Manifold Learning

Nonlinear dimensionality reduction.

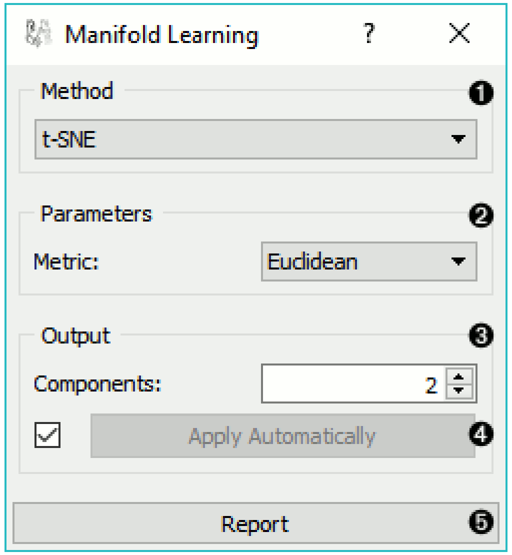
Inputs

- Data: input dataset

Outputs

- Transformed Data: dataset with reduced coordinates

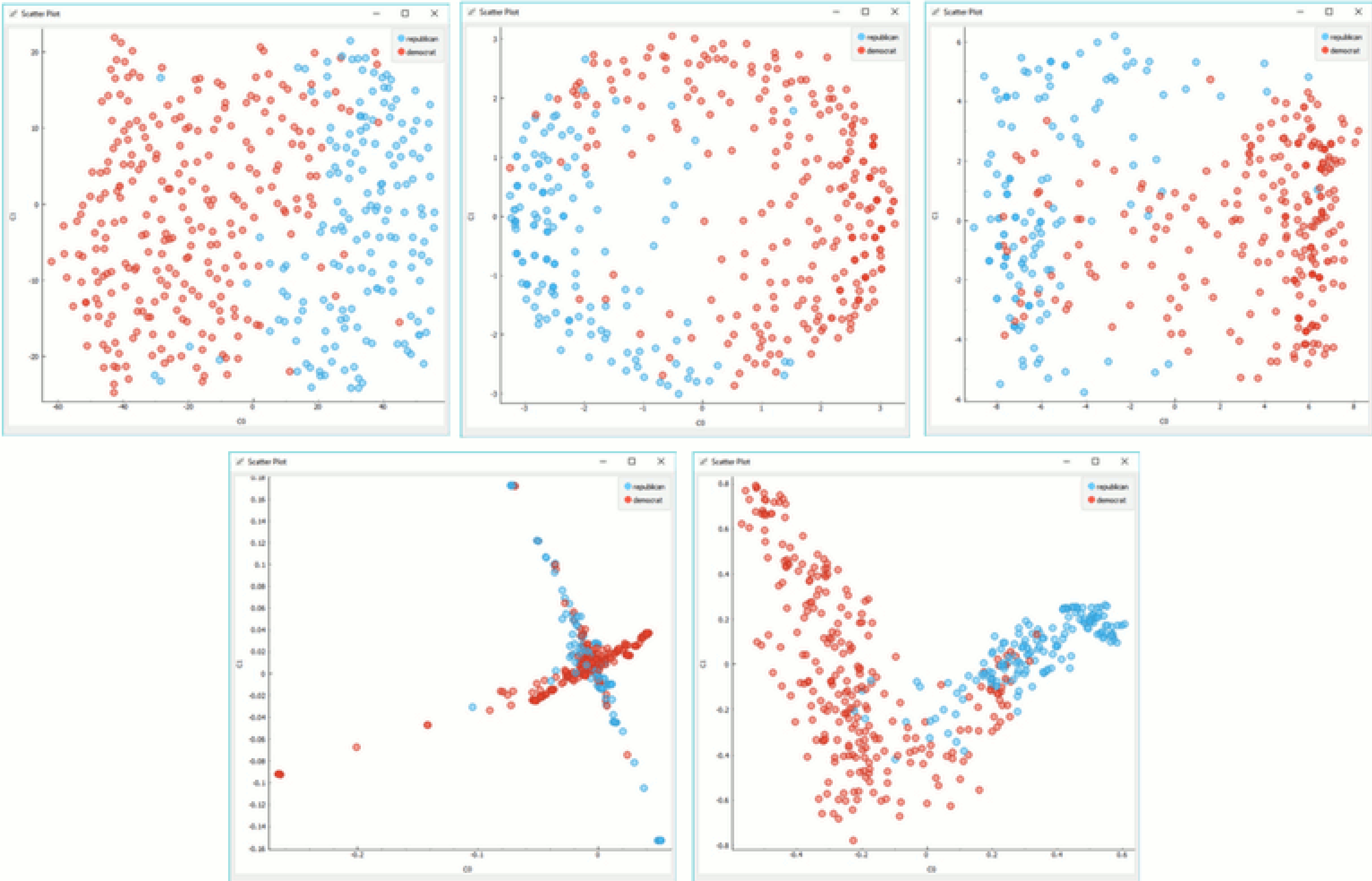
Manifold Learning is a technique which finds a non-linear manifold within the higher-dimensional space. The widget then outputs new coordinates which correspond to a two-dimensional space. Such data can be later visualized with Scatter Plot or other visualization widgets.



