CSIP5403

Research Methods and Applications  
Lab Sheet – 6

Aims:

* In this lab, you will understand transfer learning for computer vision (image classification).
* Based on: <https://pytorch.org/tutorials/beginner/transfer_learning_tutorial.html>

# Part 1 – Understanding and experimenting Transfer Learning

Go through the tutorial on <https://pytorch.org/tutorials/beginner/transfer_learning_tutorial.html>

It uses PyTorch deep learning framework.

You can run this code through two ways:

1. By downloading its .py code, and running on your chosen Python IDE.
2. Through Google Colab. You can learn more about Google Colab from <https://colab.research.google.com/notebooks/welcome.ipynb#scrollTo=gJr_9dXGpJ05> Follow the tutorials, watch the videos. In this case, you need to create ‘data’ folder and put ‘hymenoptera\_data’ in this folder (by downloading the data), and then you need to upload the data folder to the Google Colab. To use Google Colab, you need to have a google account and log into it.

You need to:

1. Understand the code very well such as the used network architecture, optimizer, loss, etc.
2. Understand how the two different types of transfer learning work.
3. The existing code uses ResNet18. Try different network architectures such as AlexNet, VGG19\_bn, ResNet50, SqueezeNet, Inception\_V3, DenseNet, etc.
4. Fine-tune the network which gives the best result from task 3 above even for getting better results. This includes trying different optimizers, loss functions, learning rate, etc.
5. Compare the obtained result from fine-tuning above (task 4) with training from scratch (you also need to train from scratch without any transfer learning to check how the performance degrades).

# Part 2 – Continue Working on your Mini-Project

Identify one or two group members to work with (this could be your lab group if you have already been working on lab exercises within a group).

After you identify the topic of your **mini-project**, you should continue working on it. Please keep in mind the **deadline** of the project.