```
In [3]: runfile('C:/Users/Nitesh Vudutha/Downloads/Spring Semester/Deep Learning/
Assignments/Assignment 8/DL8B.py', wdir='C:/Users/Nitesh Vudutha/Downloads/Spring
Semester/Deep Learning/Assignments/Assignment 8')
```

```
_____
Layer (type)                 Output Shape              Param #
=================================================================
dense_2 (Dense)              (None, 16)                160016
_____
dense_3 (Dense)              (None, 16)                272
_____
dense_4 (Dense)              (None, 1)                 17
=================================================================
Total params: 160,305
Trainable params: 160,305
Non-trainable params: 0
_____
None
Train on 25000 samples, validate on 25000 samples
Epoch 1/20
 - 6s - loss: 0.4599 - acc: 0.8194 - binary_crossentropy: 0.4599 - val_loss: 0.3197 -
val_acc: 0.8794 - val_binary_crossentropy: 0.3197
Epoch 2/20
 - 5s - loss: 0.2364 - acc: 0.9154 - binary_crossentropy: 0.2364 - val_loss: 0.2844 -
val_acc: 0.8877 - val_binary_crossentropy: 0.2844
Epoch 3/20
 - 5s - loss: 0.1753 - acc: 0.9384 - binary_crossentropy: 0.1753 - val_loss: 0.2964 -
val_acc: 0.8821 - val_binary_crossentropy: 0.2964
Epoch 4/20
 - 5s - loss: 0.1423 - acc: 0.9505 - binary_crossentropy: 0.1423 - val_loss: 0.3375 -
val_acc: 0.8714 - val_binary_crossentropy: 0.3375
Epoch 5/20
 - 5s - loss: 0.1154 - acc: 0.9618 - binary_crossentropy: 0.1154 - val_loss: 0.3468 -
val_acc: 0.8728 - val_binary_crossentropy: 0.3468
Epoch 6/20
 - 5s - loss: 0.0911 - acc: 0.9726 - binary_crossentropy: 0.0911 - val_loss: 0.3805 -
val_acc: 0.8687 - val_binary_crossentropy: 0.3805
Epoch 7/20
 - 5s - loss: 0.0699 - acc: 0.9812 - binary_crossentropy: 0.0699 - val_loss: 0.4222 -
val_acc: 0.8657 - val_binary_crossentropy: 0.4222
Epoch 8/20
 - 5s - loss: 0.0522 - acc: 0.9880 - binary_crossentropy: 0.0522 - val_loss: 0.4674 -
val_acc: 0.8620 - val_binary_crossentropy: 0.4674
Epoch 9/20
 - 5s - loss: 0.0367 - acc: 0.9936 - binary_crossentropy: 0.0367 - val_loss: 0.5087 -
val_acc: 0.8612 - val_binary_crossentropy: 0.5087
Epoch 10/20
 - 5s - loss: 0.0272 - acc: 0.9960 - binary_crossentropy: 0.0272 - val_loss: 0.5578 -
val_acc: 0.8594 - val_binary_crossentropy: 0.5578
Epoch 11/20
