

MTRE4300 Machine Learning for Robot Perception

Project #4 Image Classification using CNN

Due by 11:59 pm on 3/5/21 (Friday)

In this project, you are required to develop a Python program with the keras and tensorflow packages to implement a Convolutional Neural Network (CNN) to classify the images of five types of flowers.



In particular, the project requirements are below:

1. In the first line of your Python code, use a comment line to show all group members' names.
2. Please click the following link to download the flower dataset.
http://download.tensorflow.org/example_images/flower_photos.tgz
3. Develop a Python program with Keras to generate the training set, validation set and test set. The validation set includes 500 images (100 images for each category of flowers), the test set includes 500 images (100 images for each category of flowers), and training set includes all of the other images. Make sure the images from the training set, validation set and test set are totally independent.
4. Develop a CNN network including multiple convolutional and max-pooling layers to classify the follower images. Use the train set to train the network, use the validation set to validate the model after each epoch of training, and finally use the test set to test the model accuracy.
5. Do your best to increase the test accuracy in the test set. To this end, you may change the number of layers and the size of each layer.
6. When the training is completed, display the history curves of the validation accuracy and training accuracy of your model. Also print the test accuracy finally.

7. It is a group project. Each group saves your Python code as “CNN_flower_classification.py”, and uploads it to the D2L drop box. However, you don’t need to submit a project report.

Grading Rubrics

- 20 points: The Python code submitted correctly.
- 20 points: The code runs without any syntax errors.
- 20 point: The code generates the training set, validation set and test set correctly in appropriate folders.
- 10 Points: The code defines the CNN architecture correctly.
- 20 points: The classification result (the history curves of the validation accuracy and training accuracy of your model) is displayed on the monitor.
- 10 points: The classification result (the validation accuracy and test accuracy) is a kind of success (above 80%).