1. Method for manifold learning:
    - t-SNE
    - MDS, see also MDS widget
    - Isomap
    - Locally Linear Embedding
    - Spectral Embedding
2. Set parameters for the method:
    - t-SNE (distance measures):
        - *Euclidean* distance
        - *Manhattan*

        - *Chebyshev*
        - *Jaccard*
        - *Mahalanobis*
        - *Cosine*
    - MDS (iterations and initialization):
        - *max iterations*: maximum number of optimization interactions
        - *initialization*: method for initialization of the algorithm (PCA or random)
    - Isomap:
        - number of *neighbors*
    - Locally Linear Embedding:
        - *method*:
            - standard
            - modified
            - hessian eigenmap
            - local
        - number of *neighbors*
        - *max iterations*
    - Spectral Embedding:
        - *affinity*:
            - nearest neighbors
            - RFB kernel
3. Output: the number of reduced features (components).
4. If *Apply automatically* is ticked, changes will be propagated automatically. Alternatively, click *Apply*.
5. Produce a report.

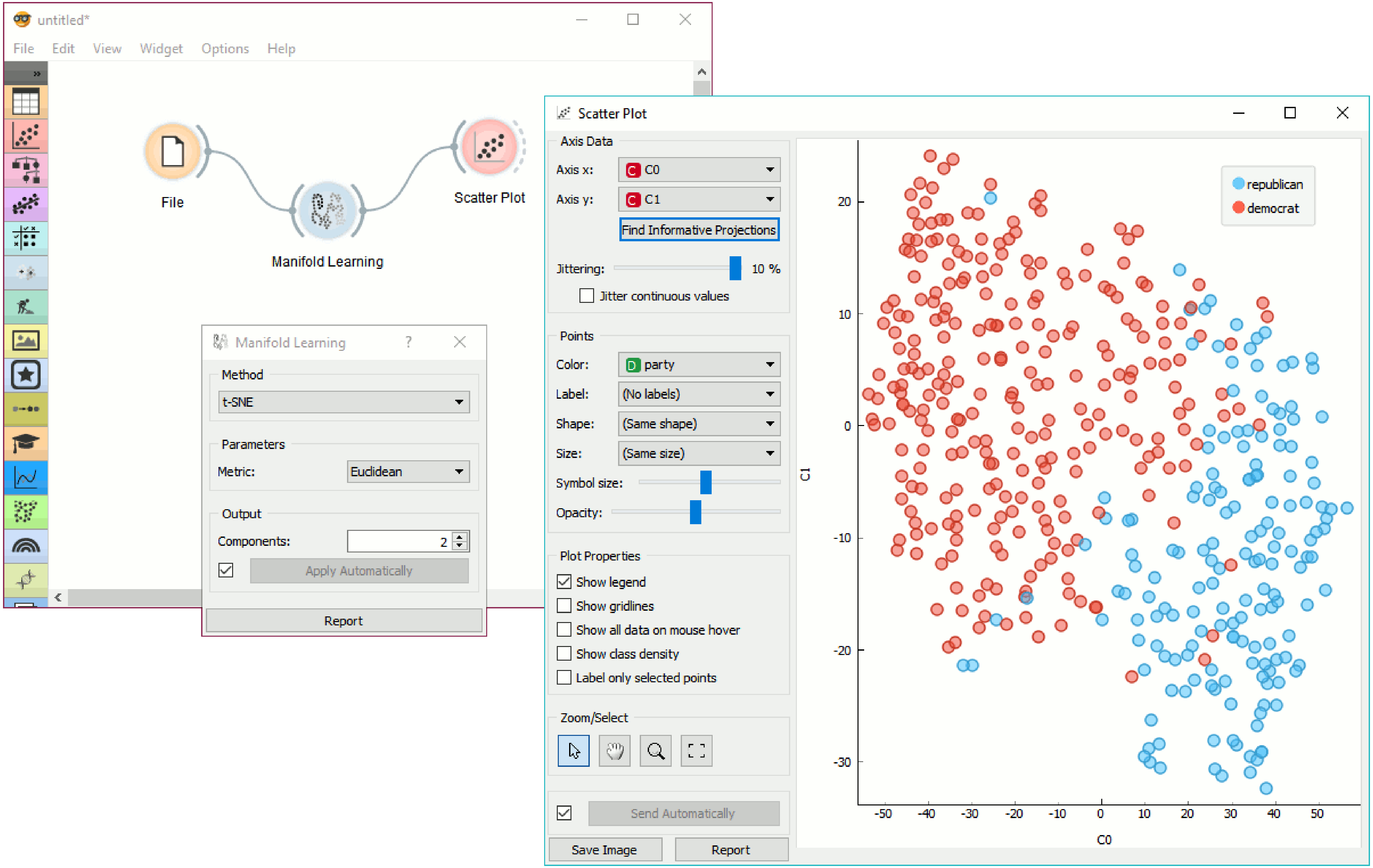
Manifold Learning widget produces different embeddings for high-dimensional data.



From left to right, top to bottom: t-SNE, MDS, Isomap, Locally Linear Embedding and Spectral Embedding.

Example

Manifold Learning widget transforms high-dimensional data into a lower dimensional approximation. This makes it great for visualizing datasets with many features. We used *voting.tab* to map 16-dimensional data onto a 2D graph. Then we used Scatter Plot to plot the embeddings.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File
Edit
View
Widget
Options
Help
File
Manifold Learning
Scatter Plot
Manifold Learning
Method
t-SNE
Parameters
Metric: Euclidean
Output
Components: 2
Apply Automatically
Report
Scatter Plot
Axis Data
Axis x: C0
Axis y: C1
Find Informative Projections
Jittering: 10 %
Jitter continuous values
Points
Color: party
Label: (No labels)
Shape: (Same shape)
Size: (Same size)
Symbol size:
Opacity:
Plot Properties
Show legend
Show gridlines
Show all data on mouse hover
Show class density
Label only selected points
Zoom/Select
Send Automatically
Save Image
Report
republican
democrat
C1
C0