 - 5s - loss: 0.0183 - acc: 0.9981 - binary_crossentropy: 0.0183 - val_loss: 0.5996 -
val_acc: 0.8580 - val_binary_crossentropy: 0.5996
Epoch 12/20
 - 5s - loss: 0.0126 - acc: 0.9993 - binary_crossentropy: 0.0126 - val_loss: 0.6365 -
```

```
val_acc: 0.8572 - val_binary_crossentropy: 0.6365
Epoch 13/20
 - 5s - loss: 0.0089 - acc: 0.9998 - binary_crossentropy: 0.0089 - val_loss: 0.6691 -
val_acc: 0.8565 - val_binary_crossentropy: 0.6691
Epoch 14/20
 - 5s - loss: 0.0066 - acc: 0.9998 - binary_crossentropy: 0.0066 - val_loss: 0.7019 -
val_acc: 0.8550 - val_binary_crossentropy: 0.7019
Epoch 15/20
 - 5s - loss: 0.0052 - acc: 1.0000 - binary_crossentropy: 0.0052 - val_loss: 0.7300 -
val_acc: 0.8549 - val_binary_crossentropy: 0.7300
Epoch 16/20
 - 5s - loss: 0.0041 - acc: 1.0000 - binary_crossentropy: 0.0041 - val_loss: 0.7524 -
val_acc: 0.8544 - val_binary_crossentropy: 0.7524
Epoch 17/20
 - 5s - loss: 0.0033 - acc: 1.0000 - binary_crossentropy: 0.0033 - val_loss: 0.7727 -
val_acc: 0.8543 - val_binary_crossentropy: 0.7727
Epoch 18/20
 - 5s - loss: 0.0027 - acc: 1.0000 - binary_crossentropy: 0.0027 - val_loss: 0.7968 -
val_acc: 0.8542 - val_binary_crossentropy: 0.7968
Epoch 19/20
 - 5s - loss: 0.0023 - acc: 1.0000 - binary_crossentropy: 0.0023 - val_loss: 0.8142 -
val_acc: 0.8540 - val_binary_crossentropy: 0.8142
Epoch 20/20
 - 5s - loss: 0.0020 - acc: 1.0000 - binary_crossentropy: 0.0020 - val_loss: 0.8314 -
val_acc: 0.8541 - val_binary_crossentropy: 0.8314
```

Layer (type)	Output Shape	Param #
dense_5 (Dense)	(None, 4)	40004
dense_6 (Dense)	(None, 4)	20
dense_7 (Dense)	(None, 1)	5

```
Total params: 40,029
Trainable params: 40,029
Non-trainable params: 0
_____
None
Train on 25000 samples, validate on 25000 samples
Epoch 1/20
 - 5s - loss: 0.5821 - acc: 0.7518 - binary_crossentropy: 0.5821 - val_loss: 0.4720 -
val_acc: 0.8610 - val_binary_crossentropy: 0.4720
Epoch 2/20
 - 4s - loss: 0.3761 - acc: 0.8893 - binary_crossentropy: 0.3761 - val_loss: 0.3539 -
val_acc: 0.8809 - val_binary_crossentropy: 0.3539
Epoch 3/20
 - 4s - loss: 0.2742 - acc: 0.9176 - binary_crossentropy: 0.2742 - val_loss: 0.3075 -
val_acc: 0.8879 - val_binary_crossentropy: 0.3075
Epoch 4/20
 - 4s - loss: 0.2202 - acc: 0.9309 - binary_crossentropy: 0.2202 - val_loss: 0.2906 -
val_acc: 0.8877 - val_binary_crossentropy: 0.2906
