

# Assignment 4 Convolutional Neural Network (150 points)

CSCE 415: Machine Learning

Spring 2021

150 Points

Due: 24 April 2021 11:30 PM

Objective: Use a CNN model to classify images.

Task Develop a CNN to classify a dataset of your choice, from the Web site

<https://lionbridge.ai/datasets/top-10-image-classification-datasets-for-machine-learning/>

The objective of this task is for you to determine the best CNN architecture by exploring the various options when constructing a CNN.

Subtasks:

1. Compare the results of using Sigmoid as the activation function versus Rectified Linear Unit. You can use Sigmoid in the first layer, and Rectified Linear in the second, or both functions in each layer, etc..
2. Compare results with at least 2 different kernel sizes
3. Compare the results with multiple layers, i.e. multiple Convolution layers. You can add Pooling layers between or after the Convolutional layers.
4. Determine the optimum number of epochs and batch sizes.
5. Compare the results using different activation functions in your architecture

Writeup:

Your writeup should include a description of the various architectures you used to find the best CNN architecture. Include a diagram of the final, and best, architecture using annotations to make it clear the hyperparameters used at each step, i.e. kernel size, activation functions, pool size, padding, stride. Your comparison should include performance and accuracy metrics, graphics, and an explanation of the graphics. Include confusion matrix and a written summary of the results.

Submission Instructions:

1. Turn in your Jupyter Notebook (\*.jpynb) file – do not turn in your data.
  - a. All changes to the data must be made through your code within Jupyter Notebook.
  - b. Use relative pathnames, if possible.
2. Analysis (See Rubric)
3. Label folder *lastname-Ass4.zip* respectively, user your last name on your write up, for example *butler-CNN.pdf*.

### Grading Rubric

Data Inspection 5%

Data Visualization 20%

Data Cleaning 5%

Explore CNN Designs Evaluate 50%

- a. Activation Functions
- b. Convolutional Layers
- c. Pooling
- d. Training parameters

Analysis of your Results 20%: performance vs accuracy, (Explain what the values mean in the narrative, do not just show numbers)