Train on 50000 samples, validate on 10000 samples

Epoch 1/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0899 - acc: 0.1606 - val\_loss: 0.0898 - val\_acc: 0.1670

Epoch 2/15

50000/50000 [==============================] - 82s 2ms/sample - loss: 0.0897 - acc: 0.1671 - val\_loss: 0.0896 - val\_acc: 0.1487

Epoch 3/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0895 - acc: 0.1864 - val\_loss: 0.0893 - val\_acc: 0.2059

Epoch 4/15

50000/50000 [==============================] - 80s 2ms/sample - loss: 0.0889 - acc: 0.2283 - val\_loss: 0.0882 - val\_acc: 0.2172

Epoch 5/15

50000/50000 [==============================] - 80s 2ms/sample - loss: 0.0823 - acc: 0.2723 - val\_loss: 0.0727 - val\_acc: 0.4132

Epoch 6/15

50000/50000 [==============================] - 82s 2ms/sample - loss: 0.0528 - acc: 0.5988 - val\_loss: 0.0352 - val\_acc: 0.7483

Epoch 7/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0259 - acc: 0.8216 - val\_loss: 0.0278 - val\_acc: 0.8085

Epoch 8/15

50000/50000 [==============================] - 80s 2ms/sample - loss: 0.0152 - acc: 0.9000 - val\_loss: 0.0118 - val\_acc: 0.9184

Epoch 9/15

50000/50000 [==============================] - 80s 2ms/sample - loss: 0.0113 - acc: 0.9254 - val\_loss: 0.0095 - val\_acc: 0.9361

Epoch 10/15

50000/50000 [==============================] - 82s 2ms/sample - loss: 0.0095 - acc: 0.9389 - val\_loss: 0.0081 - val\_acc: 0.9486

Epoch 11/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0080 - acc: 0.9479 - val\_loss: 0.0062 - val\_acc: 0.9580

Epoch 12/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0071 - acc: 0.9541 - val\_loss: 0.0061 - val\_acc: 0.9615

Epoch 13/15

50000/50000 [==============================] - 82s 2ms/sample - loss: 0.0064 - acc: 0.9584 - val\_loss: 0.0066 - val\_acc: 0.9562

Epoch 14/15

50000/50000 [==============================] - 81s 2ms/sample - loss: 0.0058 - acc: 0.9632 - val\_loss: 0.0064 - val\_acc: 0.9578

Epoch 15/15

50000/50000 [==============================] - 82s 2ms/sample - loss: 0.0053 - acc: 0.9659 - val\_loss: 0.0046 - val\_acc: 0.9705

10000/10000 [==============================] - 6s 628us/sample - loss: 0.1631 - acc: 0.1842

The testing accuracy metric for 1 no. of lstm layers is [0.16307620179653168, 0.1842]

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Train on 50000 samples, validate on 10000 samples

Epoch 1/15

50000/50000 [==============================] - 161s 3ms/sample - loss: 0.0899 - acc: 0.1370 - val\_loss: 0.0897 - val\_acc: 0.1763

Epoch 2/15

50000/50000 [==============================] - 158s 3ms/sample - loss: 0.0896 - acc: 0.1922 - val\_loss: 0.0893 - val\_acc: 0.1922

Epoch 3/15

50000/50000 [==============================] - 154s 3ms/sample - loss: 0.0881 - acc: 0.1972 - val\_loss: 0.0853 - val\_acc: 0.1932

Epoch 4/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0824 - acc: 0.2468 - val\_loss: 0.0750 - val\_acc: 0.3682

Epoch 5/15

50000/50000 [==============================] - 156s 3ms/sample - loss: 0.0572 - acc: 0.5635 - val\_loss: 0.0330 - val\_acc: 0.7601

Epoch 6/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0263 - acc: 0.8198 - val\_loss: 0.0169 - val\_acc: 0.8891

Epoch 7/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0162 - acc: 0.8933 - val\_loss: 0.0123 - val\_acc: 0.9217

Epoch 8/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0116 - acc: 0.9245 - val\_loss: 0.0148 - val\_acc: 0.9040

Epoch 9/15

50000/50000 [==============================] - 154s 3ms/sample - loss: 0.0090 - acc: 0.9405 - val\_loss: 0.0068 - val\_acc: 0.9569

Epoch 10/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0078 - acc: 0.9499 - val\_loss: 0.0064 - val\_acc: 0.9589

Epoch 11/15

50000/50000 [==============================] - 154s 3ms/sample - loss: 0.0068 - acc: 0.9560 - val\_loss: 0.0070 - val\_acc: 0.9549

Epoch 12/15

50000/50000 [==============================] - 153s 3ms/sample - loss: 0.0060 - acc: 0.9611 - val\_loss: 0.0087 - val\_acc: 0.9424

Epoch 13/15

50000/50000 [==============================] - 154s 3ms/sample - loss: 0.0054 - acc: 0.9649 - val\_loss: 0.0050 - val\_acc: 0.9673

Epoch 14/15

50000/50000 [==============================] - 152s 3ms/sample - loss: 0.0050 - acc: 0.9676 - val\_loss: 0.0043 - val\_acc: 0.9725