Epoch 5/20
 - 4s - loss: 0.1867 - acc: 0.9414 - binary_crossentropy: 0.1867 - val_loss: 0.2875 -
val_acc: 0.8860 - val_binary_crossentropy: 0.2875
```

```
Epoch 6/20
 - 4s - loss: 0.1636 - acc: 0.9492 - binary_crossentropy: 0.1636 - val_loss: 0.2929 -
val_acc: 0.8835 - val_binary_crossentropy: 0.2929
Epoch 7/20
 - 4s - loss: 0.1446 - acc: 0.9560 - binary_crossentropy: 0.1446 - val_loss: 0.2991 -
val_acc: 0.8817 - val_binary_crossentropy: 0.2991
Epoch 8/20
 - 4s - loss: 0.1297 - acc: 0.9609 - binary_crossentropy: 0.1297 - val_loss: 0.3096 -
val_acc: 0.8796 - val_binary_crossentropy: 0.3096
Epoch 9/20
 - 4s - loss: 0.1165 - acc: 0.9668 - binary_crossentropy: 0.1165 - val_loss: 0.3262 -
val_acc: 0.8775 - val_binary_crossentropy: 0.3262
Epoch 10/20
 - 4s - loss: 0.1058 - acc: 0.9707 - binary_crossentropy: 0.1058 - val_loss: 0.3367 -
val_acc: 0.8753 - val_binary_crossentropy: 0.3367
Epoch 11/20
 - 4s - loss: 0.0958 - acc: 0.9740 - binary_crossentropy: 0.0958 - val_loss: 0.3540 -
val_acc: 0.8730 - val_binary_crossentropy: 0.3540
Epoch 12/20
 - 4s - loss: 0.0873 - acc: 0.9771 - binary_crossentropy: 0.0873 - val_loss: 0.3710 -
val_acc: 0.8714 - val_binary_crossentropy: 0.3710
Epoch 13/20
 - 4s - loss: 0.0792 - acc: 0.9805 - binary_crossentropy: 0.0792 - val_loss: 0.3894 -
val_acc: 0.8681 - val_binary_crossentropy: 0.3894
Epoch 14/20
 - 4s - loss: 0.0723 - acc: 0.9831 - binary_crossentropy: 0.0723 - val_loss: 0.4065 -
val_acc: 0.8664 - val_binary_crossentropy: 0.4065
Epoch 15/20
 - 4s - loss: 0.0661 - acc: 0.9862 - binary_crossentropy: 0.0661 - val_loss: 0.4280 -
val_acc: 0.8645 - val_binary_crossentropy: 0.4280
Epoch 16/20
 - 4s - loss: 0.0604 - acc: 0.9883 - binary_crossentropy: 0.0604 - val_loss: 0.4443 -
val_acc: 0.8644 - val_binary_crossentropy: 0.4443
Epoch 17/20
 - 4s - loss: 0.0550 - acc: 0.9902 - binary_crossentropy: 0.0550 - val_loss: 0.4638 -
val_acc: 0.8628 - val_binary_crossentropy: 0.4638
Epoch 18/20
 - 4s - loss: 0.0501 - acc: 0.9920 - binary_crossentropy: 0.0501 - val_loss: 0.4835 -
val_acc: 0.8610 - val_binary_crossentropy: 0.4835
Epoch 19/20
 - 4s - loss: 0.0460 - acc: 0.9930 - binary_crossentropy: 0.0460 - val_loss: 0.5025 -
val_acc: 0.8611 - val_binary_crossentropy: 0.5025
Epoch 20/20
