Due: 2021/6/20

Course Project for Machine Learning

Computer Science Department in SJTU

1 Introduction

1. Three students form a group.

2. This project is divided into three modules:

   A. (Group assignments) Build a model for the electron microscopy image segmentation.

   B. (Individual assignments) Follow the provided instructions and transfer the given trained model, i.e., Resnet50 and GoogLeNet, to Huawei Ascend 310 for inference. (i.e., finish the Section 3 and Section 4 in the provided instruction)

   C. (Individual assignments) Transfer your trained model in Module A to Huawei Ascend 310 for inference.

Tips

(1). For module A, you are required to finish it in your free time and submit a report to ftp.
Deadline: 20:00, 2021.6.20
Submission: ftp://public.sjtu.edu.cn
user name: huangwenjing
password: public
directory: upload/machine-learning-2021/ModuleA_report
Naming format: group_number.pdf, e.g., group_8.pdf

(2). For module B, you are required to upload the screenshot of the successful experiment to ftp. **Schedule: 20:00, 2021.6.12**
Submission: see 《机器学习2021-ModuleB-华为实验指导手册》

(3). For module C, you are required to make offline presentation to TA on 12 June 2021.

2 Description for Module A

The project is inspired by *ISBI Challenge*[1] and designed for students to learn to build a model for a specific task.

[1] http://brainiac2.mit.edu/isbi_challenge/

2.1 Data

The ISBI 2012 EM Segmentation Dataset [1] can be downloaded from the course's home page on canvas (project). The data description is same with *ISBI Challenge* except that we split the raw train data set (consist of 30 samples) into two parts: the new train set and new test set. The downloaded data set consists of 30 samples, 25 for train and 5 for test. You are required to train and test your model on the newly split data sets.

2.2 Model

This course has a corporation with HUAWEI company, which provides some computation time for each students to train and deploy models on their platform. Therefore, you can train and test your model on GPU with some popular framework, such as pytorch, tensorflow.

3 Basic Assignments

1. (**Module A, 70 points**) Train a model by yourself, including:
   a. Learn to build a model for segmentation.
   b. Train the model and tune the hyper-parameters on the **train set**.
   c. Improve your model to gain as higher performance as you can on **test set**. The evaluation metrics are V^{rand} and V^{info} [1].
   d. Write a report that contains your ideas, methods, algorithms, experimental details and results.
2. (**Module B, 30 points**) Follow the provided instructions and transfer the given trained model, i.e., Resnet50 and GoogLeNet, to Huawei Ascend 310 for inference.
3. (**Module C, 20 points bonus**) Transfer your trained model in Module A to Huawei Ascend 310 for inference.

4 Evaluations for the Final Report in Module A

Code takes up $20\% \times 70 = 14$ points while report takes up $80\% \times 70 = 56$ points.

4.1 Codes

Each group is required to submit your codes by providing a link to your github repo. If you do not know how to use github, please visit its tutorial[2] for some advice. Codes will be judged by cleanness and readability, so remember to comment your codes.

[2]https://guides.github.com/activities/hello-world/

Xiao Ming	30%
Xiao Hong	30%
Xiao Fang	40%

Table 1: Contribution

4.2 Report

Each students is required to turn in a report for that contains your main ideas, methods, algorithms, experimental settings, and results. You can write your report in word or latex (encouraged), English (encouraged) or Chinese. The details of the four parts is:

Main Ideas A brief introduction of your report, including your proposed methods and the performance.

Methods The proposed method for the project, including the motivation and detailed description of your methods.

Algorithms The algorithms you choose to optimise your model (how to train your model or update the parameters), including the motivation, detailed description and pseudo-code if necessary.

Experimental Settings The experimental settings, including the structure of your network (if you have), learning rate, batch size, etc.

Results The performance of your model on test set.

Contribution At the end of the report, please attach the contribution of each member. Table 1 shows an example.

References

[1] Ignacio Arganda-Carreras, Srinivas C Turaga, Daniel R Berger, Dan Cireşan, Alessandro Giusti, Luca M Gambardella, Jürgen Schmidhuber, Dmitry Laptev, Sarvesh Dwivedi, Joachim M Buhmann, et al. Crowdsourcing the creation of image segmentation algorithms for connectomics. *Frontiers in neuroanatomy*, 9:142, 2015.