Homework Assignment 1

Ai-Master Deep Learning Foundation Program

Instruction: Please read through chapter 8 of the deep learning ai-book (Project One: Handwritten Digit Recognizer) and GitHub code for the first project (https://github.com/Ai-Master/deep-learning-foundation-program). For this assignment, please finish the following tasks and upload the assignment to your personal Github repository, and submit the GitHub link to the instructor.

1. Install Keras and Setup GitHub

The first project requires python, Jupiter notebook and Keras. If you haven't installed these, please follow the instructions in chapter 2.
You also need to use GitHub for the project.

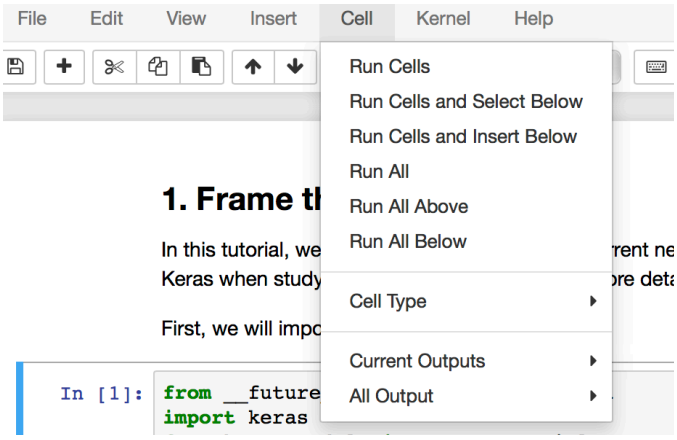
1. Please create a new GitHub account if you don't have one.
2. You should create a new repository named "am-dl-homework" for assignments (read the instruction https://help.github.com/articles/create-a-repo/).
3. Please download all files in project1 from the repository we provided. The easiest way to download and upload the file to GitHub is to do it on the website directly. Click "Clone or download" and "DOWNLOAD ZIP" to download files.

* Optional: If you are interested in learning how to use GitHub on the command line, you should first download git from (https://git-scm.com) and then setup username and email address in git (https://help.github.com/articles/set-up-git/). You should also read these instructions to learn how to manage files in git. (https://help.github.com/articles/managing-files-using-the-command-line/)

2. Run Codes in the Jupyter Notebook

We assume that you have downloaded the zip file which contains the Jupiter notebook "Project1_keras_mnist_kaggle.ipynb" and csv files and unzipped it. In the terminal, go to the downloaded file directory and type "jupiter notebook" in the terminal. This will start the server and will open your default web browser to the URL shown in the terminal. Open the notebook file in the browser.

Now you can run the code. Click the box that contains the code, then click "Cell -> Run Cells" to run the code. You can also use "shift+return" ("shift+enter" for some keyboards) as the keyboard shortcut.



We expect you to read through the whole Jupiter notebook, run codes and understand codes. Please ask TAs for help if you encounter any problems when running the given code.

* Tips: Keyboard shortcuts are very useful to accelerate your process when writing codes. Click "Help-> Keyboard Shortcuts" to learn more.

3. Write Your Own Code

Please create a new Jupiter notebook and write the script that uses Neural Network to train and test MNIST dataset. You can use the same code we provided or use other ways to preprocess data, as long as the code does not produce errors or have a

terribly low accuracy. For the model, **you are required to make following change in your code**:

1. **Change the number of neurons in at least one layer**
2. **Add one or more layer to the model**
3. **Change the optimizer** (hint**:** in our given set of parameters, RMSProp can result in higher accuracy in less than 20 epochs, you can also try other optimizers)
4. **(optional) Change batch size, epochs, learning rate as necessary.**

Remember that the goal is to get higher validation and testing accuracy.
After you finish coding, please upload the notebook to your GitHub repo.

4. (Optional) Submit to Kaggle

If you follow the instruction, you will create a file that contains label for test dataset, and you can submit the csv file to Kaggle (note that directly using the code we provided will overwrite the submission file every time you change the model, you can change the code if you want to keep every submission file separately). After submitting the file to https://www.kaggle.com/c/digit-recognizer, you can take a snapshot of your testing accuracy and upload the image to your GitHub repo.