 - 4s - loss: 0.0420 - acc: 0.9943 - binary_crossentropy: 0.0420 - val_loss: 0.5208 -
val_acc: 0.8598 - val_binary_crossentropy: 0.5208
```

Layer (type)	Output Shape	Param #
dense_8 (Dense)	(None, 512)	5120512
dense_9 (Dense)	(None, 512)	262656
dense_10 (Dense)	(None, 1)	513

Total params: 5,383,681

```
Trainable params: 5,383,681
Non-trainable params: 0
_____
None
Train on 25000 samples, validate on 25000 samples
Epoch 1/20
 - 13s - loss: 0.3407 - acc: 0.8545 - binary_crossentropy: 0.3407 - val_loss: 0.2961 -
val_acc: 0.8792 - val_binary_crossentropy: 0.2961
Epoch 2/20
 - 14s - loss: 0.1429 - acc: 0.9480 - binary_crossentropy: 0.1429 - val_loss: 0.3357 -
val_acc: 0.8701 - val_binary_crossentropy: 0.3357
Epoch 3/20
 - 14s - loss: 0.0475 - acc: 0.9858 - binary_crossentropy: 0.0475 - val_loss: 0.4591 -
val_acc: 0.8702 - val_binary_crossentropy: 0.4591
Epoch 4/20
 - 14s - loss: 0.0082 - acc: 0.9984 - binary_crossentropy: 0.0082 - val_loss: 0.5841 -
val_acc: 0.8690 - val_binary_crossentropy: 0.5841
Epoch 5/20
 - 14s - loss: 0.0012 - acc: 0.9999 - binary_crossentropy: 0.0012 - val_loss: 0.6821 -
val_acc: 0.8697 - val_binary_crossentropy: 0.6821
Epoch 6/20
 - 14s - loss: 5.3798e-04 - acc: 1.0000 - binary_crossentropy: 5.3798e-04 - val_loss:
0.7315 - val_acc: 0.8690 - val_binary_crossentropy: 0.7315
Epoch 7/20
 - 14s - loss: 3.3189e-04 - acc: 1.0000 - binary_crossentropy: 3.3189e-04 - val_loss:
0.7526 - val_acc: 0.8706 - val_binary_crossentropy: 0.7526
Epoch 8/20
 - 14s - loss: 1.0881e-04 - acc: 1.0000 - binary_crossentropy: 1.0881e-04 - val_loss:
0.7758 - val_acc: 0.8705 - val_binary_crossentropy: 0.7758
Epoch 9/20
 - 14s - loss: 7.8799e-05 - acc: 1.0000 - binary_crossentropy: 7.8799e-05 - val_loss:
0.7941 - val_acc: 0.8707 - val_binary_crossentropy: 0.7941
Epoch 10/20
 - 14s - loss: 5.9868e-05 - acc: 1.0000 - binary_crossentropy: 5.9868e-05 - val_loss:
0.8121 - val_acc: 0.8706 - val_binary_crossentropy: 0.8121
Epoch 11/20
 - 14s - loss: 4.6000e-05 - acc: 1.0000 - binary_crossentropy: 4.6000e-05 - val_loss:
0.8302 - val_acc: 0.8707 - val_binary_crossentropy: 0.8302
Epoch 12/20
 - 14s - loss: 3.5688e-05 - acc: 1.0000 - binary_crossentropy: 3.5688e-05 - val_loss:
0.8468 - val_acc: 0.8705 - val_binary_crossentropy: 0.8468
Epoch 13/20
