Introduction to Deep Learning for Computer Vision Assignment 5: PyTorch Classifier II

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February 22, 2019

Abstract

In this assignment I finished implementing the PyTorch classifer from the previous assignment by implementing ReLU activation and adding the Test mode. After finishing the implementation, I verified the accuracy and trained the model with different parameters.

1 Implementing Solution

To verify my implementation, I ran the model in test mode with the given pretrained model and verified my accuracy against what was expected. My test accuracy agreed with the expected result.

Configuration	Test Accuracy	Loss
Pretrained HoG	59.93%	1.295

2 Testing configurations

Next I trained the model with the following configurations.

Configuration	Learning Rate	Units	Hidden Layers
Model 1	1e-3	64	3
Model 2	1e-4	64	3
Model 3	1e-4	128	3
Model 4	1e-4	64	4
Model 5	1e-4	128	4

2.1   Model 1

In model 1 I adjusted the learning rate to 1e-3.

From the plot, I determined this learning rate was too high, and chose to used 1e-4 for the remaining tests. In retrospect, the test accuracy for this model was slightly higher than model 2, so perhaps was not the correct choice.

Configuration	Test Accuracy	Loss
Model 1	57.50%	1.260

2.2   Model 2

In model 1 I adjusted the learning rate to 1e-4.

Configuration	Test Accuracy	Loss
Model 2	56.41%	1.300

2.3   Model 3

In model 1 I adjusted the learning rate to 1e-4 and the number of neurons per layer to 128.

Configuration	Test Accuracy	Loss
Model 3	58.43%	1.243

2.4   Model 4

In model 1 I adjusted the learning rate to 1e-4 and the number of hidden layers to 4.

Configuration	Test Accuracy	Loss
Model 4	56.15%	1.283

2.5   Model 5

In model 1 I adjusted the learning rate to 1e-4, the number of hidden layers to 4, and the number of neurons per layer to 128.

