**Project Results:::  
  
  
  
1. Random Acquisition:**In [**19**]: run acquisition\_random\_mnist.py

Using Theano backend.

X\_train shape: (6000, 1, 28, 28)

6000 train samples

POOLING ITERATION NUMBER 0

After random acquisitions

7000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 190s - loss: 0.7393 - acc: 0.7573 - val\_loss: 0.2747 - val\_acc: 0.9070

Epoch 2/5

7000/7000 [==============================] - 206s - loss: 0.2395 - acc: 0.9291 - val\_loss: 0.1706 - val\_acc: 0.9493

Epoch 3/5

7000/7000 [==============================] - 202s - loss: 0.1705 - acc: 0.9480 - val\_loss: 0.1579 - val\_acc: 0.9560

Epoch 4/5

7000/7000 [==============================] - 203s - loss: 0.1362 - acc: 0.9593 - val\_loss: 0.1206 - val\_acc: 0.9660

Epoch 5/5

7000/7000 [==============================] - 208s - loss: 0.0971 - acc: 0.9690 - val\_loss: 0.1136 - val\_acc: 0.9663

Test score: 0.122923934132

Test accuracy: 0.9585

POOLING ITERATION NUMBER 1

After random acquisitions

8000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 226s - loss: 0.7538 - acc: 0.7685 - val\_loss: 0.2778 - val\_acc: 0.9063

Epoch 2/5

8000/8000 [==============================] - 228s - loss: 0.2347 - acc: 0.9283 - val\_loss: 0.1689 - val\_acc: 0.9470

Epoch 3/5

8000/8000 [==============================] - 228s - loss: 0.1707 - acc: 0.9467 - val\_loss: 0.1397 - val\_acc: 0.9593

Epoch 4/5

8000/8000 [==============================] - 226s - loss: 0.1316 - acc: 0.9622 - val\_loss: 0.1098 - val\_acc: 0.9697

Epoch 5/5

8000/8000 [==============================] - 226s - loss: 0.1071 - acc: 0.9659 - val\_loss: 0.1272 - val\_acc: 0.9643

Test score: 0.107158108503

Test accuracy: 0.9645

POOLING ITERATION NUMBER 2

After random acquisitions

9000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 9000 samples, validate on 3000 samples

Epoch 1/5

9000/9000 [==============================] - 252s - loss: 0.6546 - acc: 0.7966 - val\_loss: 0.2071 - val\_acc: 0.9377

Epoch 2/5

9000/9000 [==============================] - 252s - loss: 0.1965 - acc: 0.9438 - val\_loss: 0.1290 - val\_acc: 0.9580

Epoch 3/5

9000/9000 [==============================] - 252s - loss: 0.1464 - acc: 0.9549 - val\_loss: 0.1222 - val\_acc: 0.9643

Epoch 4/5

9000/9000 [==============================] - 251s - loss: 0.1033 - acc: 0.9699 - val\_loss: 0.0898 - val\_acc: 0.9733

Epoch 5/5

9000/9000 [==============================] - 253s - loss: 0.0900 - acc: 0.9728 - val\_loss: 0.1051 - val\_acc: 0.9700

Test score: 0.105763684362

Test accuracy: 0.964

POOLING ITERATION NUMBER 3

After random acquisitions

10000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 10000 samples, validate on 3000 samples

Epoch 1/5

10000/10000 [==============================] - 278s - loss: 0.6016 - acc: 0.8106 - val\_loss: 0.2066 - val\_acc: 0.9377

Epoch 2/5

10000/10000 [==============================] - 278s - loss: 0.1853 - acc: 0.9426 - val\_loss: 0.1487 - val\_acc: 0.9570

Epoch 3/5

10000/10000 [==============================] - 278s - loss: 0.1400 - acc: 0.9587 - val\_loss: 0.1189 - val\_acc: 0.9677

Epoch 4/5

10000/10000 [==============================] - 279s - loss: 0.0953 - acc: 0.9691 - val\_loss: 0.1068 - val\_acc: 0.9673

Epoch 5/5

10000/10000 [==============================] - 281s - loss: 0.0856 - acc: 0.9744 - val\_loss: 0.0877 - val\_acc: 0.9733

