

Assignment 3

Q1) Using your favorite image dataset, build a vision transformer for classification considering images as sequence of patches. Describe each component of your Transformer architecture along with its usability. Compare the classification performance of your Transformer with simple CNNs and report the results.

Q2) In this problem, you will train and test Faster RCNN on the PASCAL VOC 2007 dataset. Specifically, the task is as follows:

Given an input image from the dataset, you have to detect different objects present in the image and classify them. Train the network using the entire training dataset. You have to run Faster RCNN on the test split and submit a .txt file. Each line of the .txt file should have the following format:

Image-file ,predicted-class, class-confidence, x1 y1 x2 y2. where image-file is the name of the image file in the test dataset, x1, y1 is the top-left co-ordinates and x2, y2 is the bottom-right coordinates of the bounding box as predicted by the model, the predicted class is the class name of the object present in that bounding box and class-confidence is the confidence score of the detected object. The primary evaluation metric for the task is Mean Average Precision (mAP).

Prepare a report containing the observations and inferences for the model with the following points:

- Implement/Run the model and report their best-performing parameters.
- Calculate the mAP score at IOU of 0.5 and 0.9 on both the train and test split and report a table with Average Precision for every class.
- Compare the 3 models by plotting a graph with the IOU threshold on the X-axis and mAP scores (in %) on the Y-axis. What can you infer from the plot?
- Include some images in your report for each model showing the detected objects.

Suggested Frameworks: Tensorflow/Pytorch.

You can use GPUs available from IITD-HPC or Google Colab.

- Request for GPU on HPC:

http://www.cc.iitd.ac.in/CSC/index.php?option=com_content&view=article&id=153:hpc-cluster&catid=1:latest-news

- Setup HPC: <http://supercomputing.iitd.ac.in/?access>

- How to submit jobs:

<http://supercomputing.iitd.ac.in/?pbs>

Do not submit jobs on login nodes. The hpc account will be blocked if you Run your jobs on login nodes.

- You can use colab as well: <https://colab.research.google.com>

NOTE: Submissions will be done on moodle in the form of a pdf report and a zip containing source code(with compiled source) and all input files considered and output files generated. Only one of the group members will upload the assignment.

The deadline for this assignment is 11:59 pm @ 31st March, 2022.