Graphs in Machine Learning
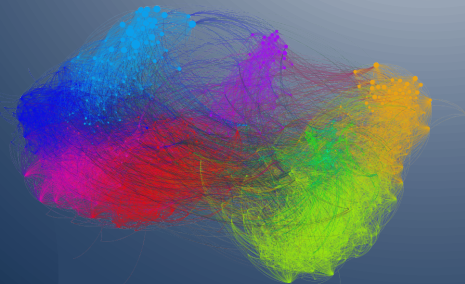
Spectral Clustering: Examples
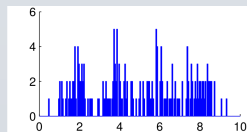
Understanding and Applications
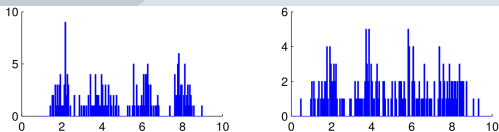
Michal Valko

Inria & ENS Paris-Saclay, MVA

Partially based on material by: Ulrike von Luxburg,
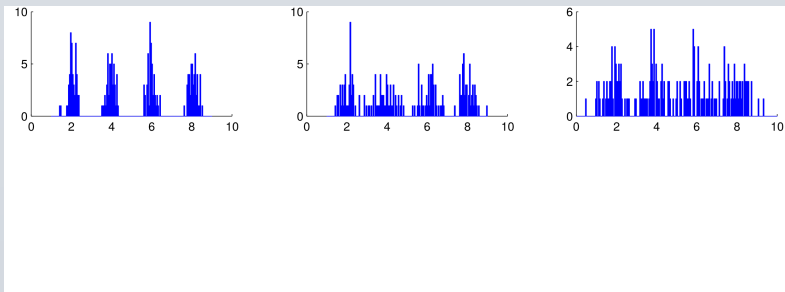Gary Miller, Doyle & Schnell, Daniel Spielman
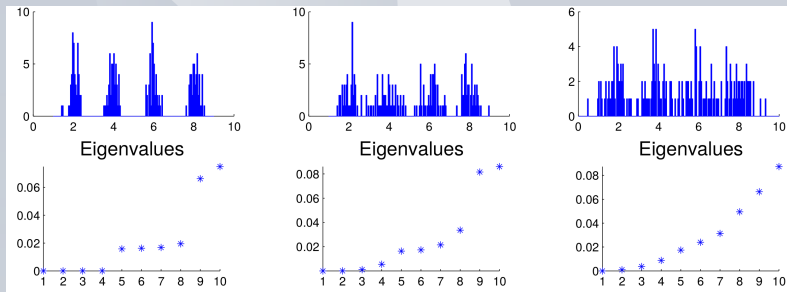
Spectral Clustering: 1D Example

Spectral Clustering: 1D Example
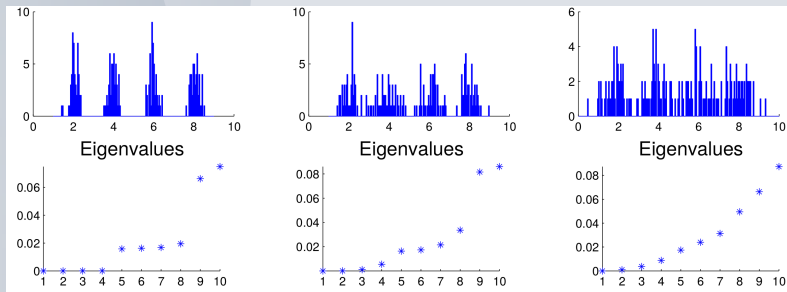
Spectral Clustering: 1D Example

Spectral Clustering: 1D Example

Spectral Clustering: 1D Example

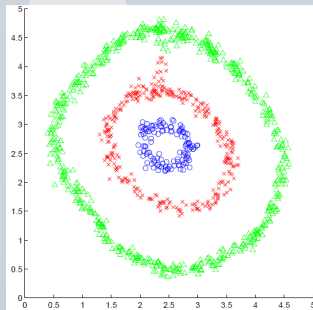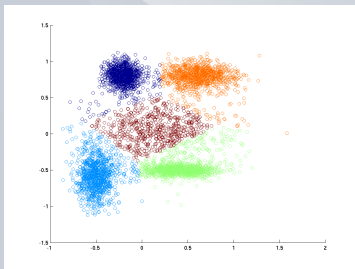**Elbow rule/EigenGap heuristic** for number of clusters

