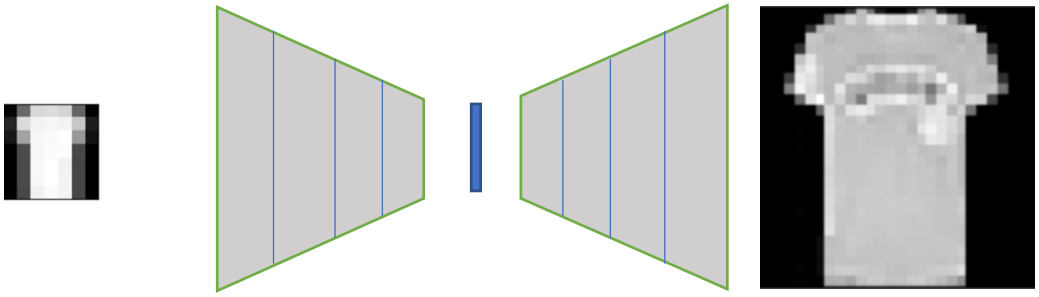
CS454-554 Homework 4: Convolutional Autoencoders
Fall 2022/2023

In this homework, you will implement a Convolutional Autoencoder to increase the resolution of FashionMNIST images from 7x7 to 28x28. An example input and its expected output is shown below:



Use *torchvision.transforms.Resize* function to generate the 7x7 version of an image, which will be the input to the network. The 28x28 image itself will be the corresponding desired output.

Your task is to try out and report 3 different network architectures to solve this task. You can experiment with different number of layers, layer sizes, and connectivity structures. Your task is not to find the best architecture but to try out the effect of different architectures on (i) the number of parameters, and, (ii) the reconstruction MSE at the output. Note that because the input and output images are not of the same size, encoder and decoder parts need not be symmetric.

Your output and report should contain:

a) A description of your architectures,
b) A table reporting the parameter count of your architectures, alongside with their corresponding final train and final test MSE.
c) A plot of epochs vs Train/Test MSE for each architecture during training.
d) Once training is completed, for each architecture, for each class, select 1 sample image from the test set and show its 3 versions: 7x7 input, 28x28 predicted output, 28x28 desired output.

You must use Python and the PyTorch library. You are welcome to modify the autoencoder template provided in the tutorial code file entitled: **autoencoder_example.py**

This homework is due **Jan 4th, 2024 (Thursday), 23:00**.

Your submission should include a short report of your findings and your source code. Upload your report **as a pdf file** to LMS alongside your .py code file.