

Invited talk 3.1

CORRELATION-BASED NETWORKS IN FINANCE

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Abstract

Some financial systems present a nested hierarchical structure, i.e. the elements of the system can be partitioned in clusters, which in turn can be partitioned in subclusters and so on up to a certain level. The correlation matrix of the time series of a multivariate financial system can be used to extract information about aspects of hierarchical organization of such a system. A clustering procedure is performed by using the correlation between pairs of elements as a similarity measure and by applying a clustering algorithm to the correlation matrix. As a result of the clustering procedure, a hierarchical tree of the elements of the system is obtained. The correlation based clustering procedure allows also associating a correlation-based network with the correlation matrix. For example, it is natural to select the minimum spanning tree, i.e. the shortest tree connecting all the elements in a graph, as the correlation based network associated with the single linkage cluster analysis. Different correlation based networks can be associated with the same hierarchical tree putting emphasis on different aspects of the sample correlation matrix. Examples of correlation-based networks different from the minimum spanning tree are the planar maximally filtered graph and the average linkage minimum spanning tree. As an application of the described techniques to real data we examine sets of equity return of highly capitalized stocks traded at major stock exchanges in the world.

Biography

Rosario Nunzio Mantegna is a Professor in Applied Physics at the University of Palermo. He coordinates the research group at the Observatory of Complex Systems (<http://lagash.dft.unipa.it>). He graduated in Physics and subsequently completed a PhD thesis at the University of Palermo. He then spent a year at the Max-Planck-Institut für Quantenoptik, München in Germany and a year at the Centre for Polymer Studies and Department of Physics at Boston University, USA. His current research interests include econophysics, comparative genomics and multivariate characterization of complex systems. Co-author of the book *An Introduction to Econophysics* (Cambridge University Press, 2000, co-authored with H. E. Stanley). He is Chairman of the PhD school in Applied Physics at Palermo University and Director of the Master course “Quantitative methods and operational strategies in the managing of financial risk” at Palermo University.