3. Programming Tasks

3.1 Visualizing Features

As you have seen in the lecture, there are several ways to visualize the features extracted by a neural network. Here, we will focus on two dimensionality reduction techniques for visualizing high-dimensional vectors: PCA and t-SNE.

- (1) Train CNN_basic on MNIST with learning rate 1e-6 (very small) and for one epoch only.

- (2) Extract the features from that model (see the tutorial about extracting features))

- (3) Visualize the features both with PCA and t-SNE (see the tutorial about visualizing features)

- (4) Train CNN_Basic on MNIST for 10 epochs. Report the test test accuracy.

- (5) Repeat steps 2 and 3 for this model too.

- (6) Report the 4 images and BRIEFLY comment on the differences (a) between PCA and t-SNE and (b) the first model (virtually not trained at all) and the second one.

Resources

- https://www.youtube.com/watch?v=SBYdqlLgbGk
- http://homepage.tudelft.nl/19j49/tsnejs/
- http://scikit-learn.org/stable/modules/generated/sklearn.manifold.TSNE.html

3.2 Overleaf Setup

Each component of the group should make an account in Overleaf. Send me (Michele) an email (one per group) with the email you use to register for it, such that I can invite you in the shared project for your group.