

Provable Subspace Clustering: When LRR meets SSC

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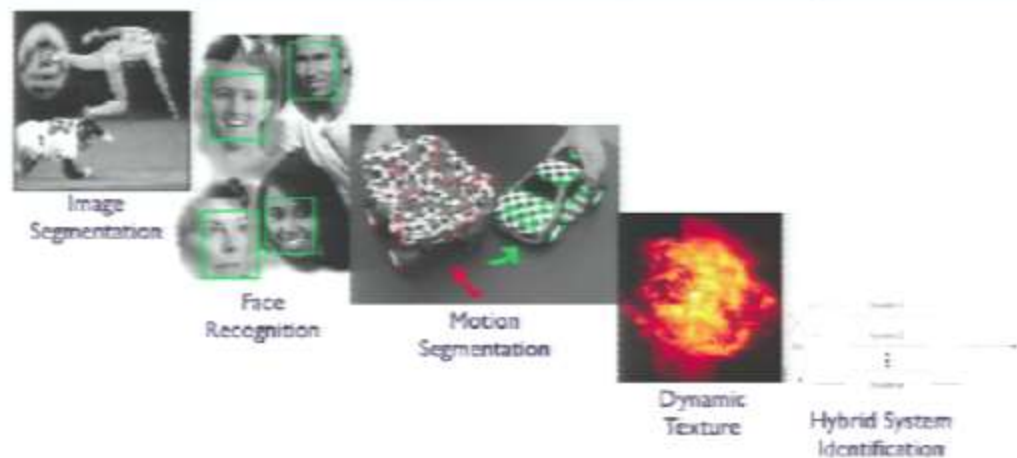
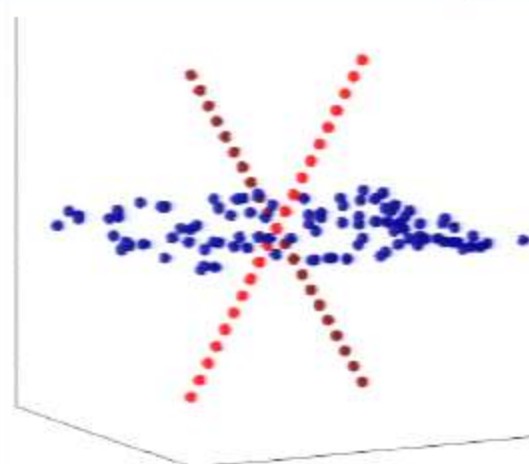
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Poster # **Fri23**.

What's the problem?

Union of Subspace Model

High dimensional data points lie in a union of low-rank subspaces.



Subspace Clustering

- **Clustering** of the data points (unsupervisedly) by their subspace.
- Alternate views: Dimension reduction, generalized PCA.
- Key: construct an **adjacency graph**, then apply **spectral clustering**.
- Analysis: Prove the graph has K -connected components.

Low-Rank Sparse Subspace Clustering

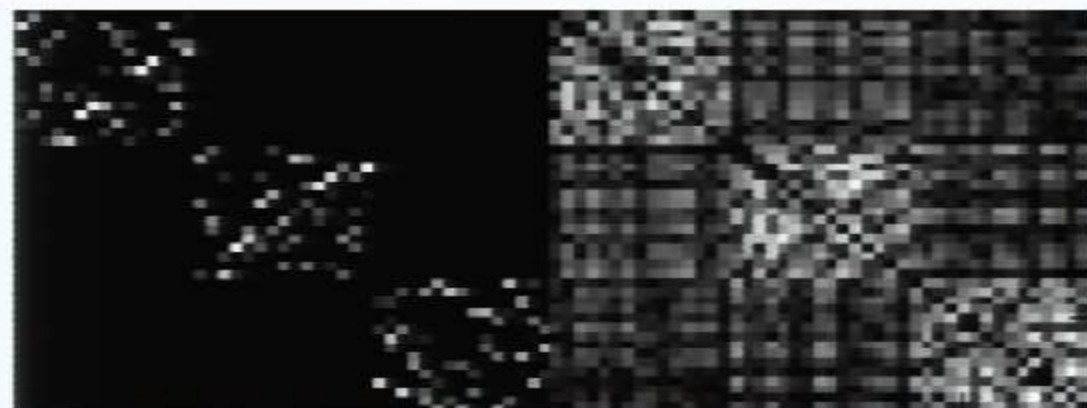
Methods

Construct block diagonal graph via $A = |C| + |C^T|$

SSC/LRR: minimize $\|C\|_1$ or $\|C\|_*$, subject to: $X = XC$, $\text{diag}(C) = 0$.