Epoch 15/15

50000/50000 [==============================] - 154s 3ms/sample - loss: 0.0046 - acc: 0.9698 - val\_loss: 0.0052 - val\_acc: 0.9669

10000/10000 [==============================] - 12s 1ms/sample - loss: 0.1724 - acc: 0.1378

The testing accuracy metric for 2 no. of lstm layers is [0.17237381148338318, 0.1378]

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Train on 50000 samples, validate on 10000 samples

Epoch 1/15

50000/50000 [==============================] - 228s 5ms/sample - loss: 0.0899 - acc: 0.1456 - val\_loss: 0.0899 - val\_acc: 0.1078

Epoch 2/15

50000/50000 [==============================] - 226s 5ms/sample - loss: 0.0898 - acc: 0.1147 - val\_loss: 0.0898 - val\_acc: 0.1099

Epoch 3/15

50000/50000 [==============================] - 225s 4ms/sample - loss: 0.0897 - acc: 0.1340 - val\_loss: 0.0896 - val\_acc: 0.1443

Epoch 4/15

50000/50000 [==============================] - 225s 5ms/sample - loss: 0.0893 - acc: 0.1872 - val\_loss: 0.0890 - val\_acc: 0.2105

Epoch 5/15

50000/50000 [==============================] - 227s 5ms/sample - loss: 0.0868 - acc: 0.2160 - val\_loss: 0.0823 - val\_acc: 0.2318

Epoch 6/15

50000/50000 [==============================] - 374s 7ms/sample - loss: 0.0779 - acc: 0.3163 - val\_loss: 0.0725 - val\_acc: 0.4252

Epoch 7/15

50000/50000 [==============================] - 529s 11ms/sample - loss: 0.0571 - acc: 0.5625 - val\_loss: 0.0381 - val\_acc: 0.7254

Epoch 8/15

50000/50000 [==============================] - 642s 13ms/sample - loss: 0.0305 - acc: 0.7876 - val\_loss: 0.0226 - val\_acc: 0.8496

Epoch 9/15

50000/50000 [==============================] - 635s 13ms/sample - loss: 0.0189 - acc: 0.8738 - val\_loss: 0.0126 - val\_acc: 0.9188

Epoch 10/15

50000/50000 [==============================] - 627s 13ms/sample - loss: 0.0129 - acc: 0.9150 - val\_loss: 0.0103 - val\_acc: 0.9297

Epoch 11/15

50000/50000 [==============================] - 628s 13ms/sample - loss: 0.0102 - acc: 0.9334 - val\_loss: 0.0095 - val\_acc: 0.9379

Epoch 12/15

50000/50000 [==============================] - 623s 12ms/sample - loss: 0.0085 - acc: 0.9446 - val\_loss: 0.0083 - val\_acc: 0.9450

Epoch 13/15

50000/50000 [==============================] - 619s 12ms/sample - loss: 0.0074 - acc: 0.9519 - val\_loss: 0.0064 - val\_acc: 0.9580

Epoch 14/15

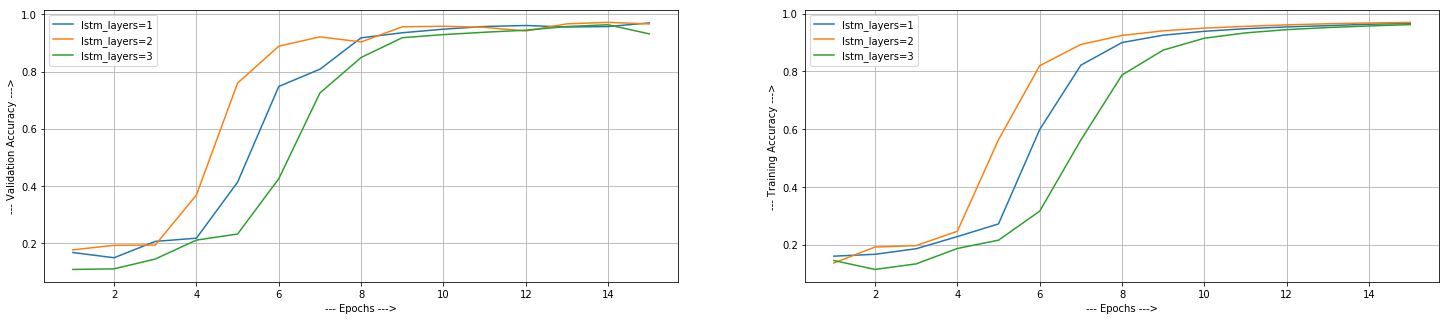
50000/50000 [==============================] - 618s 12ms/sample - loss: 0.0065 - acc: 0.9574 - val\_loss: 0.0054 - val\_acc: 0.9641

Epoch 15/15

50000/50000 [==============================] - 618s 12ms/sample - loss: 0.0059 - acc: 0.9620 - val\_loss: 0.0103 - val\_acc: 0.9320

10000/10000 [==============================] - 47s 5ms/sample - loss: 0.1695 - acc: 0.1522

The testing accuracy metric for 3 no. of lstm layers is [0.16953775885105132, 0.1522]



The above graphs shows that 2 number of LSTM layer is giving the best performance. Better than 3 and 1.