a simulation study in comparison with the more classical geostatistical kriging prediction. We show that the kalman filter is superior in estimation and prediction of space-time data, providing an adequate formal procedure for the statistical analysis of space-time data. It is finally presented an application of prediction of daily air temperature data in some regions of southern Chile.

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