ENEE731/CMSC828G Project 1

1. Dataset: CIFAR-10 dataset from `https://www.cs.toronto.edu/~kriz/cifar.html`. The dataset description is also there. Please cite the dataset as [1].

   The CIFAR-10 dataset consists of 60000 32×32 colour images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images. The dataset is divided into five training batches and one test batch, each with 10000 images. The test batch contains exactly 1000 randomly-selected images from each class. The training batches contain the remaining images in random order, but some training batches may contain more images from one class than another. However, the training batches in total contain exactly 5000 images from each class.

2. Methods:

   (a) Deep Learning

   Try to build a Convolutional Neural Network, train it on CIFAR-10 training set and test it on CIFAR-10 testing set.

   You can use any architectures learned in class or come up with your own architecture.

   There're (at least) three toolboxes you can use:

   i. Caffe Toolbox

   If you're a LINUX or OS X user, you can try it. It's powerful and fast. You can find it in `http://caffe.berkeleyvision.org/`. Follow their instruction to install it on your machine.

   ii. LightNet Toolbox

   LightNet is "A Versatile, Standalone Matlab-based Environment for Deep Learning". If you're a Windows user, perhaps it is your choice. You can find it in `https://github.com/yechengxi/LightNet`. For more details, please read their paper `https://arxiv.org/pdf/1605.02766v3.pdf`.

   iii. Deep Learning Toolbox

   It is another pure MATLAB toolbox. You can find it in `http://www.mathworks.com/matlabcentral/fileexchange/38310-deep-learning-toolbox`. The original version may not be enough to build your CNN, so we add some features to it (please check `DeepLearningToolboxSupplementary.zip`).

   (b) Local Binary Patterns (LBP)[2]

   Try to use LBP features on this dataset (learn SVM classifiers based on LBP features for example) and compare the result with deep learning methods. For SVM, you can use online toolbox like LIBSVM or the SVM functions available in MATLAB.

3. Submission: Please try deep learning method on CIFAR-10 dataset, submit a report detailing the methods employed, experiments performed and results. The project should be done INDIVIDUALLY.

References

[1] Krizhevsky, Alex and Hinton, Geoffrey *Learning multiple layers of features from tiny images*, Citeseer, 2009

[2] Ojala, Timo and Pietikäinen, Matti and Mäenpää, Topi. Multiresolution Gray-Scale and Rotation Invariant Texture Classification with Local Binary Patterns. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Volume 24 Issue 7, July 2002, Page 971-987