Configuration	Test Accuracy	Loss
Model 5	58.03%	1.269

2.6   Conclusions

My model adjustments had at most a 2% difference on the final accuracy (model 3 to model 4). From these limited results, it appears that increasing the number of neurons correlates with increased accuracy. This is a reasonable conclusion because increasing the number of neurons enables the model to learn more detailed features, which would improve accuracy. Adding an additional hidden layer seemed to decrease the accuracy of the model, which I cannot explain.
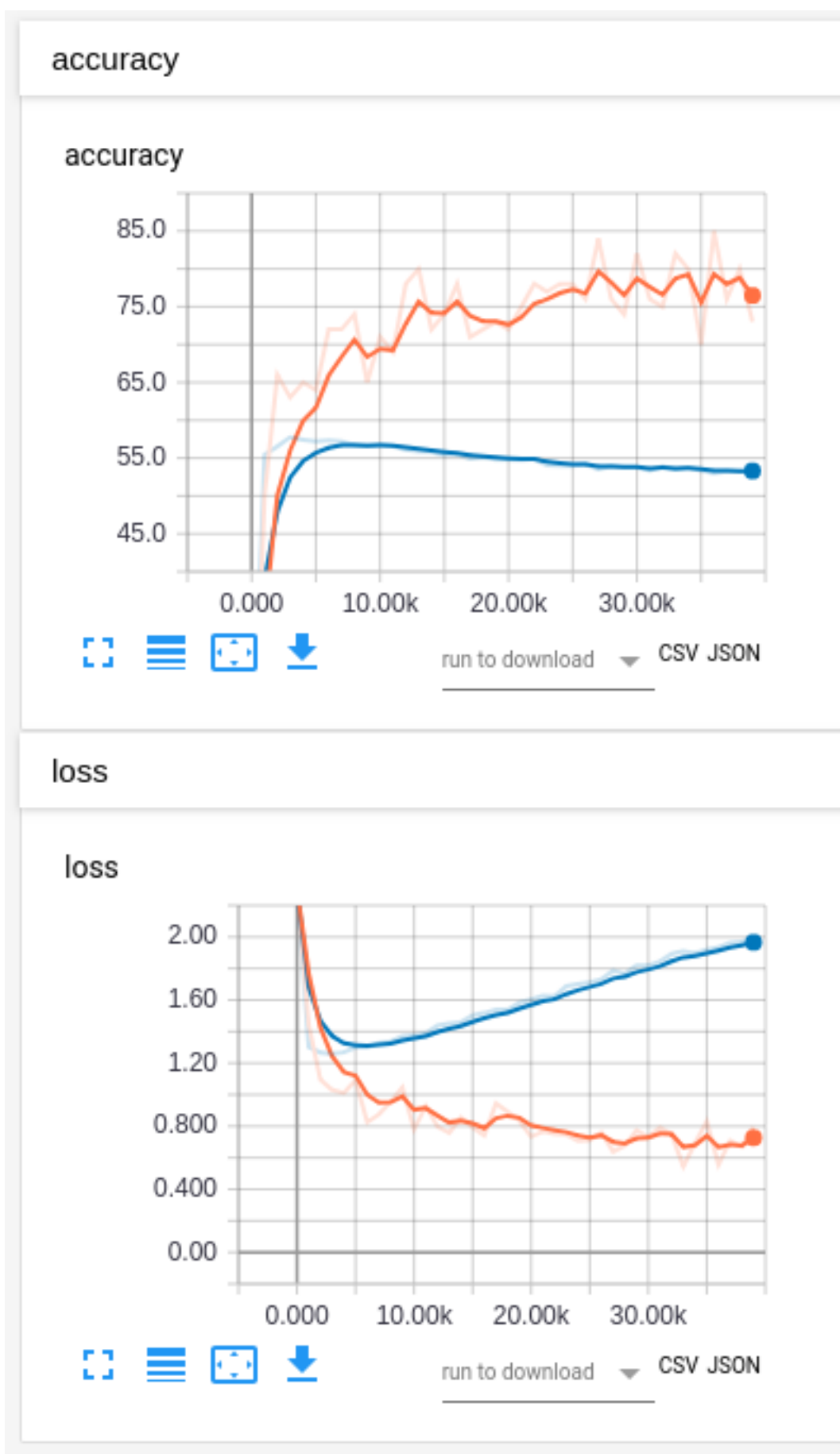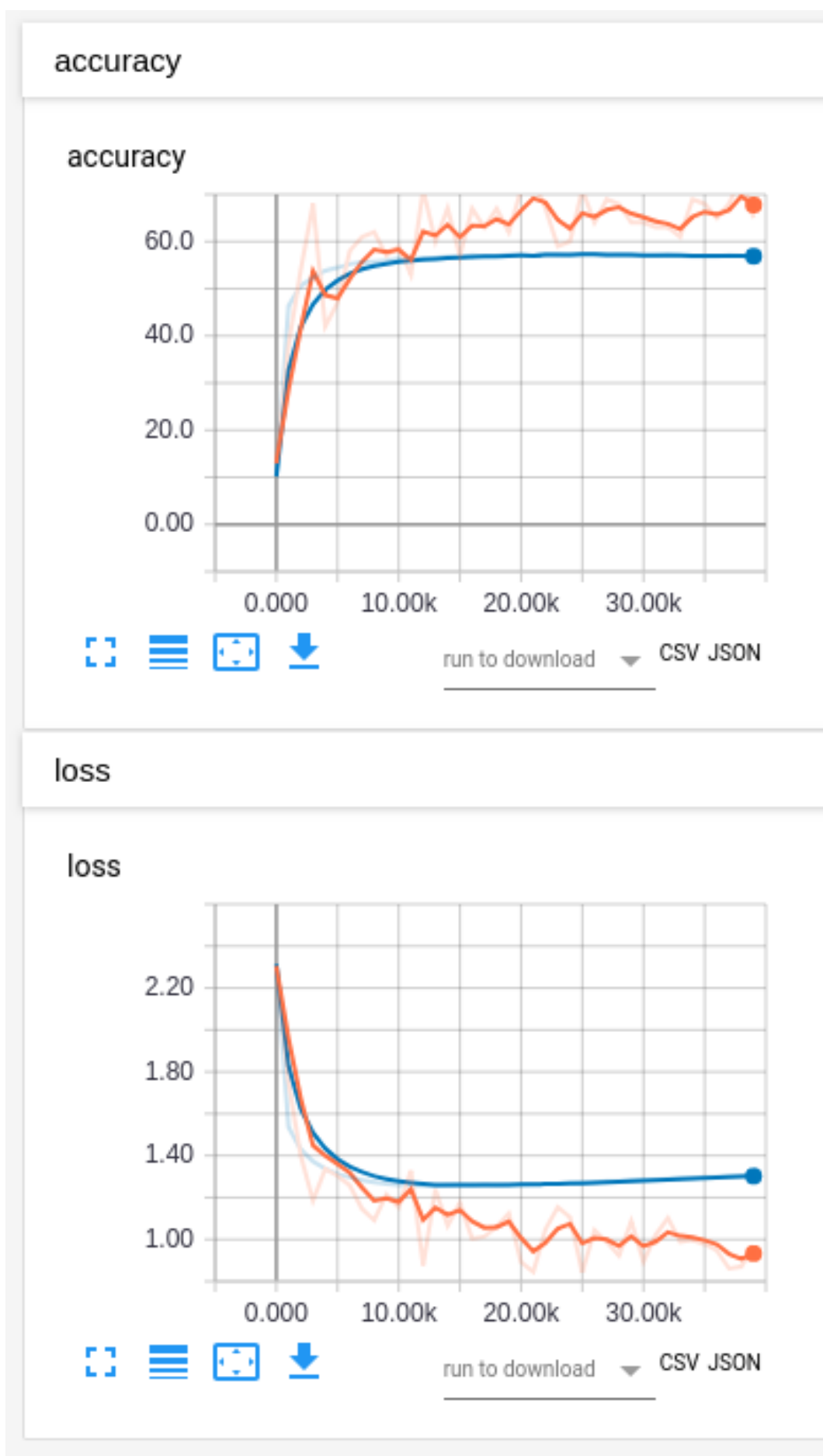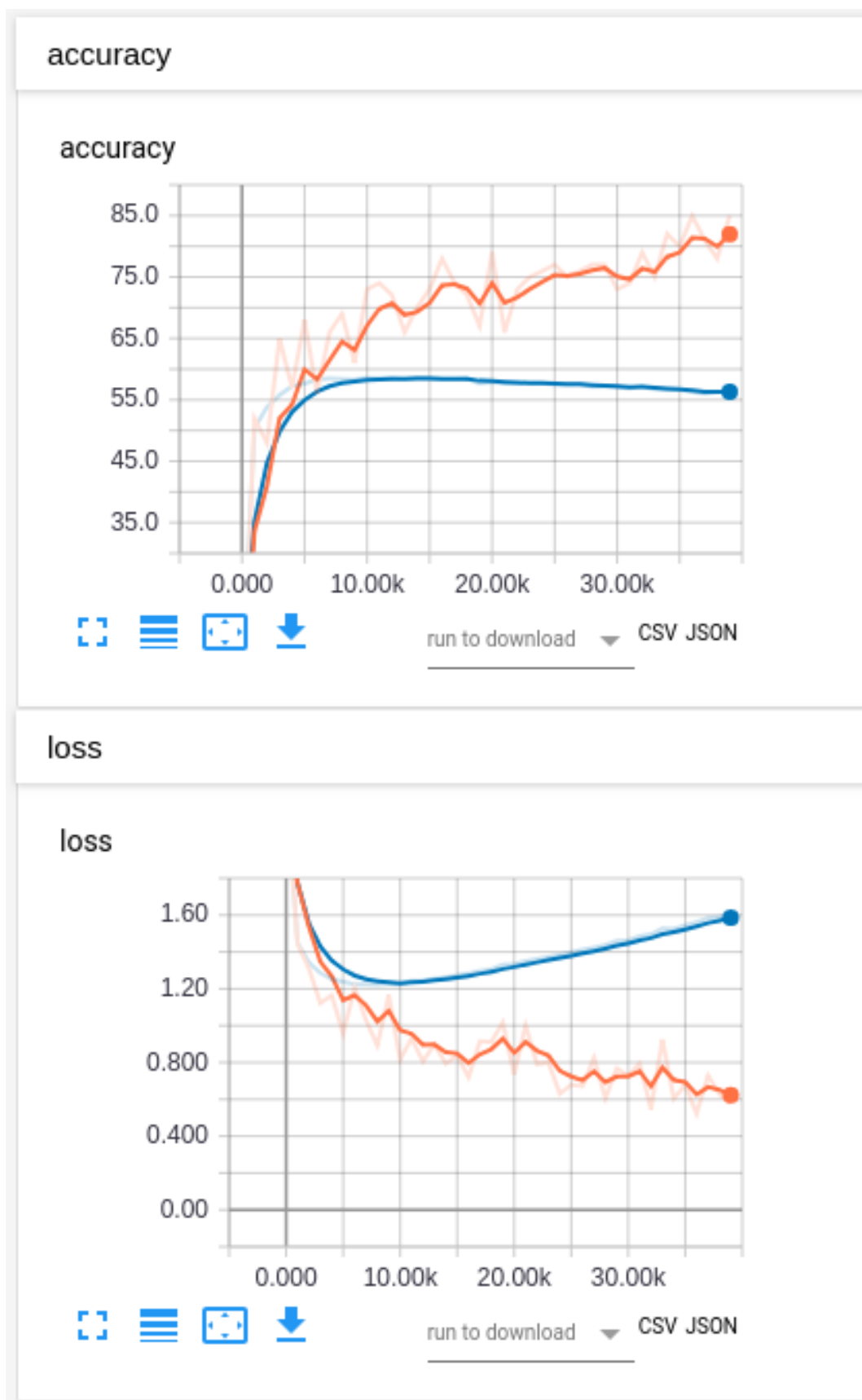