Test score: 0.0852388341129

Test accuracy: 0.971

POOLING ITERATION NUMBER 4

After random acquisitions

11000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 11000 samples, validate on 3000 samples

Epoch 1/5

11000/11000 [==============================] - 308s - loss: 0.5791 - acc: 0.8196 - val\_loss: 0.1901 - val\_acc: 0.9387

Epoch 2/5

11000/11000 [==============================] - 308s - loss: 0.1892 - acc: 0.9401 - val\_loss: 0.1221 - val\_acc: 0.9627

Epoch 3/5

11000/11000 [==============================] - 306s - loss: 0.1310 - acc: 0.9593 - val\_loss: 0.1000 - val\_acc: 0.9713

Epoch 4/5

11000/11000 [==============================] - 306s - loss: 0.1003 - acc: 0.9699 - val\_loss: 0.1020 - val\_acc: 0.9730

Epoch 5/5

11000/11000 [==============================] - 306s - loss: 0.0821 - acc: 0.9744 - val\_loss: 0.1038 - val\_acc: 0.9720

Test score: 0.0880070892274

Test accuracy: 0.97025

POOLING ITERATION NUMBER 5

After random acquisitions

12000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 12000 samples, validate on 3000 samples

Epoch 1/5

12000/12000 [==============================] - 333s - loss: 0.5783 - acc: 0.8173 - val\_loss: 0.2003 - val\_acc: 0.9353

Epoch 2/5

12000/12000 [==============================] - 337s - loss: 0.1804 - acc: 0.9442 - val\_loss: 0.1081 - val\_acc: 0.9670

Epoch 3/5

12000/12000 [==============================] - 333s - loss: 0.1249 - acc: 0.9617 - val\_loss: 0.0884 - val\_acc: 0.9747

Epoch 4/5

12000/12000 [==============================] - 333s - loss: 0.1004 - acc: 0.9696 - val\_loss: 0.0953 - val\_acc: 0.9730

Epoch 5/5

12000/12000 [==============================] - 336s - loss: 0.0794 - acc: 0.9760 - val\_loss: 0.0719 - val\_acc: 0.9797

Test score: 0.0816359501183

Test accuracy: 0.973

POOLING ITERATION NUMBER 6

After random acquisitions

13000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 13000 samples, validate on 3000 samples

Epoch 1/5

13000/13000 [==============================] - 360s - loss: 0.5781 - acc: 0.8189 - val\_loss: 0.2182 - val\_acc: 0.9383

Epoch 2/5

13000/13000 [==============================] - 360s - loss: 0.1856 - acc: 0.9457 - val\_loss: 0.1270 - val\_acc: 0.9603

Epoch 3/5

13000/13000 [==============================] - 367s - loss: 0.1353 - acc: 0.9593 - val\_loss: 0.1414 - val\_acc: 0.9617

Epoch 4/5

13000/13000 [==============================] - 363s - loss: 0.1037 - acc: 0.9698 - val\_loss: 0.0982 - val\_acc: 0.9727

Epoch 5/5

13000/13000 [==============================] - 359s - loss: 0.0844 - acc: 0.9749 - val\_loss: 0.0949 - val\_acc: 0.9727

Test score: 0.0863715667427

Test accuracy: 0.9725

POOLING ITERATION NUMBER 7

After random acquisitions

14000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 14000 samples, validate on 3000 samples

Epoch 1/5

14000/14000 [==============================] - 457s - loss: 0.4902 - acc: 0.8439 - val\_loss: 0.2081 - val\_acc: 0.9360

Epoch 2/5

14000/14000 [==============================] - 383s - loss: 0.1678 - acc: 0.9481 - val\_loss: 0.1724 - val\_acc: 0.9453

Epoch 3/5

14000/14000 [==============================] - 384s - loss: 0.1221 - acc: 0.9635 - val\_loss: 0.1461 - val\_acc: 0.9600

Epoch 4/5

14000/14000 [==============================] - 386s - loss: 0.0940 - acc: 0.9719 - val\_loss: 0.0944 - val\_acc: 0.9747

Epoch 5/5

14000/14000 [==============================] - 382s - loss: 0.0803 - acc: 0.9751 - val\_loss: 0.0905 - val\_acc: 0.9747

Test score: 0.0946954704821

Test accuracy: 0.9705

POOLING ITERATION NUMBER 8

After random acquisitions

15000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 15000 samples, validate on 3000 samples

