CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
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Project Number
S0822

Project Title
Analyzing the Efficiency of Subsequent Convolutional Layers with Small-Scale Images

Abstract

Objectives/Goals
My project attempts to find the optimal number of convolutional layers (a conv. layer teaches filters to recognize details) to place next to each other in order to improve the training efficiency of a neural network.

Methods/Materials
Using Python, four convolutional neural networks were trained on the CIFAR-10 dataset. Each model n had n conv. layers placed subsequently (otherwise, their architectures were the same). Each model was trained 5 times, running 100 loops over the training data, then assessed on its accuracy. The libraries used in this project were Keras (with TensorFlow as its backend), SciPy, Pandas, and Matplotlib.

Results
There was no significant improvement between the model that used blocks of three subsequent convolutional layers and blocks of four conv. layers.

Conclusions/Discussion
Neural networks using blocks of three convolutional layers trained the most efficiently. These results could have applications in feature detection with low resolution images.

Summary Statement
I found the optimal number of convolutional layers (filters in a neural network that can be trained to detect features like edges) to place subsequently in order to improve training efficiency.

Help Received
None. I designed and conducted the experiment myself.