

# **Manifold learning methods**



Comparison of Manifold Learning methods, http://scikitlearn.org/stable/auto\_examples/manifold/plot\_compare\_methods.html#sphx-glr-auto-examples-manifold-plot-compare-methods-py

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### **Example: tSNE on MNIST**



#### **Interpretation of tSNE**



## **MNIST: different perplexities**



#### **Interactive Example**

# How to Use t-SNE Effectively

Although extremely useful for visualizing high-dimensional data, t-SNE plots can sometimes be mysterious or misleading. By exploring how it behaves in simple cases, we can learn to use it more effectively.



Martin Wattenberg, https://distill.pub/2016/misread-tsne/

### **Practical Notes**

- Result heavily depends on hyperparameters (perplexity)
  - Good practice is to use several projections with different perplexities (5-100)
- Due to stochastic nature, tSNE provides different projections even for the same data\hyperparams
  - Train and test should be projected together
- tSNE runs for a long time with a big number of features
  - it is common to do dimensionality reduction before projection.

### **Practical Notes**

- Implementation of tSNE can be found in sklearn library.
- But personally I prefer you use stand-alone implementation python package tsne due to its' faster speed.

## Conclusion

- tSNE is a great tool for visualization
- It can be used as feature as well
- Be careful with interpretation of results
- Try different perplexities