Problem 2 (10 pts.)

Image data of handwritten numbers called MNIST is stored in dm-end1-2.csv. The image has 28x28 pixels and each pixel (pixel1 to pixel784 columns) is It is a gray scale with 256 levels. The labels (label column) from 0 to 9 represent the types of the handwritten numbers.

Follow the procedure below to reduce this data to 2 dimensions and visualize it, and submit the ipynb and html files including the figure. If the html file does not include the answer figure, it is considered incorrect. Use dm-end1-2.ipynb if necessary.

1. Use pixel1 to pixel784 columns as data, and standardize them to average 0 and variance 1 for each column.
2. Visualize the processed data in 2D using Isomap. Here, set n_neighbors=30 and n_components=2. Use the label column for the data marker, and let the markers have different colors for different types of markers.
3. Visualize the processed data in 2D using t-SNE. Here, set n_components=2, perplexity=30, n_iter=1000, and random_state=9. Use the label column for the data marker, and let the markers have different colors for different types of markers.

upload ipynb file:

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upload html file:

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