

## High Dimensional Covariance Estimation With High Dimensional Data

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High-Dimensional Covariance Estimation focuses on the methodologies based on shrinkage, thresholding, and penalized likelihood with applications to Gaussian graphical models, prediction, and mean-variance portfolio management. The book relies heavily on regression-based ideas and interpretations to connect and unify many existing methods and algorithms for the task.

High-Dimensional Covariance Estimation | Wiley Series in ...

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High-Dimensional Covariance Estimation: With High ...

High-Dimensional Covariance Estimation: With High-Dimensional Data (Wiley Series in Probability and Statistics) eBook: Mohsen Pourahmadi: Amazon.co.uk: Kindle Store

High-Dimensional Covariance Estimation: With High ...

$X \in \mathbb{R}^p$ , estimate both its covariance matrix  $\Sigma$ , and its inverse covariance or concentration matrix  $\Sigma^{-1} := \Sigma^{-1}$ . Perhaps the most natural candidate for estimating  $\Sigma$  is the empirical sample covariance matrix, but this is known to behave poorly in high-dimensional settings.

High-dimensional covariance estimation by minimizing  $\ell_1$  ...

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High-dimensional covariance estimation by minimizing  $\ell_1$  ...

We estimate the sparse covariance using the adaptive thresholding technique as in Cai and Liu (2011), taking into account the fact that direct observations of the idiosyncratic components are unavailable. The impact of high dimensionality on the covariance matrix estimation based on the factor structure is then studied. PMID: PMC3363011 PMID:

HIGH DIMENSIONAL COVARIANCE MATRIX ESTIMATION IN ...

In this paper, we study the problem of high-dimensional covariance matrix estimation with missing observations. We propose a simple procedure computationally tractable in high-dimension and that does not require imputation of the missing data. We establish non-asymptotic sparsity oracle inequalities for the estimation of the covariance matrix involving the Frobenius and the spectral norms which are valid for any setting of the sample size, probability of a missing observation and the ...

Lounici : High-dimensional covariance matrix estimation ...

ESTIMATING HIGH DIMENSIONAL COVARIANCE MATRICES 203 a linear combination of  $\hat{S}$  and  $\hat{S}^2$ , where  $\hat{S}$  is defined earlier. This estimator  $\hat{S}$  shrinks Stoward the covariance matrix implied by the CAPM model.

Estimating High Dimensional Covariance Matrices and its ...

To achieve reliable estimation in the high-dimensional setting, an effective technique is to exploit the intrinsic structure of the covariance matrix, e.g., by sparsity regularization. For sparsity regularization, the lasso penalty is popular and convenient due to its convexity but has a bias problem. A nonconvex penalty can alleviate the bias problem, but the involved nonconvex problem under positive-definiteness constraint is generally difficult to solve.

Fast and Positive Definite Estimation of Large Covariance ...

The following proposition lays the foundations for the analysis of high-dimensional covariance or precision matrix estimation with infinite kurtosis. It extends Theorem 5 in Fan et al. (2017) and gives rates of convergence for Huber's estimator of  $\|E(X_u)\|$  assuming a bounded  $\|1 + \sqrt{\epsilon}\|$  moment for  $\| \sqrt{\epsilon} \in (0, 1] \|$ .

Robust estimation of high-dimensional covariance and ...

Our Monte Carlo simulations reveal that the SAF covariance estimator has superior properties in finite samples for low and high dimensions and different designs of the covariance matrix. Moreover, in an out-of-sample portfolio forecasting application the estimator uniformly outperforms alternative

### Sparse Approximate Factor Estimation for High-Dimensional ...

It is well-known that the sample covariance matrix performs poorly in high dimensions. In the last decades, a fast growing literature on estimation of high-dimensional covariance matrix arises under structural assumptions or equivalent sparsity. A common sparsity assumption in the literature is that all rows/columns of the

### Robust Covariance Estimation for High-dimensional ...

It is well-known in the high dimensional setting when the dimension is comparable with or much larger than the sample size, a direct application of the sample covariance matrix for hypothesis...

### High-Dimensional Covariance Estimation - ResearchGate

Given i.i.d. observations of a random vector  $X \in \mathbb{R}^p$ , we study the problem of estimating both its covariance matrix  $\Sigma^*$ , and its inverse covariance or concentration matrix  $\Sigma^{*-1}$ . When  $X$  is multivariate Gaussian, the non-zero structure of  $\Sigma^*$  is specified by the graph of an associated Gaussian Markov random field; and a popular estimator for such sparse  $\Sigma^*$  is the  $\ell_1$  ...

### Ravikumar , Wainwright , Raskutti , Yu : High-dimensional ...

Introduction Covariance matrix estimation is an important component of many statistical methods and applications. For example, we apply spectral decomposition to the covariance matrix for dimension reduction methods such as principal component analysis (PCA) and common component analysis (CCA).

### High dimensional covariance matrix estimation by ...

In this paper, we give a selective review of covariance and precision matrix estimation when the matrix dimension can be diverging with, or even larger than the sample size. Two broad categories of regularization methods are presented. The first category exploits an assumed structure of the covariance or precision matrix for consistent estimation.

### High-dimensional covariance matrix estimation - Lam - 2020 ...

Using a matrix regression model as in Bigot et al. (2010), we propose a new methodology for high-dimensional covariance matrix estimation based on empirical contrast regularization by a group Lasso penalty. Using such a penalty, the method selects a sparse set of basis functions in the dictionary used to approximate the process  $X$ .

### Group Lasso Estimation of High-dimensional Covariance Matrices

If  $n > p$ , the log-likelihood achieves its maximum for  $\hat{\Sigma} = S^{-1}$ . In the high-dimensional setting where  $p > n$ , the sample covariance matrix is singular and its inverse is undefined. Consequently, so is  $\hat{\Sigma}$ . A common workaround is the addition of a penalty to the log-likelihood (1).

### Ridge estimation of inverse covariance matrices from high ...

Estimation of large covariance matrices, particularly in situations where the data dimension  $p$  is comparable to or larger than the sample size  $n$ , has attracted a lot of attention recently. The abundance of high-dimensional data is one reason for the interest in the problem: gene arrays, fMRI, various kinds of spectroscopy, climate

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