



Assignment 4: Deep Learning for Classification

A. What to DO:

This assignment consists of two sub-assignments. You can select one sub-assignment among them and submit it to D2L.

Sub-assignment 1

1. Download the training and test images from D2L. Image labels are given in the file names.
For example:
Label 0 : IDRiD_118_-0.jpg
Label 3 : IDRiD_001_-3.jpg
- Separate images in train and test into two groups as DR and nonDR:
o NonDR : Label 0
o DR : Label 3 & Label 4 (You don't need to use Label 1 and Label 2)
2. Download a pretrained CNN such as AlexNet, GoogLeNet, VGG, or ResNet50 in MATLAB. Note that you can use other programming languages.
3. Retrain your CNN using transfer learning for DR and nonDR for different learning rates and epochs.
4. Test your retrained CNN with test images and record your accuracy in a table.
5. Plot ROC curve for the best result and show the confusion matrix.

Sub-assignment 2

1. MedMNIST is a large-scale set of biomedical images including 12 datasets for 2 dimensional and 6 datasets 3D dimensional.
2. Download one of the datasets and run a simple model by training (Refer to "Getting started with PyTorch"). *** Note that you can sample (10% or more) the dataset if the size of the dataset is too large. ***
3. Retrain your model with different learning rates and epochs.
4. Test your retrained model with test images and create a table that shows both AUC and Accuracy for different learning rates and epochs.
5. You can use MATLAB, Python, Java, and etc. It depends on your preference.
6. Resources
 - MedMNIST abstract (<https://medmnist.com/>)
 - Github Repo. (<https://github.com/MedMNIST/MedMNIST>)
 - Examples
 - o Getting started with PyTorch
(https://github.com/MedMNIST/MedMNIST/blob/main/examples/getting_started.ipynb)



- Getting started without PyTorch
(https://github.com/MedMNIST/MedMNIST/blob/main/examples/getting_started_without_PyTorch.ipynb)

B. What to turn in:

- A zip file with all the necessary SOURCE code
- A written report (in pdf format) using the template including the following contents:
 - **Cover page** with your name, class title, class number, date, etc.
 - **"Abstract"** (no more than 300 words) summarizing what this project is about (objective), what you did, and what you found out in this project.
 - **"Result"** listing both the original images and the output images of the sampling and quantization effects. Make sure that there is captions for each image in the figure and parameters used to generate the result are elaborated in the caption.
 - **"Discussion"** section summarizing lessons learned, your experience working on the project, potential future work if given time, etc. Note that this should be a short paragraph, no more than 300 words.
 - **Source code** printout.
- Upload the zip file and project report to D2L.

C. Due Date is on D2L