Multi-Head Classification

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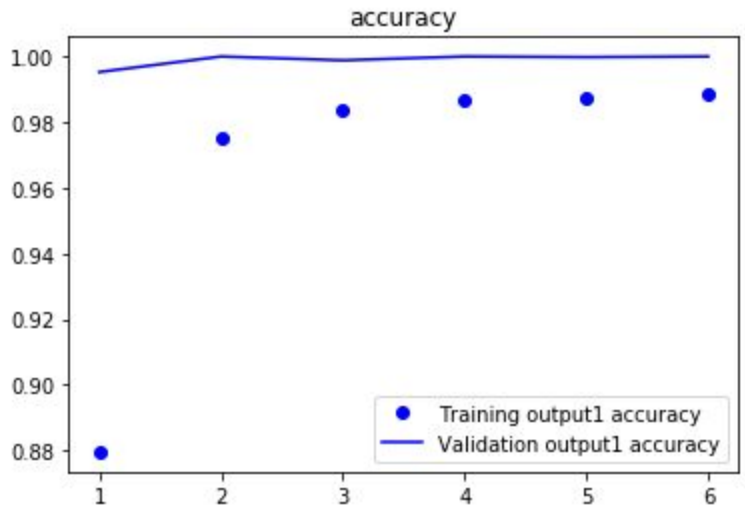
Group 21

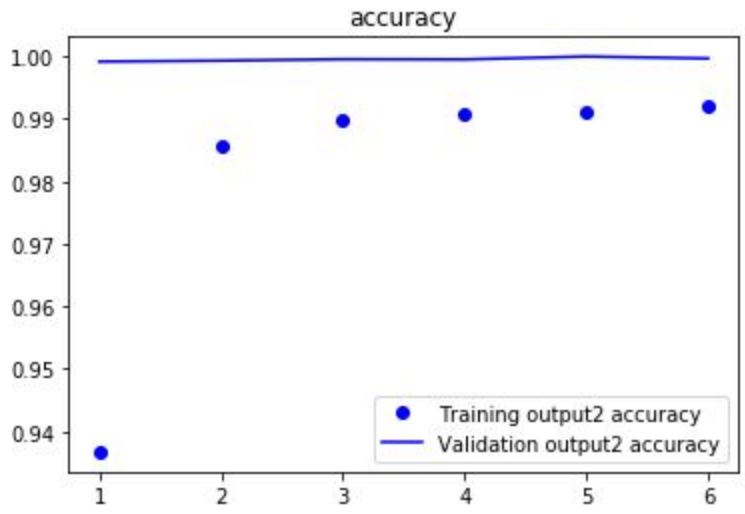
Line Dataset

Learning Curves:

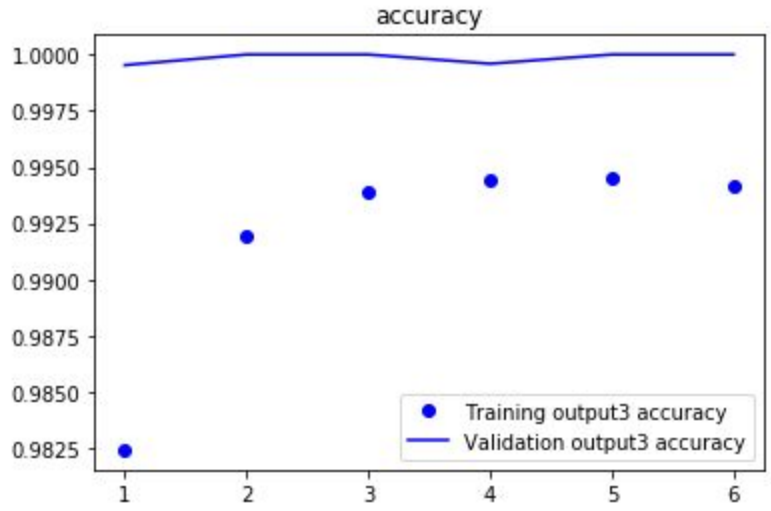
(A) Output 1 stands for Length



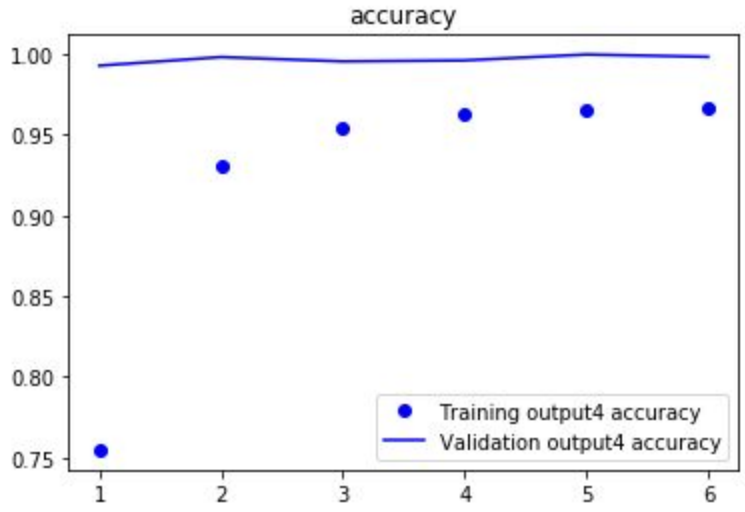
(B) Output 2 stands for width



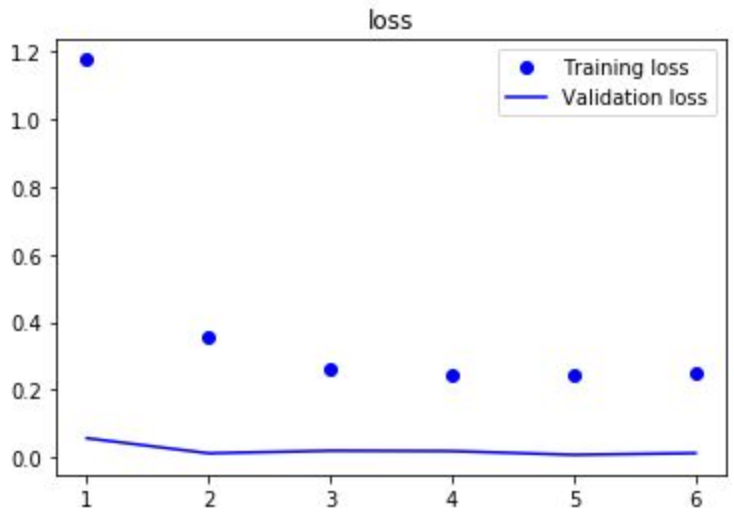
(C) Output 3 stands for Angle



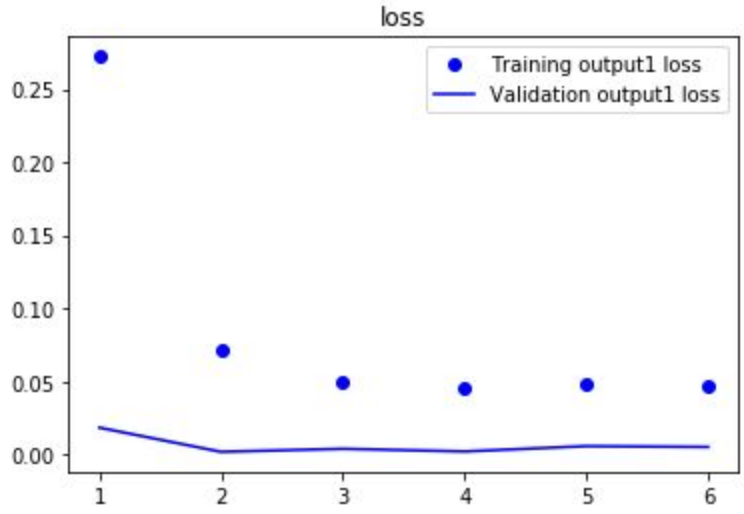
(D) Output 4 stands for colour



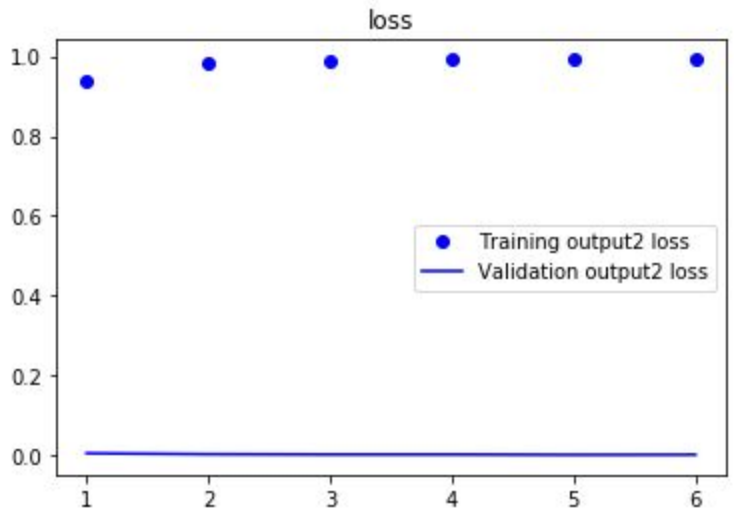
(E) Loss is for complete model



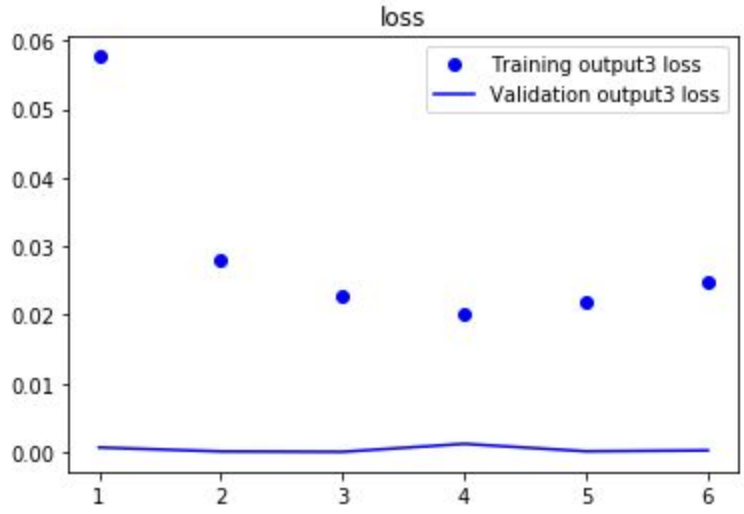
(F) Output 1 stands for Length



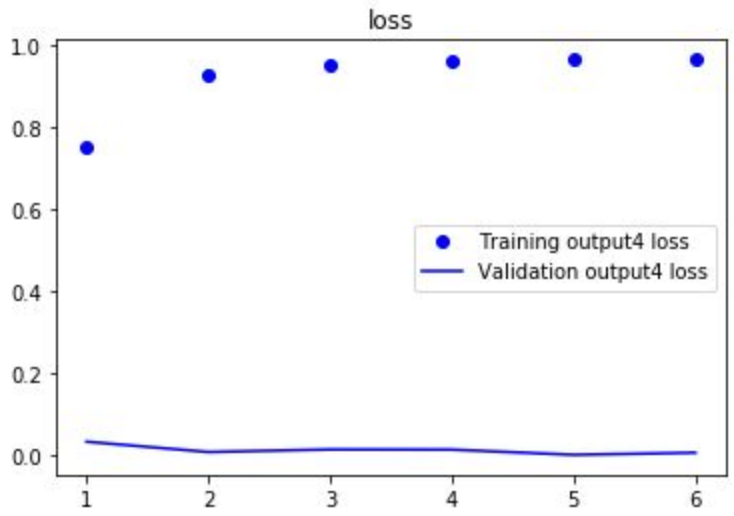
(G) Output 2 stands for Width



(H) Output 3 stands for Angle



(I) Output 4 stands for colour



F-Scores:

(A) 0.9907492084791505 (For Length Model)
(B) 0.7951630542667286 (For Width Model)
(C) 0.9982805118053002 (For Angle Model)
(D) 0.9822756853787273 (For Colour Model)

Confusion Matrices:

(A) For Length Model

```
[[48000     0]
 [  888 47112]]
```

(B) For Width Model

```
[[48000     0]
[18902 29098]]
```

(C) For Angle Model

```
[[8000    0    0    0    0    0    0    0    0    0    0    0]
[   0 8000    0    0    0    0    0    0    0    0    0    0]
[   0    0 8000    0    0    0    0    0    0    0    0    0]
[   0    0    0 8000    0    0    0    0    0    0    0    0]
[   0    0    0    0 7962   38    0    0    0    0    0    0]
[   0    0    0    0    0 8000    0    0    0    0    0    0]
[   0    0    0    0    0    0 8000    0    0    0    0    0]
[   0    0    0    0    0    0   50 7950    0    0    0    0]
[   0    0    0    0    0    0    0    0 8000    0    0    0]