Epoch 1/5

15000/15000 [==============================] - 413s - loss: 0.5087 - acc: 0.8377 - val\_loss: 0.3101 - val\_acc: 0.8957

Epoch 2/5

15000/15000 [==============================] - 606s - loss: 0.1581 - acc: 0.9516 - val\_loss: 0.1069 - val\_acc: 0.9677

Epoch 3/5

15000/15000 [==============================] - 648s - loss: 0.1213 - acc: 0.9632 - val\_loss: 0.0988 - val\_acc: 0.9720

Epoch 4/5

15000/15000 [==============================] - 649s - loss: 0.0913 - acc: 0.9717 - val\_loss: 0.0795 - val\_acc: 0.9787

Epoch 5/5

15000/15000 [==============================] - 664s - loss: 0.0730 - acc: 0.9763 - val\_loss: 0.1382 - val\_acc: 0.9650

Test score: 0.149629973441

Test accuracy: 0.961

POOLING ITERATION NUMBER 9

After random acquisitions

16000 train samples after acquisition

4000 test samples

3000 validation samples

51000 pool samples

Train on 16000 samples, validate on 3000 samples

Epoch 1/5

16000/16000 [==============================] - 707s - loss: 0.4582 - acc: 0.8580 - val\_loss: 0.1453 - val\_acc: 0.9537

Epoch 2/5

16000/16000 [==============================] - 694s - loss: 0.1533 - acc: 0.9531 - val\_loss: 0.1091 - val\_acc: 0.9663

Epoch 3/5

16000/16000 [==============================] - 700s - loss: 0.1130 - acc: 0.9639 - val\_loss: 0.0972 - val\_acc: 0.9720

Epoch 4/5

16000/16000 [==============================] - 698s - loss: 0.0851 - acc: 0.9740 - val\_loss: 0.0751 - val\_acc: 0.9773

Epoch 5/5

16000/16000 [==============================] - 693s - loss: 0.0706 - acc: 0.9776 - val\_loss: 0.0725 - val\_acc: 0.9783

Test score: 0.070572636798

Test accuracy: 0.9745

**2. Maximum Entropy Acquisition**In [**73**]: run acquisition\_highest\_entropy\_mnist.py

X\_train shape: (6000, 1, 28, 28)

6000 train samples

POOLING ITERATION NUMBER 0

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 183s - loss: 0.7984 - acc: 0.7393 - val\_loss: 0.2657 - val\_acc: 0.9207

Epoch 2/5

6000/6000 [==============================] - 178s - loss: 0.2435 - acc: 0.9263 - val\_loss: 0.1639 - val\_acc: 0.9483

Epoch 3/5

6000/6000 [==============================] - 175s - loss: 0.1664 - acc: 0.9540 - val\_loss: 0.1433 - val\_acc: 0.9563

Epoch 4/5

6000/6000 [==============================] - 176s - loss: 0.1291 - acc: 0.9612 - val\_loss: 0.1281 - val\_acc: 0.9587

Epoch 5/5

6000/6000 [==============================] - 181s - loss: 0.1069 - acc: 0.9672 - val\_loss: 0.1167 - val\_acc: 0.9637

51000/51000 [==============================] - 263s

After random acquisitions

7000 train samples after acquisition

4000 test samples

3000 validation samples

50000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.117441687584

Test accuracy: 0.959

POOLING ITERATION NUMBER 1

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 201s - loss: 0.9901 - acc: 0.6741 - val\_loss: 0.2460 - val\_acc: 0.9247

Epoch 2/5

7000/7000 [==============================] - 201s - loss: 0.4018 - acc: 0.8671 - val\_loss: 0.1680 - val\_acc: 0.9560

Epoch 3/5

7000/7000 [==============================] - 200s - loss: 0.2713 - acc: 0.9104 - val\_loss: 0.1057 - val\_acc: 0.9690

Epoch 4/5

7000/7000 [==============================] - 199s - loss: 0.2093 - acc: 0.9321 - val\_loss: 0.1282 - val\_acc: 0.9593

Epoch 5/5

7000/7000 [==============================] - 200s - loss: 0.1759 - acc: 0.9406 - val\_loss: 0.0671 - val\_acc: 0.9823

