Project 4 - Image Classification with Convolutional Neural Networks

Problem 1: Run the classification notebook (2 points)

From the class website

https://www.cs.ucf.edu/~lboloni/Teaching/CAP1931_Spring2026/index.html

Download the classification notebook from the February 9 lecture. Using one of the environments you used for the Project 2, run the notebook.

Tip: probably the best idea is to click on the button "Clear All Outputs" first and then run each cells separately.

What to submit: The executed version of the modified notebook (do not clear the outputs). Put it in a folder Problem-1.

Problem 2: Evaluate the models in the classification notebook (8 points)

In the classification notebook there are three models: (1) a small CNN, (2) a better CNN and (3) a model based on transfer learning.

Create a test dataset with 10 images each of cats, dogs and monkeys. You can use images from the internet, or you can take pictures of your own pets.

Use the three models to classify the images in your test dataset. For each model calculate the accuracy of classification. For instance, if the model correctly classifies 17 out of the 30 images, then the accuracy is $17/30 = 56.7\%$.

What to submit: The executed version of the modified notebook (do not clear the outputs) and the 30 images. Put it in a folder Problem-2.

Problem 3: Bonus - Extend the classification model to more classes (extra 5 points)

The current data has cats, dogs and monkeys. Extend the dataset to include another class of animals (e.g., horses, cows, etc.). You can use images from the internet, or you can take pictures of your own pets.

You need to have a sufficient number of images for the new class (about 50 for training and at least 20 for testing). You can just create a new folder with the new class in the training and validation folders.

Run the classification notebook again. Verify that the new class is now included in the classification. Add 10 test images of the new class to your test dataset and evaluate the accuracy of the three models on the new test dataset.

What to submit: The executed version of the modified notebook (do not clear the outputs) and the new images in the training and validation data. Put it in a folder Problem-3.

How to use chatbots

For this assignment, you can use chatbots to help you in the computer configuration and debugging. For instance, you might ask you chatbot:

```
Why I am getting an error XXX in vscode?
```

```
How do I install Python on a Windows 11 machine and connect it to vscode?
```

```
How do I print to pdf in Google Colab?
```

Alternatively, you can just search for answers on the internet.

What to submit

- For all the problems, submit the executed version of the notebook (do not clear the outputs). Put the notebooks in separate folders (Problem-1, Problem-2, Problem-3).