[   0    0    0    0    0    0    0    0    0 8000    0    0]
[   0    0    0    0    0    0    0    0    0    0 8000    0]
[  19   58    0    0    0    0    0    0    0    0    0 7923]]
```

(D) For Colour Model

```
[[48000     0]
 [ 1701 46299]]
```

Inferences:

(A) In this model we saw it sub-divided into two elementry elements in which first was group of convolution and max pool layers for feature extraction supported by Dropout heuristics.

And second was 4 subgroups of fully connected layers responsible for 4 types of predictions respectively.

Since Fully collected layers are easier to design as they are only responsible for calculation of results in form of features obtained from feature base layer.

So main part of question was to design feature extraction layers. Thats why for maximum feature extraction we applied alternated convolution layers and max

pool layers till plane of images is reduced to 1 while all the features are calculated in image height.

Results Obtained after final 6th epoch are:

Epoch 6/6

64319/64319 [==============================] - 40s 617us/step - loss: 0.2523 - output1_loss: 0.0473 - output2_loss: 0.0337 - output4_loss: 0.1465 - output3_loss: 0.0247 - output1_acc: 0.9883 - output2_acc: 0.9920 - output4_acc: 0.9665 - output3_acc: 0.9941 - val_loss: 0.0126 - val_output1_loss: 0.0052 - val_output2_loss: 4.5386e-04 - val_output4_loss: 0.0067 - val_output3_loss: 2.4651e-04 - val_output1_acc: 1.0000 - val_output2_acc: 0.9997 - val_output4_acc: 0.9982 - val_output3_acc: 1.0000