Covariance filtering using neural networks

The goal of this project is to use an AI based method to estimate the true covariance matrix of a d dimensional stochastic process. This task is often referred to as "covariance shrinkage" and a lot of literature has been written on this topic, whose mathematical foundations lie in random matrix theory (RMT). The problem is the following : having a set of d time series, and N observations, if the ratio T/d is not very large compared to 1, the classical covariance estimator does not perform well.

The goal here is to train a neural network (NN) to actually recover the true covariance from the empirical covariance.

(1) Generate a training set of correlation matrices

(2) Generate a training set of individual variances processes (Garch like)

(3) Simulate the multivariate process

(4) Compute the empirical correlation/covariance (might be good to first compute the individual variances to normalize and then compute the approximate correlation.)

(5) obtain a data set of pairs (p; e) where p (resp. e) is the vector of the population (resp. empirical) correlation matrix. (6) train a neural network on this data set

(7) use this to compute a global mean variance ptf on simulated / empirical data, and compare with other methods.

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Classification de Session: supprimé