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Assignment 3 - Computer vision

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CEE 9730/4420 Assignment 3

Consider the database of rock images available at https://www.kaggle.com/datasets/neelgajare/rocks-dataset. Each folder contains images of a different kind of rock, where the folder name is the rock type. Please build a convolutional neural network to classify a given rock image as the correct rock type.

1) Create a preliminary model architecture of your choice, and train the model at learning rates of 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}. Plot the training and validation loss curve (loss over epochs) at each learning rate. Select and justify a choice of learning rate. (5 points)
2) Quantify the performance of your network using a confusion matrix. Qualitatively show the results by plotting test images and their true and predicted labels. Discuss why some test images may be wrongly labelled, if any, by the network. (5 points)
3) Explore different architectures by changing the number of layers, number of nodes, kernel size, and activation functions. Which combination achieves the best performance? (5 points)

Note 1: Figures are expected to be plotted in python with all axes labelled and legend included where multiple data series are presented.

Note 2: You may not achieve good performance scores. This is ok, just document what was done and why.