50000/50000 [==============================] - 255s

After random acquisitions

8000 train samples after acquisition

4000 test samples

3000 validation samples

49000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.0760395129919

Test accuracy: 0.97375

POOLING ITERATION NUMBER 2

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 227s - loss: 1.3001 - acc: 0.6105 - val\_loss: 0.3371 - val\_acc: 0.9353

Epoch 2/5

8000/8000 [==============================] - 226s - loss: 0.8820 - acc: 0.7648 - val\_loss: 0.2665 - val\_acc: 0.9477

Epoch 3/5

8000/8000 [==============================] - 225s - loss: 0.7797 - acc: 0.7863 - val\_loss: 0.2117 - val\_acc: 0.9540

Epoch 4/5

8000/8000 [==============================] - 227s - loss: 0.6923 - acc: 0.8155 - val\_loss: 0.1675 - val\_acc: 0.9707

Epoch 5/5

8000/8000 [==============================] - 224s - loss: 0.6337 - acc: 0.8266 - val\_loss: 0.1616 - val\_acc: 0.9690

49000/49000 [==============================] - 250s

After random acquisitions

9000 train samples after acquisition

4000 test samples

3000 validation samples

48000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.172862562895

Test accuracy: 0.96125

POOLING ITERATION NUMBER 3

Train on 9000 samples, validate on 3000 samples

Epoch 1/5

9000/9000 [==============================] - 252s - loss: 1.4882 - acc: 0.5488 - val\_loss: 0.4955 - val\_acc: 0.9107

Epoch 2/5

9000/9000 [==============================] - 254s - loss: 1.0843 - acc: 0.6873 - val\_loss: 0.3565 - val\_acc: 0.9437

Epoch 3/5

9000/9000 [==============================] - 253s - loss: 0.9642 - acc: 0.7189 - val\_loss: 0.2232 - val\_acc: 0.9613

Epoch 4/5

9000/9000 [==============================] - 255s - loss: 0.9096 - acc: 0.7328 - val\_loss: 0.2811 - val\_acc: 0.9573

Epoch 5/5

9000/9000 [==============================] - 255s - loss: 0.8649 - acc: 0.7392 - val\_loss: 0.2323 - val\_acc: 0.9630

48000/48000 [==============================] - 249s

After random acquisitions

10000 train samples after acquisition

4000 test samples

3000 validation samples

47000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.25590389967

Test accuracy: 0.956

POOLING ITERATION NUMBER 4

Train on 10000 samples, validate on 3000 samples

Epoch 1/5

10000/10000 [==============================] - 280s - loss: 1.5751 - acc: 0.5141 - val\_loss: 0.3828 - val\_acc: 0.9127

Epoch 2/5

10000/10000 [==============================] - 278s - loss: 1.2431 - acc: 0.6296 - val\_loss: 0.3018 - val\_acc: 0.9413

Epoch 3/5

10000/10000 [==============================] - 280s - loss: 1.1413 - acc: 0.6550 - val\_loss: 0.3483 - val\_acc: 0.9343

Epoch 4/5

10000/10000 [==============================] - 280s - loss: 1.0806 - acc: 0.6721 - val\_loss: 0.2765 - val\_acc: 0.9517

Epoch 5/5

10000/10000 [==============================] - 280s - loss: 1.0352 - acc: 0.6781 - val\_loss: 0.2539 - val\_acc: 0.9467

47000/47000 [==============================] - 246s

After random acquisitions

11000 train samples after acquisition

4000 test samples

3000 validation samples

46000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.286422284365

Test accuracy: 0.941

POOLING ITERATION NUMBER 5

Train on 11000 samples, validate on 3000 samples

Epoch 1/5

11000/11000 [==============================] - 306s - loss: 1.6935 - acc: 0.4646 - val\_loss: 0.5184 - val\_acc: 0.9220

Epoch 2/5

11000/11000 [==============================] - 307s - loss: 1.3696 - acc: 0.5801 - val\_loss: 0.3157 - val\_acc: 0.9470

Epoch 3/5

11000/11000 [==============================] - 310s - loss: 1.2732 - acc: 0.5994 - val\_loss: 0.3380 - val\_acc: 0.9533

Epoch 4/5

11000/11000 [==============================] - 304s - loss: 1.2194 - acc: 0.6122 - val\_loss: 0.3323 - val\_acc: 0.9533

