

國立高雄大學統計學研究所

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Spatial-Temporal Image Pattern Prediction using Multilinear  
Principal Component Analysis

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摘要

This study proposes a methodology to predict the spatial-temporal image pattern. The first step is to transform the observed sequence of images to a lower-dimensional space by the multilinear principal component analysis under a rolling window framework. This step aims to achieve a parsimonious usage of parameters and simultaneously preserve the data's vital information. The second step is to smooth the representative images at each timestamp in the reduced space and apply the fixed rank kriging (FRK) to modeling these images' spatial-temporal patterns. The one-step-ahead forecasting is obtained by performing the inverse transformation of the smoothing procedure with the FRK prediction. We apply the methodology to predict a flower's blooming pattern. The numerical results reveal that the proposed method is capable of capturing crucial features when predicting the image pattern.

關鍵詞：dimension reduction, fixed rank kriging, spatial-temporal image pattern.

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