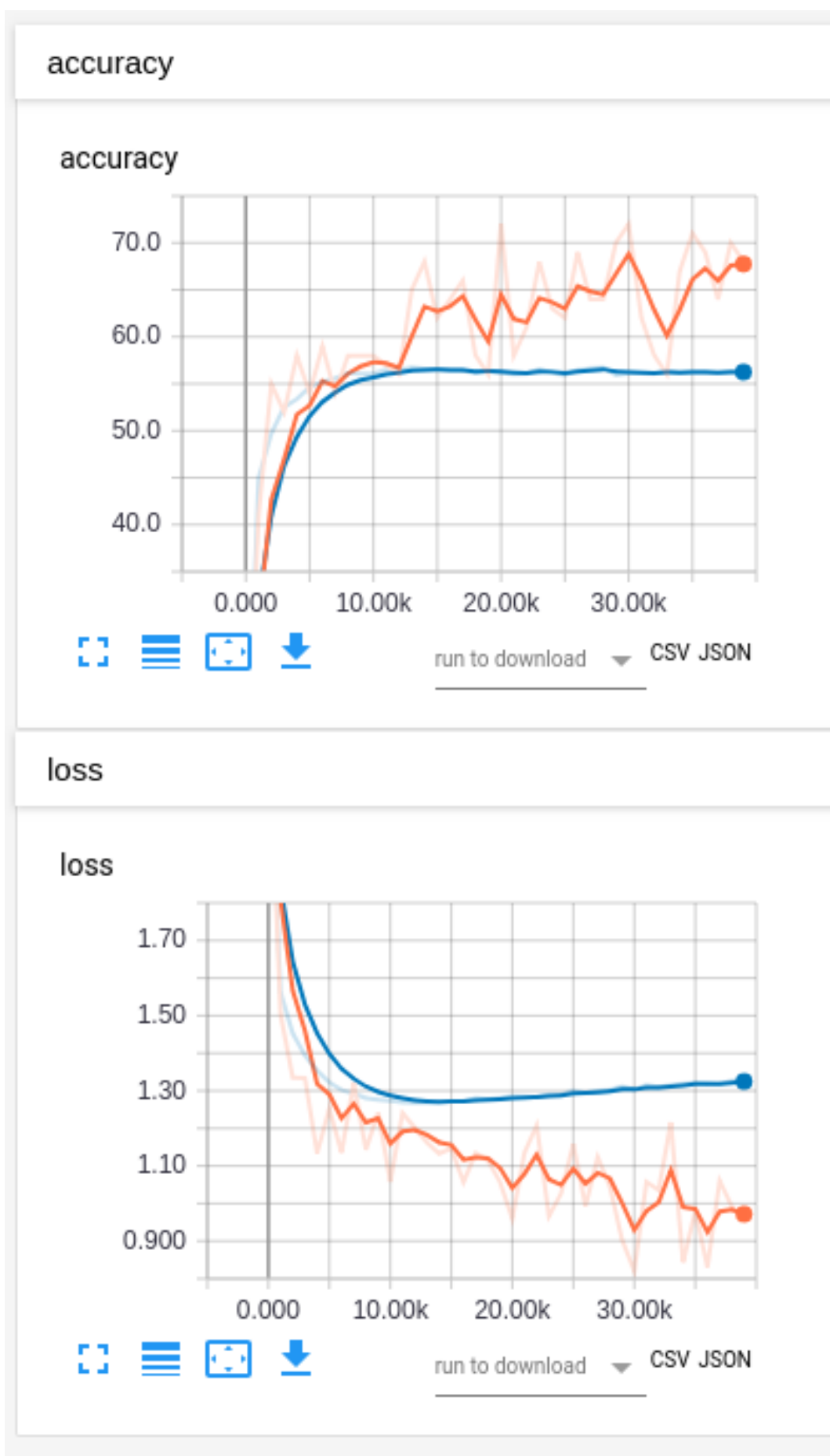
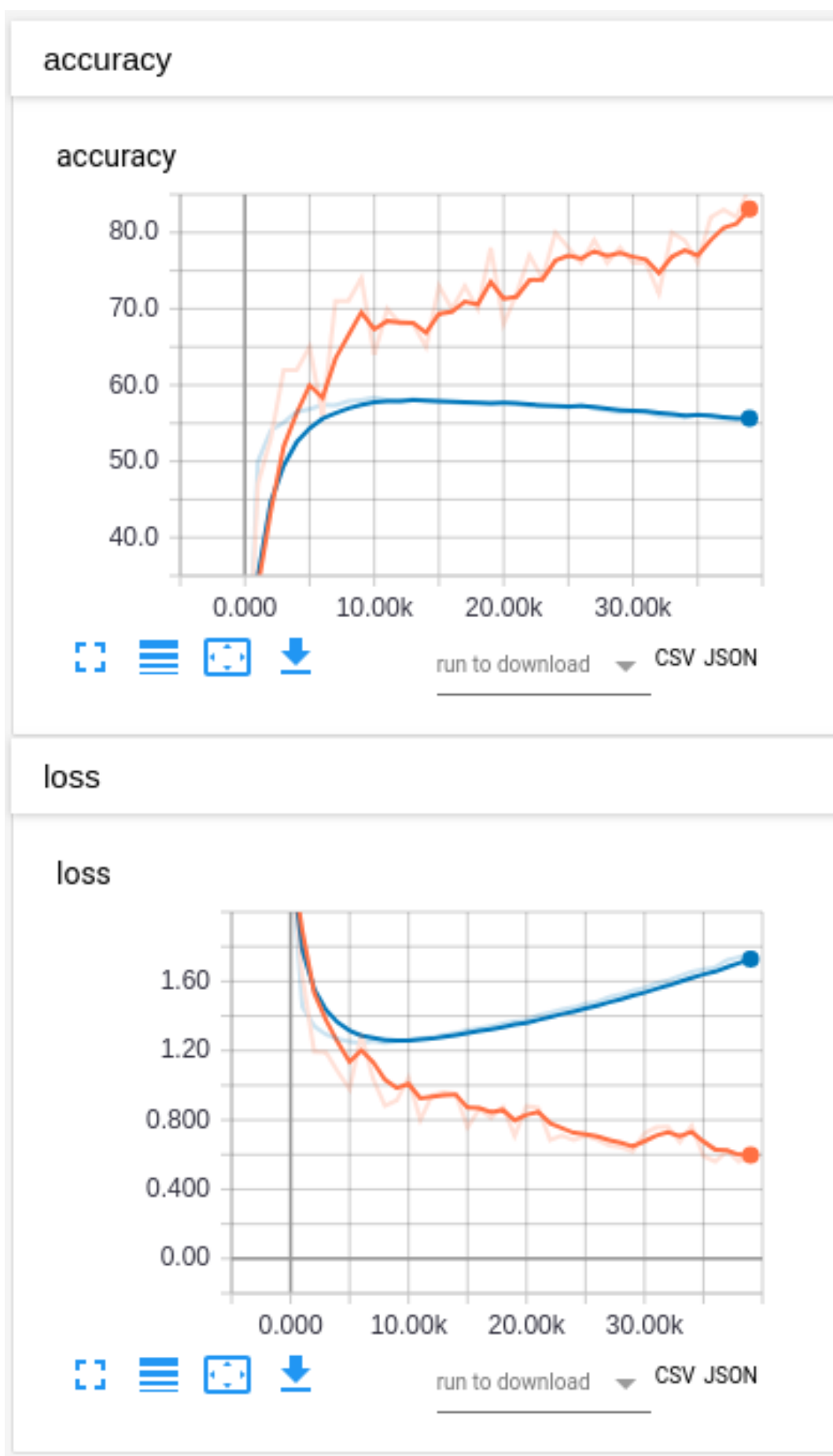Figure 1: Model 1 Testing

Figure 2: Model 2 Testing

Figure 3: Model 3 Testing

Figure 4: Model 4 Testing

Figure 5: Model 5 Testing