LRSSC: minimize $\|C\|_* + \lambda\|C\|_1$ subject to: $X = XC$, $\text{diag}(C) = 0$.

Connectivity and Separation: A tradeoff

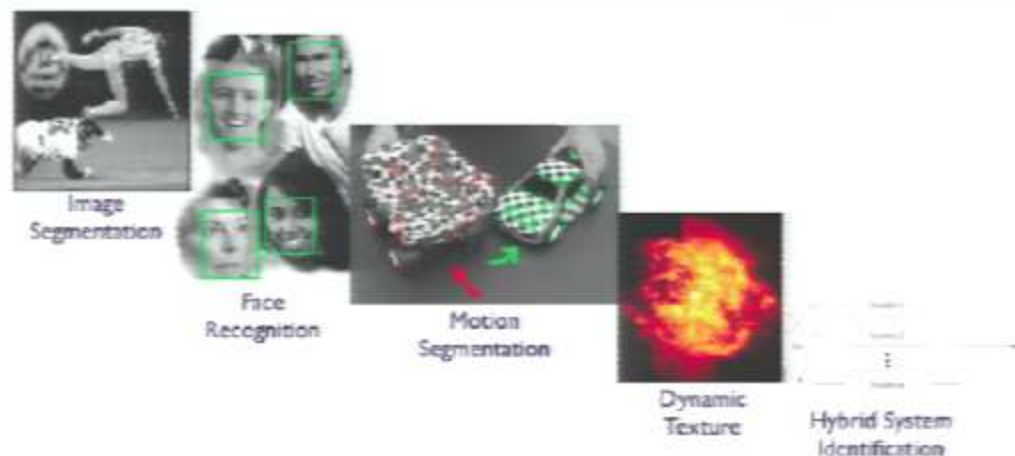
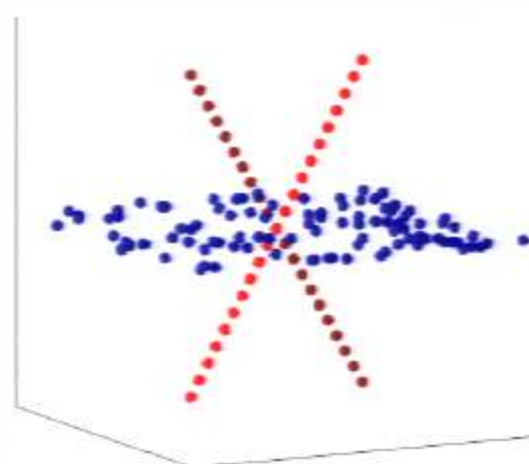


Somewhere in between?