 - 14s - loss: 2.7823e-05 - acc: 1.0000 - binary_crossentropy: 2.7823e-05 - val_loss:
0.8632 - val_acc: 0.8704 - val_binary_crossentropy: 0.8632
Epoch 14/20
 - 14s - loss: 2.2059e-05 - acc: 1.0000 - binary_crossentropy: 2.2059e-05 - val_loss:
0.8797 - val_acc: 0.8708 - val_binary_crossentropy: 0.8797
Epoch 15/20
 - 14s - loss: 1.7695e-05 - acc: 1.0000 - binary_crossentropy: 1.7695e-05 - val_loss:
0.8937 - val_acc: 0.8708 - val_binary_crossentropy: 0.8937
Epoch 16/20
 - 14s - loss: 1.4480e-05 - acc: 1.0000 - binary_crossentropy: 1.4480e-05 - val_loss:
0.9082 - val_acc: 0.8708 - val_binary_crossentropy: 0.9082
Epoch 17/20
 - 14s - loss: 1.2001e-05 - acc: 1.0000 - binary_crossentropy: 1.2001e-05 - val_loss:
```

```
0.9201 - val_acc: 0.8708 - val_binary_crossentropy: 0.9201
Epoch 18/20
 - 15s - loss: 1.0071e-05 - acc: 1.0000 - binary_crossentropy: 1.0071e-05 - val_loss:
0.9314 - val_acc: 0.8708 - val_binary_crossentropy: 0.9314
Epoch 19/20
 - 14s - loss: 8.5722e-06 - acc: 1.0000 - binary_crossentropy: 8.5722e-06 - val_loss:
0.9411 - val_acc: 0.8706 - val_binary_crossentropy: 0.9411
Epoch 20/20
 - 14s - loss: 7.3914e-06 - acc: 1.0000 - binary_crossentropy: 7.3914e-06 - val_loss:
0.9509 - val_acc: 0.8707 - val_binary_crossentropy: 0.9509
```
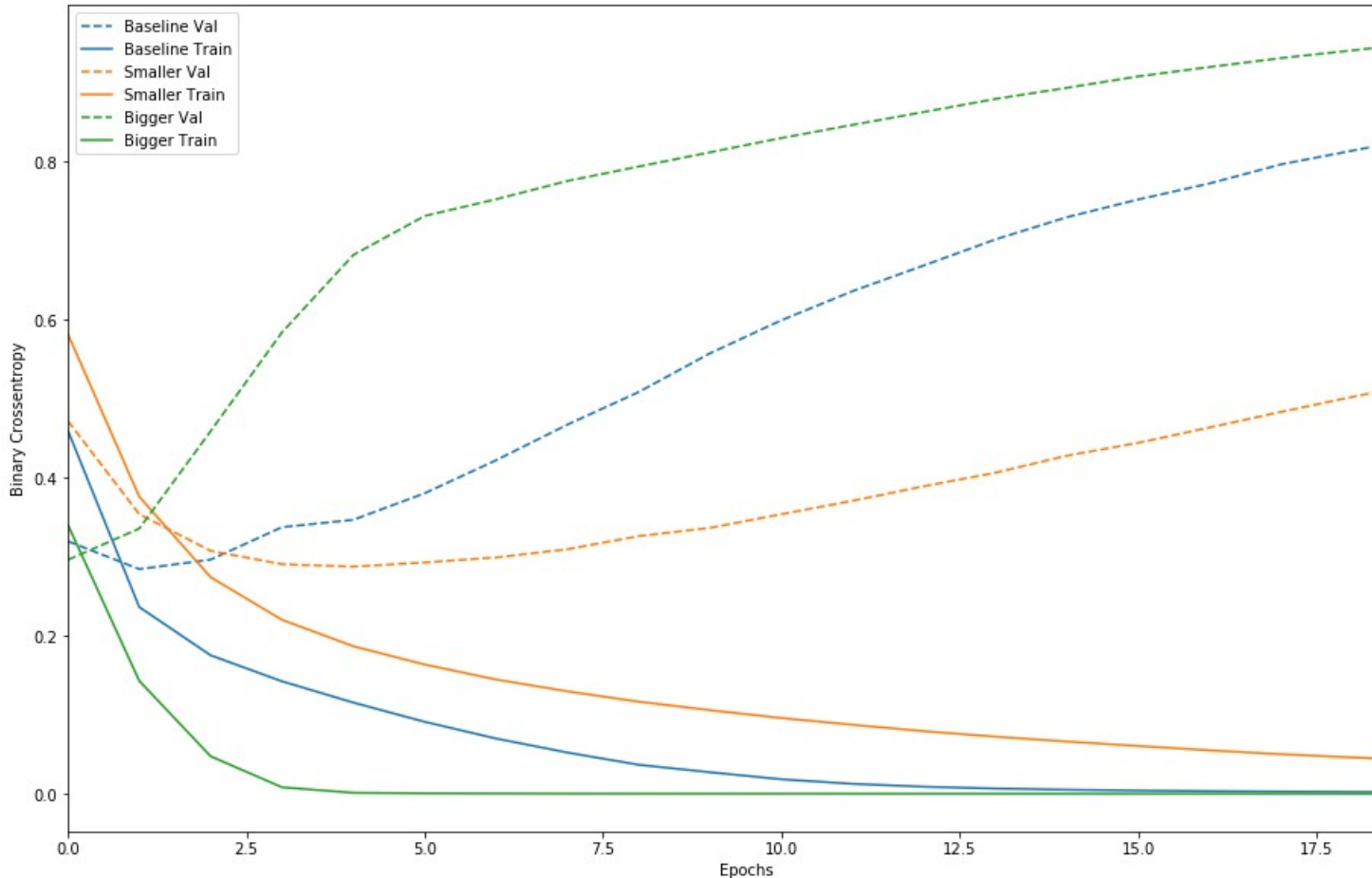


```
Train on 25000 samples, validate on 25000 samples
Epoch 1/20
 - 5s - loss: 0.5374 - acc: 0.8083 - binary_crossentropy: 0.4981 - val_loss: 0.3882 -
val_acc: 0.8750 - val_binary_crossentropy: 0.3461
Epoch 2/20
 - 5s - loss: 0.3116 - acc: 0.9063 - binary_crossentropy: 0.2642 - val_loss: 0.3369 -
val_acc: 0.8877 - val_binary_crossentropy: 0.2857
Epoch 3/20
 - 5s - loss: 0.2577 - acc: 0.9280 - binary_crossentropy: 0.2036 - val_loss: 0.3385 -
val_acc: 0.8854 - val_binary_crossentropy: 0.2826
Epoch 4/20
 - 5s - loss: 0.2354 - acc: 0.9385 - binary_crossentropy: 0.1776 - val_loss: 0.3549 -
val_acc: 0.8801 - val_binary_crossentropy: 0.2959
Epoch 5/20
 - 5s - loss: 0.2204 - acc: 0.9457 - binary_crossentropy: 0.1603 - val_loss: 0.3656 -
```
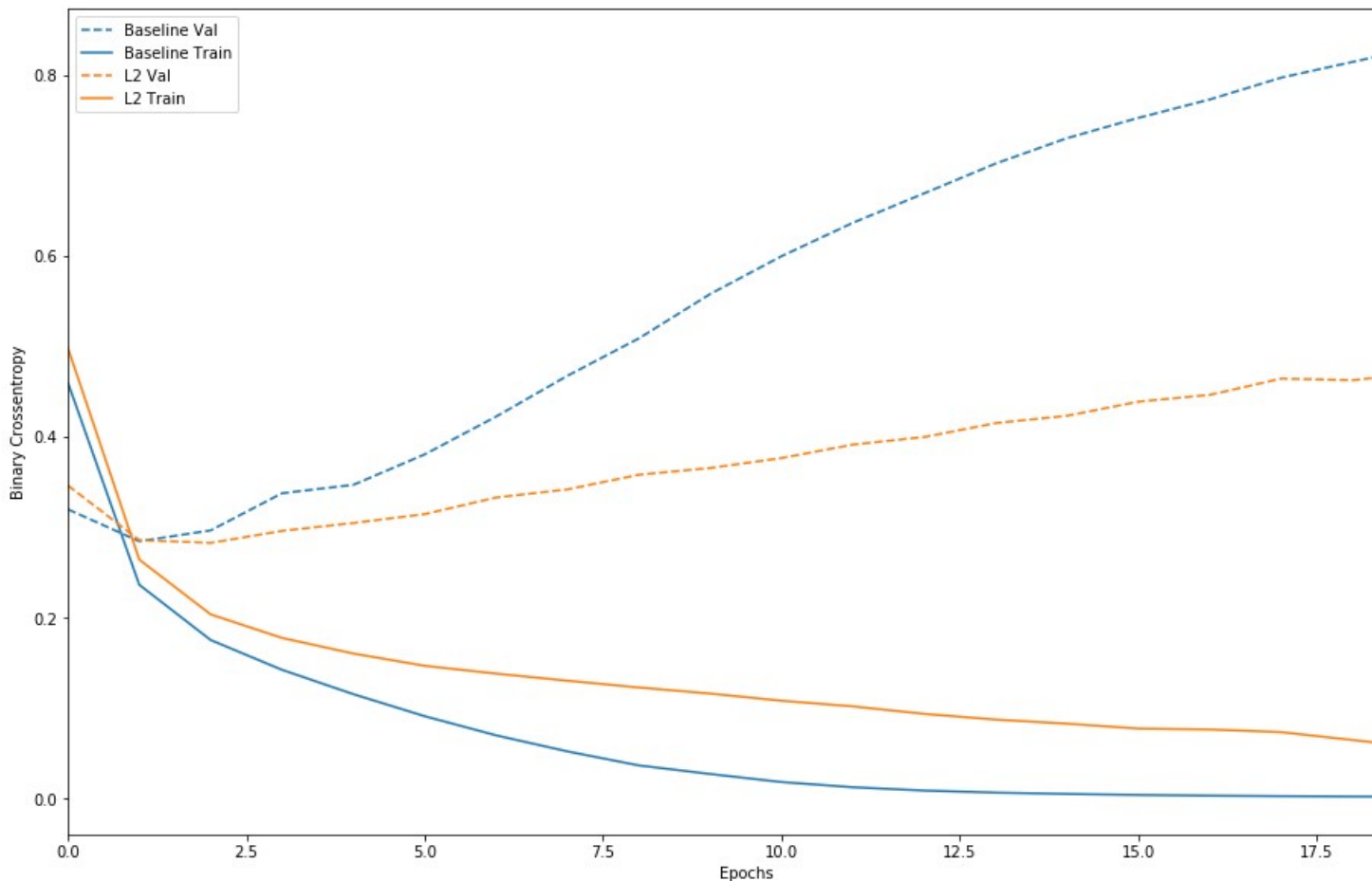
val_acc: 0.8782 - val_binary_crossentropy: 0.3046
Epoch 6/20
 - 6s - loss: 0.2087 - acc: 0.9510 - binary_crossentropy: 0.1468 - val_loss: 0.3768 - val_acc: 0.8762 - val_binary_crossentropy: 0.3144
Epoch 7/20
