ML6: Convolutional Neural Networks

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AP 186

objectives

The main objective of this activity is to classify images (dogs and cats) using CNN.

Improving the algorithm

Dogs were categorized as 1 while cats 0.

Training data: 18,000

Validation data: 4,500

For my algorithm, whose parameters were mostly based on an algorithm by Uysim Ty, **3 convolutional layers were used**. The first layer was made to have 32 filters, while the second and third had 64 and 128, respectively. Ultimately, this made the model learn more complex features from the images as compared to the original algorithm thus **providing a better model performance**. However, training took SO long! Epoch was set to 15 and each epoch took ~18 minutes to run! The wait was worth it because at epoch 1, the accuracy was already equal to the accuracy the author achieved (75%).

Finally, after waiting for ~7 hours, the final accuracy is at 88% with validation loss of 23%.

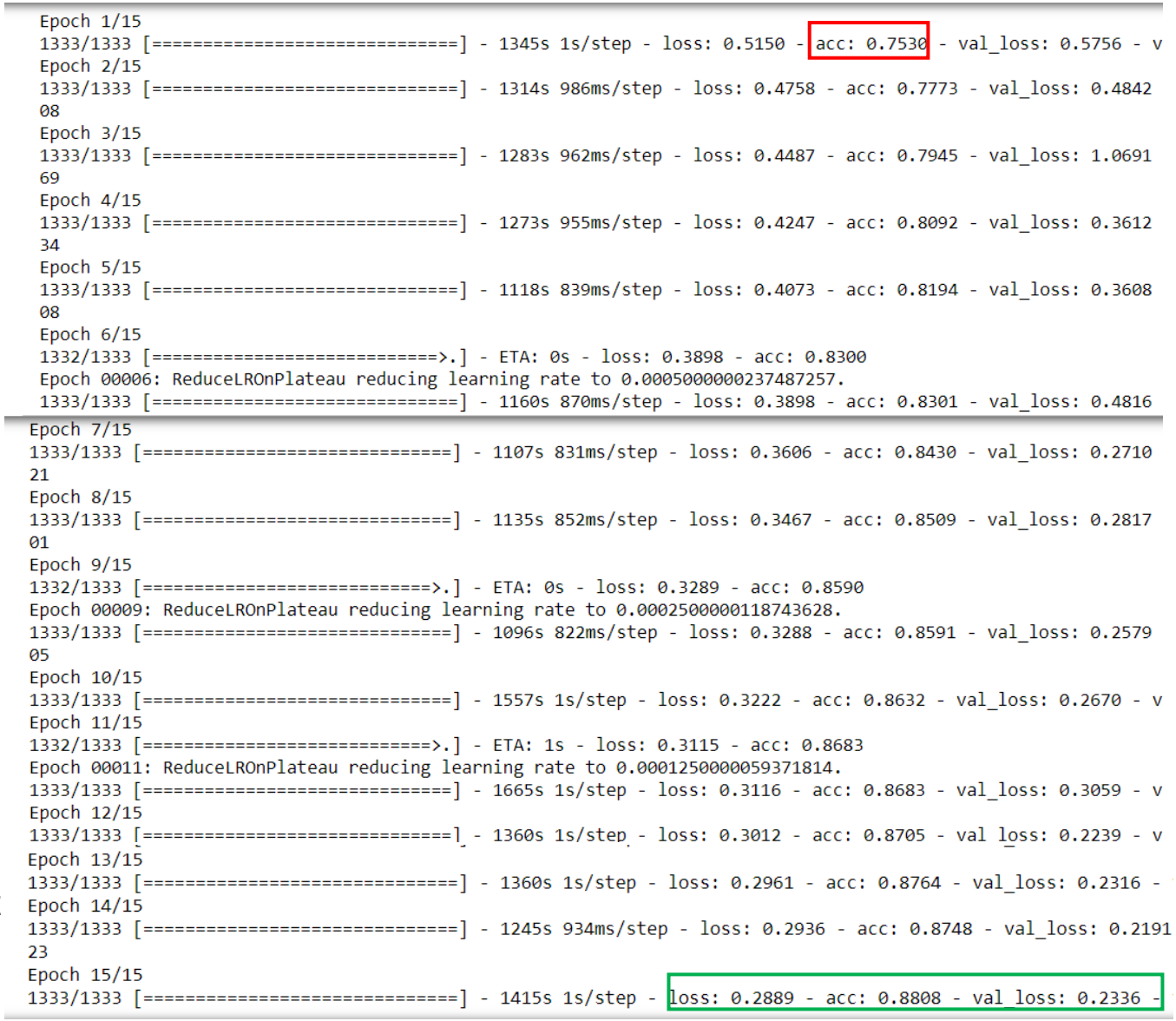

Figure 1. Python output for training accuracy

Results: Testing the model

The model with three convolution layers reached **an accuracy of 88%.** Sample predictions are shown below:

Figure 2. Randomly chosen images and their predicted category enclosed in (). 1: dog, 0: cat.

Analysis

Images were successfully classified without deriving extracted features using Convolutional Neural Networks.

The model’s accuracy is highly dependent on how patient you are. A model with more convolutional layers with fully connected layers having more filters produces better results. The tradeoff here is that the better performance, the longer the training time.

If there are time constraints, it is better to increase the fully connected layers’ size than to increase the quantity of convolutional filters.

Reflection

Rating: 12/10

This activity was overwhelming! Thankfully, the step by step tutorial provided was clear and easy to follow. It was easy to check if the algorithm was correct since the tutorial provided expected results. I also love that I am 12,500 dog pictures richer now.

References:

Soriano, M. (2020). ML6 – Convolutional Neural Networks.

Algorithm: Convolutional Neural Networks: A Python Tutorial Using TensorFlow and Keras (kdnuggets.com)

Uysim Ty's algorithm: https://www.kaggle.com/uysimty/keras-cnn-dog-or-cat-classification/comments#Prepare-Traning-Data