

We load the data, standardize the data, and then convert the pandas dataframes into PyTorch tensors because we work with the Torch package.

For the first task, we design a fully connected neural network with three hidden layers. It gives an accuracy of 89.35% on Fashion Dataset and 83.25% on Sign Dataset

For the second task, we design a convolutional neural network with three convolution layers and then 2 hidden layers. It gives an accuracy of 89.85% on Fashion Dataset and 92.93% on Sign Dataset. So, there is not much difference for the Fashion Dataset but the Convolutional neural network performs much better for Sign Dataset.

For the third task, we randomly permute the images and feed them to the same two models above and see if it affects the performance.

For the fully connected neural network, the accuracies are 88.97% (Fashion) and 84.27% (Sign), so there is a very slight difference in performance.

However, for the Convolutional neural network, the accuracies drop down to 87.29% (Fashion) and 65.13% (Sign). So, there is a noticeable change in performance especially for the Sign Dataset and we can say that Convolutional networks use visual information for classification.

Here is a table depicting the performance of all our models:

	Fashion Dataset	Sign Language Dataset
DNN	89.35%	83.25%
CNN	89.85%	92.93%
DNN with perturbation	88.97%	84.27%
CNN with perturbation	87.29%	65.13%