Graded Assignment 4 : CNNs

Re-submit Assignment

Due Wednesday by 11:59pm **Points** 20 **Submitting** a website url
Available Apr 1 at 12am - May 20 at 11:59pm about 2 months

Please submit github directory with colabs for below tasks - extra points for clean colab with good documentation.:

a) CNN basics : use KERAS and from scratch (not using existing architecture shipped models) write basic LeNet (mnist) and VGG-16 model (cifar100) and RESNET (only 8 layers - not 52) architectures - run on gpu - train and report all the stats (see some pointers in slides)

b) CNN basics : use pytorch and from scratch (not using existing architecture shipped models) write basic LeNet (mnist) and VGG-16 model (cifar100) and and RESNET (only 8 layers - not 52) architectures - run on gpu (use .cuda instruction) - train and report all the stats

c) transfer learning with CNN (either keras or fastai or pytorch - use your favorite) : Kaggle competion : **https://www.kaggle.com/c/dog-breed-identification/overview (https://www.kaggle.com/c/dog-breed-identification/overview)**

https://medium.com/nanonets/how-to-easily-build-a-dog-breed-image-classification-model-2fd214419cde (https://medium.com/nanonets/how-to-easily-build-a-dog-breed-image-classification-model-2fd214419cde)

https://towardsdatascience.com/dog-breed-prediction-using-cnns-and-transfer-learning-22d8ed0b16c5 (https://towardsdatascience.com/dog-breed-prediction-using-cnns-and-transfer-learning-22d8ed0b16c5)

(https://towardsdatascience.com/dog-breed-prediction-using-cnns-and-transfer-learning-22d8ed0b16c5)

create a dog breeds classifier with > 83% validation accuracy (use all techniques - data =augmentation and transfer learning etc.,.) Eg:

https://github.com/fchollet/deep-learning-with-python-notebooks/blob/master/5.3-using-a-pretrained-convnet.ipynb (https://github.com/fchollet/deep-learning-with-python-notebooks/blob/master/5.3-using-a-pretrained-convnet.ipynb)

for all :

properly visualize the results, model metrics, samples etc.,. use tensorboard primitives for showing training progress.

Visualize what the network for various ways (input sample dog image,random image gradient ascent, heatmap, etc.,.) has learnt using various techniques (see colab and chpater on cnn in prescribed textbook)

Sample code : **https://github.com/fchollet/deep-learning-with-python-notebooks/blob/master/5.4-visualizing-what-convnets-learn.ipynb (https://github.com/fchollet/deep-learning-with-python-notebooks/blob/master/5.4-visualizing-what-convnets-learn.ipynb)**

Try out various hyper parameters. provide detailed comments in colab with various experiments.

Please implement from scratch and not copy paste.

Total models to submit : 7 colabs

3 keras resnet/vgg/lenet

3 pytorch resnet/vgg/lenet

1 transfer learning