 - 5s - loss: 0.2013 - acc: 0.9533 - binary_crossentropy: 0.1381 - val_loss: 0.3965 - val_acc: 0.8726 - val_binary_crossentropy: 0.3328
Epoch 8/20
 - 5s - loss: 0.1948 - acc: 0.9562 - binary_crossentropy: 0.1303 - val_loss: 0.4067 - val_acc: 0.8714 - val_binary_crossentropy: 0.3418
Epoch 9/20
 - 5s - loss: 0.1887 - acc: 0.9572 - binary_crossentropy: 0.1228 - val_loss: 0.4244 - val_acc: 0.8664 - val_binary_crossentropy: 0.3579
Epoch 10/20
 - 5s - loss: 0.1830 - acc: 0.9610 - binary_crossentropy: 0.1161 - val_loss: 0.4330 - val_acc: 0.8679 - val_binary_crossentropy: 0.3654
Epoch 11/20
 - 5s - loss: 0.1764 - acc: 0.9643 - binary_crossentropy: 0.1082 - val_loss: 0.4453 - val_acc: 0.8655 - val_binary_crossentropy: 0.3764
Epoch 12/20
 - 5s - loss: 0.1715 - acc: 0.9662 - binary_crossentropy: 0.1019 - val_loss: 0.4614 - val_acc: 0.8631 - val_binary_crossentropy: 0.3913
Epoch 13/20
 - 5s - loss: 0.1642 - acc: 0.9700 - binary_crossentropy: 0.0936 - val_loss: 0.4707 - val_acc: 0.8631 - val_binary_crossentropy: 0.3996
Epoch 14/20
 - 5s - loss: 0.1589 - acc: 0.9720 - binary_crossentropy: 0.0874 - val_loss: 0.4869 - val_acc: 0.8602 - val_binary_crossentropy: 0.4150
Epoch 15/20
 - 5s - loss: 0.1549 - acc: 0.9743 - binary_crossentropy: 0.0828 - val_loss: 0.4958 - val_acc: 0.8610 - val_binary_crossentropy: 0.4231
Epoch 16/20
 - 5s - loss: 0.1510 - acc: 0.9763 - binary_crossentropy: 0.0774 - val_loss: 0.5127 - val_acc: 0.8582 - val_binary_crossentropy: 0.4387
Epoch 17/20
 - 5s - loss: 0.1504 - acc: 0.9752 - binary_crossentropy: 0.0764 - val_loss: 0.5211 - val_acc: 0.8596 - val_binary_crossentropy: 0.4462
Epoch 18/20
 - 5s - loss: 0.1494 - acc: 0.9768 - binary_crossentropy: 0.0735 - val_loss: 0.5406 - val_acc: 0.8581 - val_binary_crossentropy: 0.4642
Epoch 19/20
 - 5s - loss: 0.1407 - acc: 0.9804 - binary_crossentropy: 0.0648 - val_loss: 0.5382 - val_acc: 0.8578 - val_binary_crossentropy: 0.4625
Epoch 20/20
 - 5s - loss: 0.1314 - acc: 0.9855 - binary_crossentropy: 0.0561 - val_loss: 0.5455 - val_acc: 0.8572 - val_binary_crossentropy: 0.4708

WARNING:tensorflow:From C:\Users\Nitesh Vudutha\Anaconda3\lib\site-packages\tensorflow
\python\keras\layers\core.py:143: calling dropout (from tensorflow.python.ops.nn_ops) with
keep_prob is deprecated and will be removed in a future version.