Epoch 5/5

11000/11000 [==============================] - 309s - loss: 1.1817 - acc: 0.6216 - val\_loss: 0.2863 - val\_acc: 0.9587

46000/46000 [==============================] - 237s

After random acquisitions

12000 train samples after acquisition

4000 test samples

3000 validation samples

45000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.320228999615

Test accuracy: 0.9525

POOLING ITERATION NUMBER 6

Train on 12000 samples, validate on 3000 samples

Epoch 1/5

12000/12000 [==============================] - 341s - loss: 1.7412 - acc: 0.4479 - val\_loss: 0.7403 - val\_acc: 0.9140

Epoch 2/5

12000/12000 [==============================] - 336s - loss: 1.4651 - acc: 0.5349 - val\_loss: 0.3737 - val\_acc: 0.9470

Epoch 3/5

12000/12000 [==============================] - 334s - loss: 1.3793 - acc: 0.5551 - val\_loss: 0.3795 - val\_acc: 0.9473

Epoch 4/5

12000/12000 [==============================] - 404s - loss: 1.3367 - acc: 0.5641 - val\_loss: 0.3705 - val\_acc: 0.9490

Epoch 5/5

12000/12000 [==============================] - 331s - loss: 1.2845 - acc: 0.5801 - val\_loss: 0.3641 - val\_acc: 0.9437

45000/45000 [==============================] - 229s

After random acquisitions

13000 train samples after acquisition

4000 test samples

3000 validation samples

44000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.41454232645

Test accuracy: 0.9315

POOLING ITERATION NUMBER 7

Train on 13000 samples, validate on 3000 samples

Epoch 1/5

13000/13000 [==============================] - 358s - loss: 1.7880 - acc: 0.4287 - val\_loss: 0.6019 - val\_acc: 0.9183

Epoch 2/5

13000/13000 [==============================] - 360s - loss: 1.5418 - acc: 0.5033 - val\_loss: 0.5025 - val\_acc: 0.9300

Epoch 3/5

13000/13000 [==============================] - 356s - loss: 1.4799 - acc: 0.5193 - val\_loss: 0.4210 - val\_acc: 0.9403

Epoch 4/5

13000/13000 [==============================] - 361s - loss: 1.4251 - acc: 0.5310 - val\_loss: 0.3797 - val\_acc: 0.9463

Epoch 5/5

13000/13000 [==============================] - 515s - loss: 1.3895 - acc: 0.5413 - val\_loss: 0.4104 - val\_acc: 0.9483

44000/44000 [==============================] - 372s

After random acquisitions

14000 train samples after acquisition

4000 test samples

3000 validation samples

43000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.479231177807

Test accuracy: 0.93375

POOLING ITERATION NUMBER 8

Train on 14000 samples, validate on 3000 samples

Epoch 1/5

14000/14000 [==============================] - 612s - loss: 1.9178 - acc: 0.3713 - val\_loss: 0.8944 - val\_acc: 0.8787

Epoch 2/5

14000/14000 [==============================] - 606s - loss: 1.6595 - acc: 0.4587 - val\_loss: 0.5385 - val\_acc: 0.9200

Epoch 3/5

14000/14000 [==============================] - 620s - loss: 1.5837 - acc: 0.4806 - val\_loss: 0.4535 - val\_acc: 0.9263

Epoch 4/5

14000/14000 [==============================] - 623s - loss: 1.5370 - acc: 0.4904 - val\_loss: 0.4586 - val\_acc: 0.9317

Epoch 5/5

14000/14000 [==============================] - 610s - loss: 1.5018 - acc: 0.4924 - val\_loss: 0.4863 - val\_acc: 0.9290

43000/43000 [==============================] - 364s

After random acquisitions

15000 train samples after acquisition

4000 test samples

3000 validation samples

42000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.565837798595

Test accuracy: 0.91

POOLING ITERATION NUMBER 9

Train on 15000 samples, validate on 3000 samples

Epoch 1/5

15000/15000 [==============================] - 663s - loss: 1.8936 - acc: 0.3779 - val\_loss: 0.4706 - val\_acc: 0.9143

