CPSC 8810 Deep learning midterm report: Classifying Cyberbullying

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Abstract

This report compares training results for 10 groups of cyberbullying images (non-bullying included) using three different convolution neural networks, which are 3-layer CNN, VGG16, VGG19 and Inception. Each basic convolution layer goes from convolution, followed by batch normalization(optional), activation function, dropout(optional) and pooling. Testing accuracy and training efficiency will be provided in evaluation section.

Network Structure

We tried a 3-layer CNN network at first, but it didn't work out well. After that we tried on Inception but the training accuracy oscillate too much and the final result is not satisfying. We then followed the standard VGG16 and VGG19 structure and eventually settled our network on VGG19 as in Figure 1 showed.

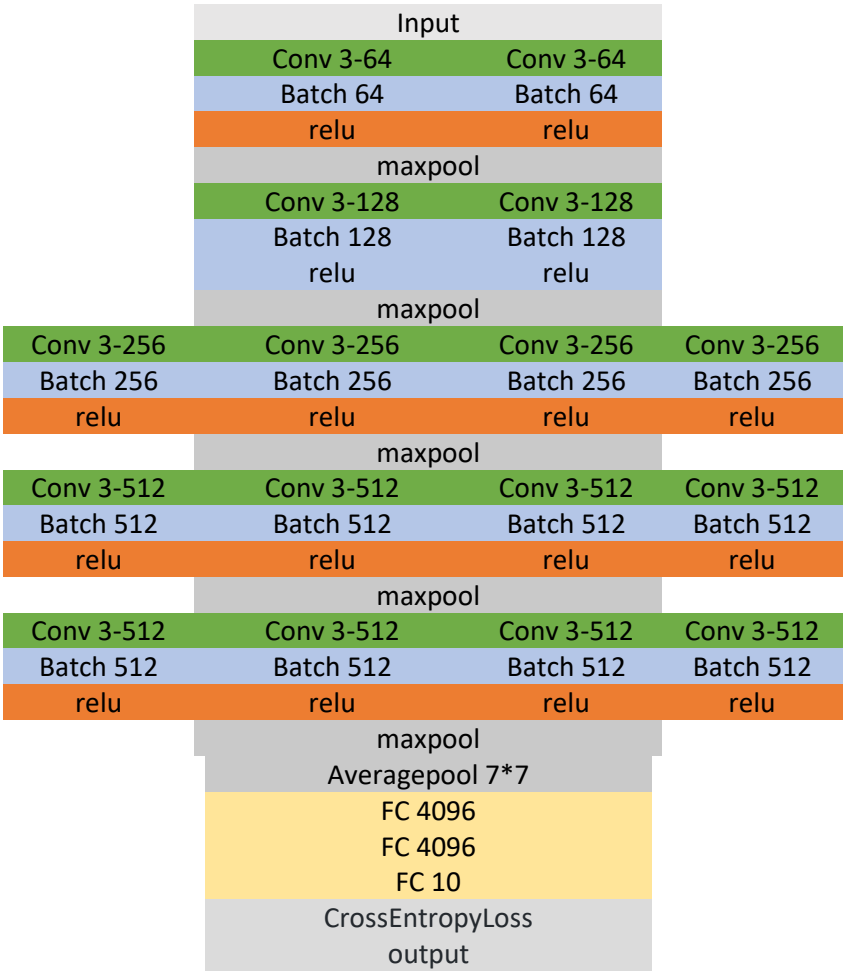

Figure 1: VGG 19 Structure

Process the Data

We randomly split the dataset into two parts. 80 percent of the images are regarded as training set and the rest are used as test set. We augment the images in training set with 5 and 10 degrees of rotation and horizontal flipping. By this mean we expanded our training set five folds.

Training and Testing

The final learning rate is set to 0.00005. The learning process is smooth and swift under this learning rate after we switched our optimizer from SGD to Adam. We tried L2 regularization and dropping out at full connected layer and we tried switching the distribution function for weight initialization from normal distribution to uniform distribution. However, all these methods are unable to help us overcome an approximately 30% overfitting problem. The testing accuracy always stables at 70%.

Future Work

We plan to use transfer learning and add attention layer to our network. Hopefully we can raise our classification accuracy to more than 95%, otherwise we will not be able to making progress towards final purpose.