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On Factorial HMMs for Time Series in Finance

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Abstract: In this article we propose a generalization of the linear factor model, that combines hidden Markov chain Models (HMM) with latent factor models. The HMM generates a piece-wise constant state evolution process and the observations are produced from the state vectors by a factor analysis observation process. This new switching specification provides an alternative, compact, model to handle intra-frame correlation in financial data. Furthermore, it allows variable dimension subspaces to be explored. For maximum likelihood estimation we have proposed an iterative approach based on the Expectation-Maximisation (EM) algorithm. Extensive Monte Carlo simulations and preliminary experiments obtained with a foreign exchange rate data set show promising results, especially for segmentation and tracking tasks.

Keywords: factor analysis; HMM; EM algorithm; finance

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