Instructions for updating:
Please use `rate` instead of `keep_prob`. Rate should be set to `rate = 1 - keep_prob`.
Train on 25000 samples, validate on 25000 samples
Epoch 1/20
 - 5s - loss: 0.6356 - acc: 0.6308 - binary_crossentropy: 0.6356 - val_loss: 0.5223 -
val_acc: 0.8493 - val_binary_crossentropy: 0.5223
Epoch 2/20
 - 5s - loss: 0.4724 - acc: 0.8032 - binary_crossentropy: 0.4724 - val_loss: 0.3555 -
val_acc: 0.8807 - val_binary_crossentropy: 0.3555
Epoch 3/20
 - 5s - loss: 0.3606 - acc: 0.8693 - binary_crossentropy: 0.3606 - val_loss: 0.2956 -
val_acc: 0.8882 - val_binary_crossentropy: 0.2956
Epoch 4/20
 - 5s - loss: 0.2897 - acc: 0.9020 - binary_crossentropy: 0.2897 - val_loss: 0.2726 -
val_acc: 0.8900 - val_binary_crossentropy: 0.2726
Epoch 5/20
 - 5s - loss: 0.2439 - acc: 0.9211 - binary_crossentropy: 0.2439 - val_loss: 0.2736 -
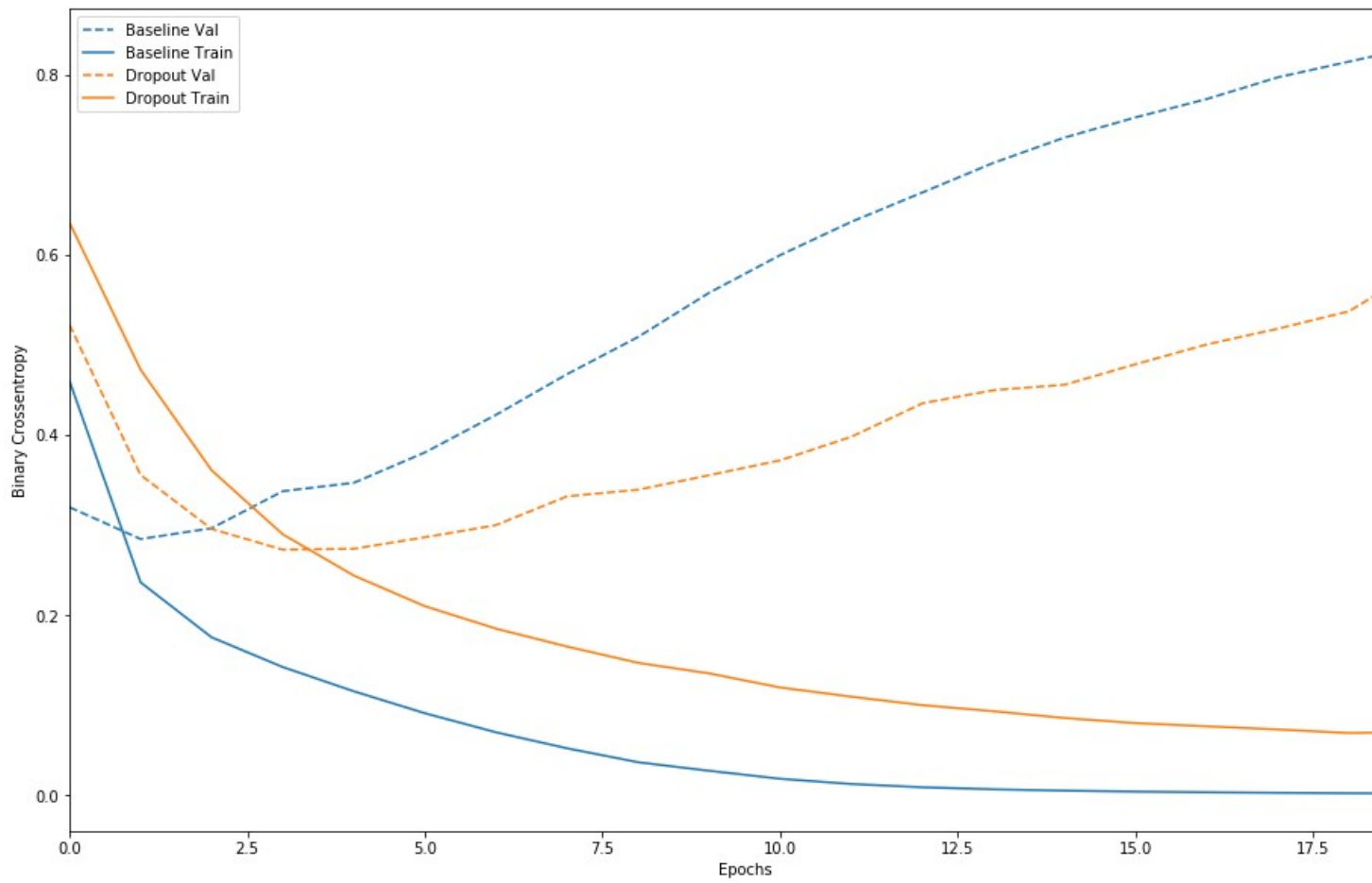val_acc: 0.8891 - val_binary_crossentropy: 0.2736
Epoch 6/20
 - 5s - loss: 0.2099 - acc: 0.9295 - binary_crossentropy: 0.2099 - val_loss: 0.2863 -
val_acc: 0.8856 - val_binary_crossentropy: 0.2863
Epoch 7/20
 - 5s - loss: 0.1850 - acc: 0.9394 - binary_crossentropy: 0.1850 - val_loss: 0.2998 -

```
val_acc: 0.8858 - val_binary_crossentropy: 0.2998
Epoch 8/20
 - 5s - loss: 0.1651 - acc: 0.9470 - binary_crossentropy: 0.1651 - val_loss: 0.3318 -
val_acc: 0.8821 - val_binary_crossentropy: 0.3318
Epoch 9/20
 - 5s - loss: 0.1470 - acc: 0.9525 - binary_crossentropy: 0.1470 - val_loss: 0.3391 -
val_acc: 0.8829 - val_binary_crossentropy: 0.3391
Epoch 10/20
 - 5s - loss: 0.1353 - acc: 0.9562 - binary_crossentropy: 0.1353 - val_loss: 0.3552 -
