

Assignment-AVR

Kumar Shubham
MS2018008

Q2.

For given problem I have chosen 10 class from caltech 101 dataset.[1]. namely

- Airplanes
- Chair
- Crocodile
- Cup
- Elephant
- Headphone
- Helicopter
- Lotus
- Motorbikes
- Watch

A training dataset consisting of 40 example per category and a testing dataset of 20 example per category was created from the given dataset.

Accuracy :

Alexnet Based :

- **Description**

For given experiment caffe model was taken from caffe repo [2] and converted into tensorflow using caffe2tensorflow model[3]. Code from Michael Guerzhoy repository [4] was used for reference.

- **CodeBase**

AlexNetFeatureExtMain.py contain main file for execution and it inherit from **AlexNetModel.py** where Net structure and other relevant information are defined.

TrainAlexNetFeatureVector() : This method is for training a SVM over the features extracted from **FC7** layer of Alexnet.

TestAlexNetFeatureVector() : This method is for testing model over the extracted feature vector of the testing dataset.

- **Accuracy**

Alexnet FeatureExt + SVM classifier - **58.082 %**

Bag of Words + SVM classifier based

- **Description**

In this part of the experiment a SVM model was trained over histogram of feature vector extracted from the K - nearest neighbour clustering algorithm over 200 cluster.

- **CodeBase**

Main code for given experiment resides in **BagOfWordMain.py** It has following method defined within the experiment.

HistogramTrainingfn() : Train a K nearest neighbour model for given experiment with 200 cluster point.

trainingClassifier() : Train a SVM which classify given data based on the features Histogram of training data.

testingClassifier(): Test the trained SVM over the input Test dataset

- **Accuracy**

BOW + SVM classifier - **41.52%**

Conclusion :

AlexNet based feature vector outperform bagofWord by 17% and is better choice.

Q1.

For Given experiment, a class **ConvNetStructure** is created in **cifarConvNet.py** file were all the training and testing for CIFAR dataset happens.

Given class inherits from **Cifar10Loader** in **cifarData.py** file were all methods and process for loading the dataset are defined.

For, experimentation an I-7 processor with GTX1050Ti GPU and 8GB RAM is used.

For given experiment, we gave used **data_batch_1** of CIFAR data for training and **test_batch** of CIFAR dataset[5]. For testing.

Network Architecture :-

Conv1 : filter size [5,5,32]

Pool1 : filter size [2,2]

Conv2 : filter size [2,2,16]

Pool2 : filter size [2,2]

Fc1 : 1024

Fc2 : 512

Fc3 : 10

If not specified, learning rate is taken fixed with 0.01 and no batch . Full code run for 20 epochs.
Of batch size 16

Testing accuracy/ raining time	Relu	Sigmoid	tanh	With batch normalizati on + Relu	With batch normalizati on + Sigmoid	With batch normalizati on + tanh
Momentum optimizer	48% 173 sec	10% 178 sec	57.16% 180 sec	54.69% 124 sec	60.85% 122sec	47.2% 127 sec
Gradient descent	53.12% 167 sec	10.30% 172 sec	57.04% 171 sec	58.20 % 119 sec	54.66 % 124 sec	58.44 % 123 sec
With adaptive learning rate/3000 step	52.50% 172 sec	10.01% 181 sec	57.69% 178 sec	52.82 % 124 sec	61.40 % 127 sec	47.26 % 126 sec

Conclusion :

My preferred parameter will be sigmoid with batch normalization and adaptive learning rate for given neural network.

References:-

- [1] http://www.vision.caltech.edu/Image_Datasets/Caltech101/
- [2] https://github.com/BVLC/caffe/tree/master/models/bvlc_alexnet
- [3] <https://github.com/ethereon/caffe-tensorflow>
- [4] http://www.cs.toronto.edu/~guerzhoy/tf_alexnet/
- [5] <https://www.cs.toronto.edu/~kriz/cifar.html>