Project **2**

November 11, 2019

1. Dataset: Fashion-MNIST dataset from `https://github.com/zalandoresearch/fashion-mnist`. The dataset description is also there.

   Basically it has a training set with 60000 28×28 grayscale images of 10 classes. The testing set has 10000 images with the same size.

2. Methods:

   (a) SVM

   Implement linear and kernel SVMs on Fashion-MNIST dataset. You can use online toolbox like LIBSVM or SVM functions provided in MATLAB or Python.

      i. PCA and LDA can be used here for dimension reduction.

      ii. Try different kernels (linear, polynomial, RBF).

   (b) Deep Learning

   Build a Convolutional Neural Network, train it on Fashion-MNIST training set and test it on Fashion-MNIST testing set.

   You can use any existing architectures like LeNet[1], VGGNet[2], ResNet[3], or come up with your own architecture.

   There are several tools you can use:

      i. Caffe `http://caffe.berkeleyvision.org/`

      ii. TensorFlow `https://www.tensorflow.org/`

      iii. PyTorch `http://pytorch.org/`

      iv. MatConvNet `http://www.vlfeat.org/matconvnet/`

3. Submission: Implement both SVM and deep learning method on Fashion-MNIST dataset, submit a report online in ELMS, detailing the methods employed, experiments performed and results. Besides your report, submit a zip file containing the codes. The project should be done INDIVIDUALLY. Due on **December 11th, 5:00** pm.

References

[1] Yann LeCun, Leon Bottou, Yoshua Bengio, and Patrick Haffner *Gradient-based learning applied to document recognition*, Proceedings of the IEEE, 1998, pp 2278-2324.

[2] Karen Simonyan, and Andrew Zisserman, *Very Deep Convolutional Networks for Large-Scale Image Recognition*, International Conference on Learning Representations, 2015.

[3] Kaiming He, Xiangyu Zhang, Shaoqing Ren, and Jian Sun, *Deep Residual Learning for Image Recognition*, IEEE Conference on Computer Vision and Pattern Recognition, 2016