CSC 180-01 Intelligent Systems (Fall 2019)

Mini-Project 3: Computer Vision using GPU and Transfer Learning

Due at 11 am, Friday, October 25, 2019

Demo Session: class time, Friday, October 25, 2019

1. Problem Formulation

In this project, you practice with image classification using Google GPU and transfer learning.

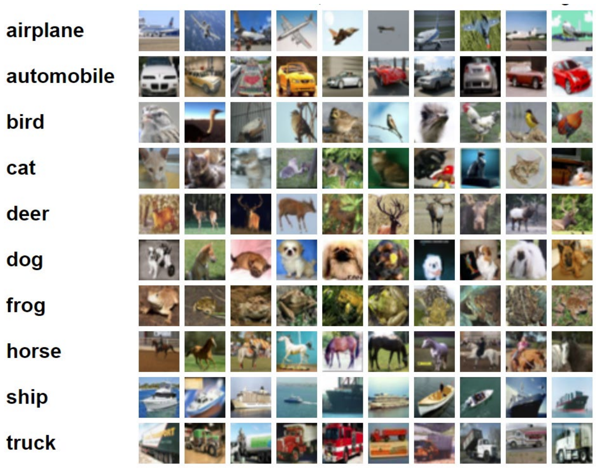
Google Colaboratory is a cloud-based Jupyter notebook environment that is free to use and requires no setup. **When you create a new notebook on colab.research.google.com, TensorFlow is already pre-installed**. **Just *import tensorflow as tf*, and start coding.**

Transfer learning is a machine learning technique where pre-trained models are used as the starting point on computer vision and natural language processing tasks. Transfer learning is an optimization that allows rapid progress or improved performance when modeling the second task.

The project is twofold:

1. You train and test a CNN model on GPU **without** transfer learning
2. You train and test a CNN model on GPU **using** transfer learning

2. Dataset



We work with the CIFAR-10 dataset, which is preinstalled with Tensorflow.

https://keras.io/datasets/

For more details, go to https://www.cs.toronto.edu/~kriz/cifar.html

The CIFAR-10 dataset consists of 60000 32x32 color images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images.

3. Notebook

Write your code to complete the provided notebook on Canvas. The notebook should run on GPU as Google Colab file.

How to launch notebooks as Google Colab files:

- To start working with Colab, you first need to log in to your google account, then go to this link https://colab.research.google.com
- Go to the folder "Colab Notebooks" under "My Drive" and upload the notebook file there. Right click your notebook and open with "Google Colab".
- (Optional) If you want to access Google Drive from Google Colab, do the following: https://www.marktechpost.com/2019/06/07/how-to-connect-google-colab-with-google-drive/

4. Grading breakdown

Use the evaluation form on Canvas as a checklist to make sure your work meet all the requirements.

Implementation	**70 pts**
Your report	**20 pts**
In-class defense	**10 pts**

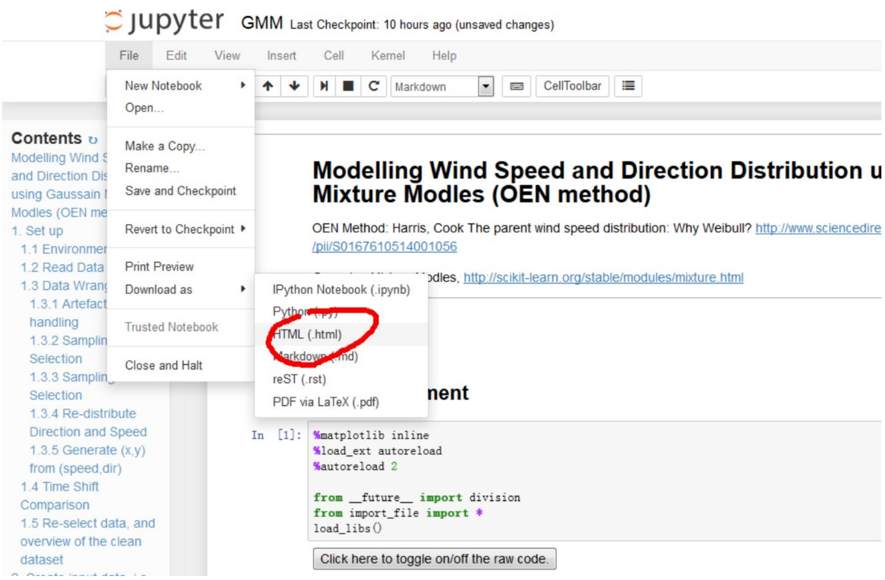
5. Teaming:

Students must work in teams with no more than 3 people. Think clearly about who will do what on the project. Normally people in the same group will receive the same grade. However, the instructor reserve the right to assign different grades to team members depending on their contributions. So you should choose partner carefully!

6. Deliverables:

(1) The HTML version of your notebook that includes all your source code.

1.1. Download your google colab file by going to "File" and then click "Download .ipynb".
1.2. Open the notebook file locally.
1.3. Go to "File" and then "Download as". Click "HTML" to convert the notebook to HTML.



Modelling Wind Speed and Direction Distribution u
Mixture Modles (OEN method)

OEN Method: Harris, Cook The parent wind speed distribution: Why Weibull? http://www.sciencedire /pii/S0167610514001056

odles, http://scikit-learn.org/stable/modules/mixture.html

```
In [1]: %matplotlib inline
        %load_ext autoreload
        %autoreload 2

        from __future__ import division
        from import_file import *
        load_libs()
```

5 pts will be deducted for the incorrect file format.

(2) Your report in PDF format, with your name, your id, course title, assignment id, and due date on the first page. As for length, I would expect a report with more than one page. Your report should include the following sections (but not limited to):

- **Problem Statement**
- **Methodology**
- **Experimental Results and Analysis**
- **Task Division and Project Reflection**

In the section "**Task Division and Project Reflection**", describe the following:

- who is responsible for which part,
- challenges your group encountered and how you solved them
- and what you have learned from the project as a team.

10 pts will be deducted for missing the section of task division and project reflection.

All the files must be submitted **by team leader** on Canvas before

11 am, Friday, October 25, 2019

NO late submissions will be accepted.

7. In-class Demo:

Each team member must demo your work during the scheduled demo session. Each team have **three minutes** to demo your work in class. Failure to show up in defense session will result in **zero** point for the project. The following is how you should allocate your time:

- Model/code design (1 minute)
- Findings/results (1 minute)
- Task division, challenges encountered, and what you learned from the project (1 minutes)