Assignment 4

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Project Description:

The goal of this assignment is to use a convolutional neural network (CNN) to identify the highest of 3 integers in a series of black-and-white photos with different backgrounds.

Implementation of the Model:

A convolutional neural network (CNN) with 4 convolutional layers and 3 fully connected layers was used. To implement the CNN, the Keras and TensorFlow Python libraries were used. The first convolutional layer used 64 filters, and for each subsequent convolutional layer the number of filters increased as per convention by powers of 2. Relu activation was used for each of the convolutional layers, and dropout was implemented for each convolutional layer to prevent overfitting. MaxPooling was also utilized for each convolutional layer to reduce the size of the data and control overfitting. To make the CNN faster and more stable, batch normalization was used for each convolutional layer.

Three fully connected layers were implemented, also with batch normalization and dropout. Softmax activation was used for the output layer.

[insert process on binary threshold]

15 epochs were used when training the model, as after 15 epochs, the changes in validation loss and training loss were minimal.

Results:

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Challenges:

One of the challenges that we encountered was the crashing of the Google Colab notebook due to maxing out of RAM. To account for this problem, we had to split the project into many parts, saving the computing results of each part into Google Drive so that instead of computing all the variables each time, we just had to load the results from Google Drive.

[maybe fine tuning binary threshold?]

Conclusion:

From this assignment, we learned how to pre-process data so that it is optimal for model fitting. We also learned how to work with convolutional neural networks and process images. Through this assignment, we became more familiar with useful libraries such as TensorFlow, Keras, cv2, and NumPy.

Individual Contributions

Jenny:

- Loaded and reshaped data so that it can be fit into the CNN model
- Created the convolutional neural network sequential model
- Formatted outputs for Kaggle submission

Jack:

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