DLSR\_lab1\_0516310

Introduction

The lab is going to train a CNN model via Pytorch with given imbalanced dataset and count MACs / FLOPs of the model via customized hook function.

Experiment Setup

* Python 3.7.4
* Pytorch 1.2.0
* Pytorchvision 0.4.0
* Thop 0.0.31.post2001170342

Workflow

1. Lab 1-1 : training model
   1. Data Preprocessing
   2. Test on Validation Data
   3. Loop : Train on Training Data
   4. Loop : Test on Validation Data
   5. Loop : If the Validation Accuracy is better, then save the weights
   6. Test on Testing Data

Data Preprocessing

1. Resize to 512 \* 512 for training and 256 \* 256 for validation and testing data
2. RandomCrop to 256 on training data only
3. RandomHorizontalFlip on training data only
4. ColorJitter on training data only

Model

1. Lab 1-1
   1. Wide Residual Network + Fully-connected Layer x 3 with ReLu
2. Lab 1-2
   1. Wide Residual Network
   2. Mobile Network
3. Lab 1-3
   1. Wide Residual Network
   2. Image Autoencoder (CNN & DeCNN)

Result

1. Lab 1-1
   1. Total Accuracy : 77.14%
   2. Class 0 : 368 cases / 57.61%
   3. Class 1 : 148 cases / 77.03%
   4. Class 2 : 231 cases / 83.12%
   5. Class 3 : 500 cases / 71.00%
   6. Class 4 : 335 cases / 73.73%
   7. Class 5 : 287 cases / 79.09%
   8. Class 6 : 432 cases / 72.92%
   9. Class 7 : 147 cases / 94.56%
   10. Class 8 : 96 cases / 94.79%
   11. Class 9 : 303 cases / 82.51%
   12. Class 10 : 500 cases / 88.00%
2. Lab 1-2 (params / MACs)
   1. Wide Residual Network (68.88M / 14926.38M)
   2. Mobile Network (3.5M / 411.18M)
3. Lab 1-3 (details would be displayed in demo, params, MACs, FLOPs)
   1. Wide Residual Network (68.88M / 14.91G / 44.04G)
   2. Image Autoencoder (0.06M / 625.97M / 1.26G)

Discussion

1. How should we evaluate the efficiency (complexity) of a neural network?

**OPs(MACs / FLOPs), parameter size, activation size, arithmetic intensity.**

1. Do we need to count MACs for pooling layer?

**No. Since it doesn’t conduct any multiplication.**

1. Do you get the same result from 'thop' & your own functions?

**No. The results from thop are not real MACs. In some layers, thop counts multiplication and addition as two operations.**

1. How could you get a difference result between FLOPs and MACs?

**One multiplication and one addition are counted as one MAC, while they are two FLOPs.**

1. Is MACs/FLOPs a good metric to estimate the real inference latency ? If not, please explain.

**No. We should also consider memory access and usage. For example, if we consume too many memories, we may make it swap frequently.**

Other

1. Demo command : python demo.py --load demo.weight --thread 10 --batch\_size 128