Spectral Clustering: Understanding
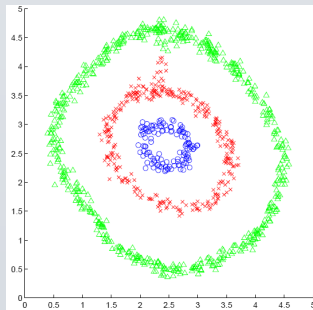
Compactness vs. **Connectivity**
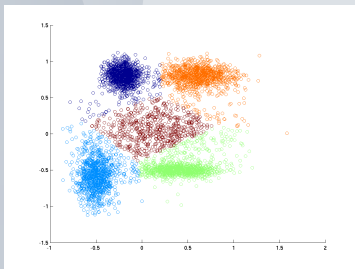
Spectral Clustering: Understanding

Compactness vs. **Connectivity**
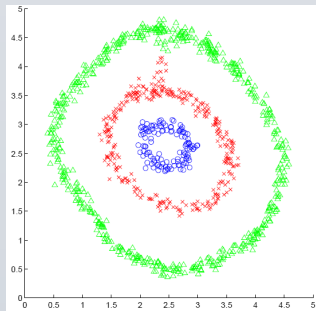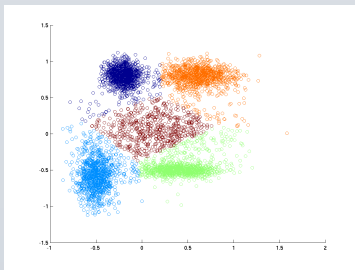
Spectral Clustering: Understanding

Compactness vs. **Connectivity**

For which kind of data we can use one vs. the other?
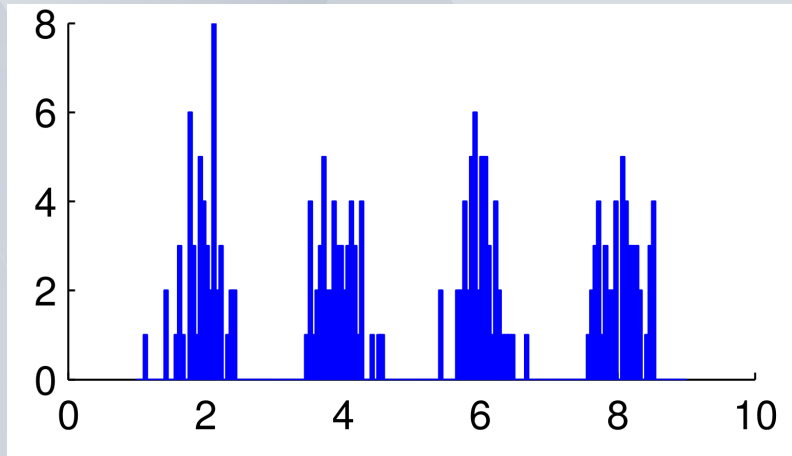
Spectral Clustering: Understanding

Compactness vs. **Connectivity**

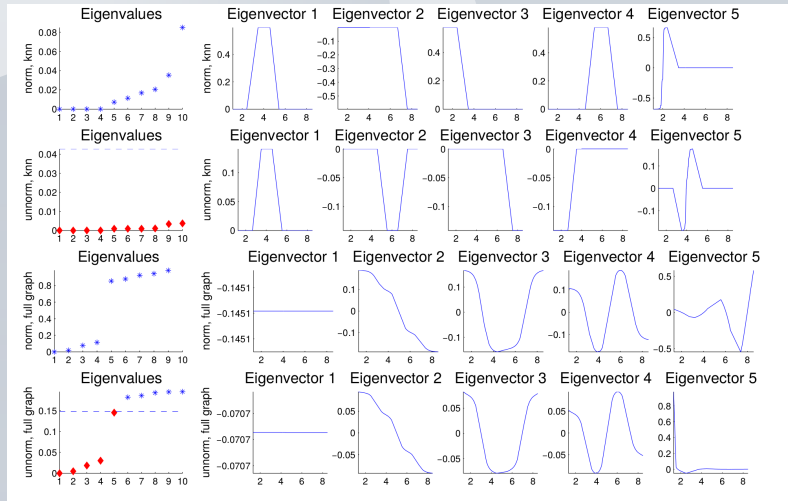For which kind of data we can use one vs. the other?

Any disadvantages of spectral clustering?

Spectral Clustering: 1D Example - Histogram

http://www.informatik.uni-hamburg.de/ML/contents/people/luxburg/
publications/Luxburg07_tutorial.pdf

Spectral Clustering: 1D Example - Eigenvectors

Spectral Clustering: Bibliography

- **meila2001random**
- $\mathbf{L}_{\mathrm{sym}}$ **ng2001spectral**
- $\mathbf{L}_{\mathrm{rm}}$ **shi2000normalized**
- Things can go wrong with the relaxation:
  spielman2007spectral

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https://misovalko.github.io/mva-ml-graphs