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PhD Dissertation Proposal Presentation

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**Estimation of Covariance Matrix
via the Sparse Cholesky Factor with Lasso**

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ABSTRACT

In this talk, we discuss a parsimonious approach to the estimation of high-dimensional covariance matrices via the modified Cholesky decomposition with lasso. Two different methods (equi-angular and equi-sparse) are proposed. We use simulation to compare the performance of the proposed methods with others available in the literature, including the sample covariance matrix, the banding method, and the L1-penalized normal loglikelihood method. We then apply the proposed methods to a portfolio selection problem using 80 series of daily stock returns. On the other hand, to facilitate the use of lasso in high-dimensional time series analysis, we develop the dynamic weighted lasso (DWL) algorithm that extends the LARS-lasso algorithm. In particular, the proposed algorithm can easily change the penalty weights and therefore efficiently update the lasso solution as new data become available. It can also add or remove explanatory variables simply.