val_acc: 0.8817 - val_binary_crossentropy: 0.3552
Epoch 11/20
 - 5s - loss: 0.1196 - acc: 0.9626 - binary_crossentropy: 0.1196 - val_loss: 0.3718 -
val_acc: 0.8798 - val_binary_crossentropy: 0.3718
Epoch 12/20
 - 5s - loss: 0.1094 - acc: 0.9654 - binary_crossentropy: 0.1094 - val_loss: 0.3979 -
val_acc: 0.8780 - val_binary_crossentropy: 0.3979
Epoch 13/20
 - 5s - loss: 0.1000 - acc: 0.9664 - binary_crossentropy: 0.1000 - val_loss: 0.4350 -
val_acc: 0.8772 - val_binary_crossentropy: 0.4350
Epoch 14/20
 - 5s - loss: 0.0933 - acc: 0.9690 - binary_crossentropy: 0.0933 - val_loss: 0.4496 -
val_acc: 0.8766 - val_binary_crossentropy: 0.4496
Epoch 15/20
 - 5s - loss: 0.0858 - acc: 0.9705 - binary_crossentropy: 0.0858 - val_loss: 0.4556 -
val_acc: 0.8767 - val_binary_crossentropy: 0.4556
Epoch 16/20
 - 5s - loss: 0.0801 - acc: 0.9736 - binary_crossentropy: 0.0801 - val_loss: 0.4784 -
val_acc: 0.8762 - val_binary_crossentropy: 0.4784
Epoch 17/20
 - 5s - loss: 0.0765 - acc: 0.9747 - binary_crossentropy: 0.0765 - val_loss: 0.5004 -
val_acc: 0.8756 - val_binary_crossentropy: 0.5004
Epoch 18/20
 - 5s - loss: 0.0730 - acc: 0.9760 - binary_crossentropy: 0.0730 - val_loss: 0.5179 -
val_acc: 0.8754 - val_binary_crossentropy: 0.5179
Epoch 19/20
 - 5s - loss: 0.0691 - acc: 0.9765 - binary_crossentropy: 0.0691 - val_loss: 0.5371 -
val_acc: 0.8750 - val_binary_crossentropy: 0.5371
Epoch 20/20
 - 5s - loss: 0.0701 - acc: 0.9748 - binary_crossentropy: 0.0701 - val_loss: 0.5852 -
val_acc: 0.8743 - val_binary_crossentropy: 0.5852
```

In [**4**]: