Assignment No. 4

Submission Date: 2/2/2025

Practice the usage of CNN (Convolutional Neural Network).

In this assignment you will use at least two pretrained CNNs to identify the type of a flower that appears in an image. You will need to choose your pretrained models and use Transfer Learning to associate flower images into their corresponding categories.

For example – for the following image:

We would like the model to classify the image into its category (the dandelions category in this example). The model should be probabilistic and returns the probability of a flower belonging to each of the categories.

General instructions:

1. The code should be written either in Python or R.

2. We recommend that the code be implemented with one of the following deep-Learning packages: Keras/TensorFlow/PyTorch.

3. Choose **at least** two pre-trained models (YOLOv5 and VGG19) and adapt them to the current task. Note: You must use the YOLOV5 and VGG19. You may use additional pretrained models.

4. For basic training, use the following image database provided in: https://www.robots.ox.ac.uk/~vgg/data/flowers/102/

5. Additional Images from other repositories can be added to improve accuracy.

6. The dataset should be randomly divided into training (50%), validation (25%) for hyperparameter tuning, and test sets (25%). This random split should be repeated at least twice.

7. Describe in detail the preprocessing process you performed to get the input from the raw images.

8. Describe in detail the network you are using (including the specific layers).

9. Provide an accuracy graph and the Cross-Entropy graph for train/validation/test as a function of the number of epochs for all models.

Minimum accuracy performance

Accuracy in the test set of part 2 should be greater than 70% by at least one of the models.

Submission should include:

One file (RAR or ZIP) should be submitted in Moodle (4 תרגיל). The file should contain:

1) Readme file with the links to the GitHub source codes
2) A link to other Datasets (if you used them in addition to the database specified)
3) A PDF file for explaining your solution and results.