Deep Learning (CS F425)

1st Semester 2024-25

Project Task 2

<u>Flower Classification using CNNs</u>

General Instructions

1. You may do the project in a group of **maximum 3 students**, or **individually**. It is advised to have the same group members as in Task 1.
2. You may use any Python libraries like Tensorflow or Pytorch etc.
3. The Viva will be taken for each team for Task 1 and Task 2.

Task 2 Instructions

1. The task is to classify different categories of flowers as shown below:

2. A dataset is provided to you for training and validation.
3. The flower dataset contains **60** classes. The train set contains 50 RGB images of each class, making a total of **3000** images with dimensions **256 x 256**.
4. The validation set contains 10 RGB images of each class making a total of **600** images.
5. The train and validation labels are also shared viz. **train_labels.txt**, and **val_labels.txt** respectively.
6. You need to train a **convolutional neural network (CNN)** architecture with any number of layers, activation functions and optimiser.
7. PLEASE NOTE THAT YOU **CANNOT** USE ANY RNN/LSTM/TRANSFORMER ETC. FOR THIS TASK. YOU HAVE TO USE A **CONVOLUTIONAL NEURAL NETWORK** ONLY.
8. Now, for **feature extraction** you are free to use any feature extraction method like wavelet transform, PCA etc. Those features you can feed into your network as input, if you wish. You may use the features extracted from a convolutional neural network/RNN/LSTM/TRANSFORMER etc. (whether pre-trained or not).
9. You are free to use any pre-trained CNN or you may also fine-tune it or you may train a network from scratch. It's your choice.

Submissions

1. **CODE SUBMISSION:** You need to provide the model weights in your submission so that the code can be checked on the test dataset which is not shared with you.
2. **Please provide a cell in your notebook at the end for classifying test data, where any user can test a set of new images on your trained model. This is MANDATORY. If you do not add this cell, then your code will not be evaluated on test data.**
    - Submit the notebook with a cell which has a proper code for testing (i.e. with a path to load the data, code for any preprocessing steps etc.), so that the evaluator just has to change the path of the directory for the testing data.
3. The submission will also include the outputs in the notebook file itself. E.g. The training loss vs epochs plot, **accuracy values for training and validation datasets.**
4. Evaluation metric will be **accuracy** i.e. number of correct predictions out of all predictions. Try to get maximum accuracy (as much as you can) on validation dataset for optimal performance of your model.
5. **TASK 2 PROJECT REPORT:** Every team/individual needs to submit a report (softcopy) in proper format with name and ID of group members, table of contents, results, the training process, and any other details related to your implementation. You must explain all the training or design choices adopted by you.

Submission Deadline

1. The submission deadline is **18 November 2024,** 11 AM IST.
2. The submission link will be shared with you in a few days.
3. It is advised that you plan early and try to submit the Task 2 project prior to the deadline, as **NO EXTENSIONS will be possible after the deadline.**

Checklist for Submission

1. A single Python notebook file with the code for pre-processing steps, train and validation results, and a cell for testing of your model.
2. Task 2 Project Report in PDF format.

    These files must be sent in a single zip file with first names of the team members e.g. (Abc_xyz_pqr.zip), and without the train and validation datasets.

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