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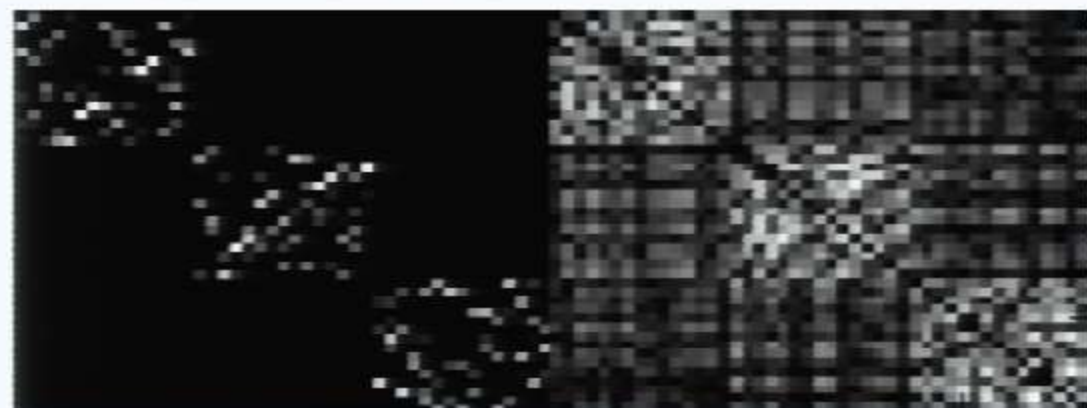
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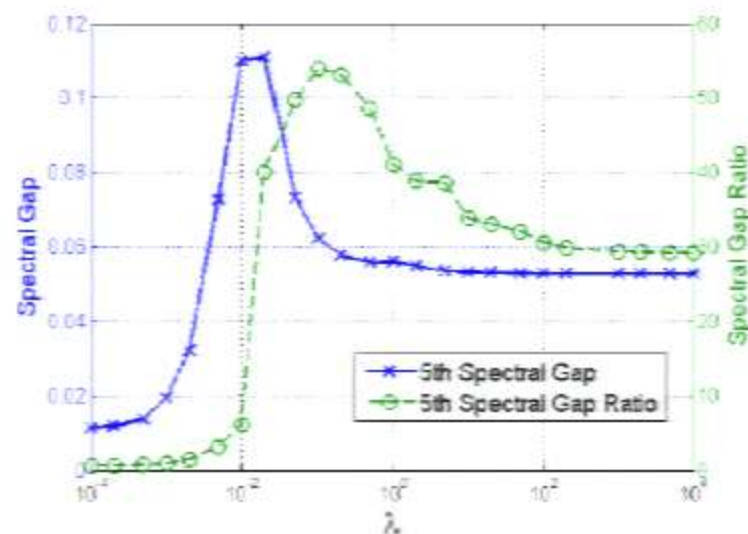
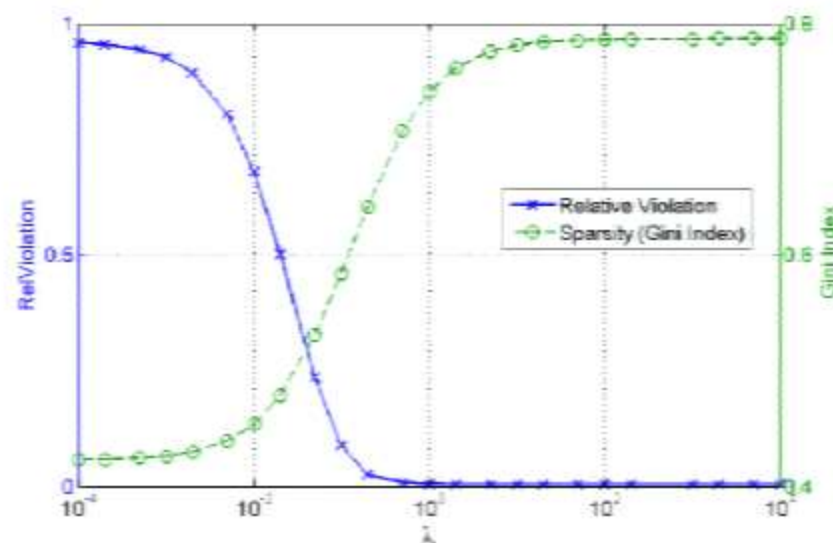


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Theoretical guarantee and Experiments

Highlight of results

- 1 LRSSC with λ is guaranteed to ensure **separation** (Theorem 1&2)
 - For both deterministic and randomized data.
 - Trade off separation margin with connectivity by using a smaller λ .
 - Matching and (slightly) advancing the strongest guarantee for SSC.
 - A computationally tractable condition via singular value.
- 2 LRR for guaranteed to ensure **dense connectivity**. (Proposition 1)



More results! Please visit us at **Poster Fri23!** Thanks!