Midterm Presentation:

Risk Properties in Bandable Precision Matrix Estimation

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Statistics 490
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Outline

1. Refresher on Graphical Models & Multivariate Gaussian
2. Pairwise Inference for Entrywise Recovery of Σ^{-1}
3. Risk Bounds for Entrywise Recovery in $\|\cdot\|_\infty$
4. Next Steps

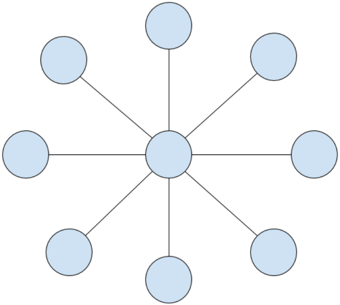
Refresher

Graphical Models

Markov Random Fields

Example: Hub and Spoke Model

$$
\begin{bmatrix}
1 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 1 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 1 & 0 & 0 & 0 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 \\
0 & 0 & 0 & 1 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 1
\end{bmatrix}
$$



Multivariate Gaussian

Precision Matrix Estimation

Maximum Likelihood Estimation

Maximum Likelihood Estimation: Issues

- Invertibility & Conditioning
- Noise & Sparsity

Graphical Lasso

Asymptotic Normal Thresholding (ANT)

Risk Bounds in $\|\cdot\|_\infty$

Risk Upper Bound

Theorem. *Lorem ipsum.*

Oracle Inequalities

Coupling Argument

Risk Lower Bound

Le Cam's Two-Point Argument

Next Steps