Assignment 3

CPS584 - Advanced Intelligent Systems and Deep Learning

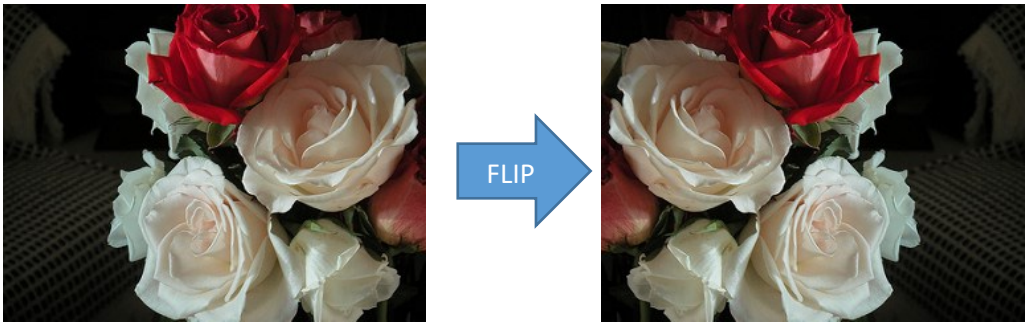
Released Date: 04/01/2023

Requirements

In this assignment, you will solve practical and interesting problems. By completing the project, you will gain valuable hands-on experience in the design, implementation and evaluation of classification algorithms. The details are listed as below.

You are provided with the "MoreFlowers.zip" file which contains images of four classes: *Rose, Tulip, Dandelion,* and *Sunflower*. For each class, 40 training images and 20 testing images are provided.

1. You are required to collect additional 30 training images for each class.
2. Design your own deep learning network which must be different from LeNet, AlexNet, and the custom net (CustomNet) in Lab6. Your designed network is named after your favorite name, for example, VarunNet, SeanNet, AkhilNet, SrikarNet. Please carefully describe your designed network in the assignment report. For example, you need to state how many layers in your network, the configuration of each layer, and why you think your own network is efficient.
3. Train your designed network with the provided data + your collected data. Note that you can only use matconvnet (Matlab) or tensorflow + keras (Python). There are 40 (already provided) + 30 (newly collected) = 70 training images for each class. Report the accuracy of your trained network on the testing data.
4. Flip all training images in (3) to have **70** more training images for each class (as shown in the example below). Train your network again with the new training data. And please report the accuracy rate of your new trained network on the testing data.



5. Brainstorm and propose any method to improve the performance. For example, rotating training images, changing brightness of the training images to increase more training samples. And please report the accuracy rate of your new trained network with your augmented data on the testing data.
6. Discuss the accuracy rates in (3), (4), and (5). For example:
    a. Will more training data lead to a better performance?

b. Comparison the accuracy rate on each class, for example, which class reaches the highest/lowest accuracy rate. Any explanation.
c. Your own observations/comments, for example, the difficulties when designing and training your own network, and how you handle more than 2 classes.

What to Submit

1. A well-documented program that implements the aforementioned problem in the Assignment 3. You must submit your program source code and the newly collected training data set.

2. A well-written, concise project report. It should include: (a) title and names of group members; (b) the analysis of each problem; (c) the issues during the implementation; (d) the solutions to overcome the issues in (c); (e) the contribution of each individual member; and (f) the powerpoint slides (maximum 15 slides) used in the Assignment presentation.

For each group, you must submit the files above in a single zipped folder. Please do not submit matconvnet library. And please upload your trained model to a dropbox or google drive and share the link in your submission.

Important: Your submission will be thoroughly checked. If any plagiarism (from Internet, former students, or anywhere else) is found in this assignment, an F will be assigned to course grade and an academic dishonesty report will be given.

Submission Due: 8:30am, 25 April, 2023