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Cross Correlation of Intra-day Stock Prices in Comparison to Random Matrix Theory

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Author(s)

Mieko Tanaka-Yamawaki

ABSTRACT

We propose and apply a new algorithm of principal component analysis which is suitable for a large sized, highly random time series data, such as a set of stock prices in a stock market. This algorithm utilizes the fact that the major part of the time series is random, and compare the eigenvalue spectrum of cross correlation matrix of a large set of random time series, to the spectrum derived by the random matrix theory (RMT) at the limit of large dimension (the number of independent time series) and long enough length of time series. We test this algorithm on the real tick data of American stocks at different years between 1994 and 2002 and show that the extracted principal components indeed reflects the change of leading stock sectors during this period.

KEYWORDS

Principal Component, Random Matrix Theory, Cross Correlation, Eigenvalues, Stock Market

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References

- [1] V. Plerou, P. Gopikrishnan, B. Rosenow, L. A. N. Amaral and H. E. Stanley, " Random Matrix Approach to Cross Correlation in Financial Data," *Physical Review E*, Vol. 65, 2002, pp. 066126. doi:10.1103/PhysRevE.65.066126
- [2] V. Plerou, P. Gopik-rishnan, B. Rosenow, L. A. N. Amaral and H. E. Stanley, " Universal and Nonuniversal Properties of Cross Correlations in Financial Time Series," *Physical Review Letters*, Vol. 83, 1999, pp. 1471-1474. doi:10.1103/PhysRevLett.83.1471
- [3] L. Laloux, P. Cizeaux, J. P. Bouchaud and M. Potters, " Noise Dressing of Financial Correlation Matrices," *Physical Review Letters*, Vol. 83, 1999, pp.1467-1470. doi:10.1103/PhysRevLett.83.1467
- [4] J. P. Bouchaud and M. Potters, " *Theory of Financial Risks*," Cambridge University Press, Cambridge, 2000.
- [5] R. N. Mantegna and H. E. Stanley, " *An Introduction to Econophysics: Correlations and Complexity in Finance*," Cambridge University Press, Cambridge, 2000.
- [6] M. L. Mehta, " *Random Matrices*," 3rd Edition, Academic Press, San Diego, 2004.
- [7] A. M. Sengupta and P. P. Mitra, " Distribution of Singular Values for Some Random Matrices," *Physical Review E*, Vol. 60, 1999, pp.3389-3392. doi:10.1103/PhysRevE.60.3389
- [8] M. Tanaka-Yamawaki, " Extracting Principal Components from Pseudo-Random Data by Using Random Matrix Theory" , KES2010, Cardiff, UK, 2010.
- [9] M. Tanaka-Yamawaki, " Applying Random Matrix Theory to Extract Principal Components of Intra-Day Stock Price Correlations" , Proceedings of the 4th International Conference on New Trends in Information Science and Service Science (NISS2010), Vol. 1, 2010, pp. 201-205.

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