Epoch 2/5

15000/15000 [==============================] - 649s - loss: 1.6751 - acc: 0.4468 - val\_loss: 0.5640 - val\_acc: 0.8947

Epoch 3/5

15000/15000 [==============================] - 609s - loss: 1.6158 - acc: 0.4585 - val\_loss: 0.6181 - val\_acc: 0.9217

Epoch 4/5

15000/15000 [==============================] - 521s - loss: 1.5815 - acc: 0.4694 - val\_loss: 0.4852 - val\_acc: 0.9223

Epoch 5/5

15000/15000 [==============================] - 513s - loss: 1.5436 - acc: 0.4749 - val\_loss: 0.4458 - val\_acc: 0.9130

42000/42000 [==============================] - 275s

After random acquisitions

16000 train samples after acquisition

4000 test samples

3000 validation samples

41000 Pooled X samples

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.53198222065

Test accuracy: 0.88425

**3. Dropout BALD**In [**16**]: run Dropout\_BALD\_acquisition.py

Using Theano backend.

X\_train shape: (6000, 1, 28, 28)

6000 train samples

POOLING ITERATION 0

Dropout Iteration 0

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 288s - loss: 0.8731 - acc: 0.7153 - val\_loss: 0.3208 - val\_acc: 0.9103

Epoch 2/5

6000/6000 [==============================] - 276s - loss: 0.2793 - acc: 0.9183 - val\_loss: 0.1752 - val\_acc: 0.9417

Epoch 3/5

6000/6000 [==============================] - 274s - loss: 0.1747 - acc: 0.9452 - val\_loss: 0.1407 - val\_acc: 0.9593

Epoch 4/5

6000/6000 [==============================] - 276s - loss: 0.1288 - acc: 0.9593 - val\_loss: 0.1320 - val\_acc: 0.9603

Epoch 5/5

6000/6000 [==============================] - 277s - loss: 0.1013 - acc: 0.9690 - val\_loss: 0.1210 - val\_acc: 0.9637

51000/51000 [==============================] - 447s

Dropout Iteration 1

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 277s - loss: 0.8437 - acc: 0.7305 - val\_loss: 0.3089 - val\_acc: 0.9040

Epoch 2/5

6000/6000 [==============================] - 286s - loss: 0.2624 - acc: 0.9205 - val\_loss: 0.1931 - val\_acc: 0.9380

Epoch 3/5

6000/6000 [==============================] - 276s - loss: 0.1784 - acc: 0.9463 - val\_loss: 0.1427 - val\_acc: 0.9543

Epoch 4/5

6000/6000 [==============================] - 286s - loss: 0.1328 - acc: 0.9603 - val\_loss: 0.1330 - val\_acc: 0.9593

Epoch 5/5

6000/6000 [==============================] - 280s - loss: 0.1120 - acc: 0.9660 - val\_loss: 0.1543 - val\_acc: 0.9530

51000/51000 [==============================] - 448s

Dropout Iteration 2

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 280s - loss: 0.8513 - acc: 0.7198 - val\_loss: 0.2677 - val\_acc: 0.9210

Epoch 2/5

6000/6000 [==============================] - 274s - loss: 0.2521 - acc: 0.9275 - val\_loss: 0.1948 - val\_acc: 0.9387

Epoch 3/5

6000/6000 [==============================] - 281s - loss: 0.1819 - acc: 0.9473 - val\_loss: 0.1457 - val\_acc: 0.9553

Epoch 4/5

6000/6000 [==============================] - 275s - loss: 0.1384 - acc: 0.9610 - val\_loss: 0.1350 - val\_acc: 0.9577

Epoch 5/5

6000/6000 [==============================] - 279s - loss: 0.1141 - acc: 0.9653 - val\_loss: 0.1194 - val\_acc: 0.9633

51000/51000 [==============================] - 448s

Dropout Iteration 3

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 280s - loss: 0.7818 - acc: 0.7560 - val\_loss: 0.2243 - val\_acc: 0.9373

Epoch 2/5

6000/6000 [==============================] - 249s - loss: 0.2317 - acc: 0.9307 - val\_loss: 0.1842 - val\_acc: 0.9413

Epoch 3/5

6000/6000 [==============================] - 216s - loss: 0.1709 - acc: 0.9505 - val\_loss: 0.1479 - val\_acc: 0.9567

Epoch 4/5

6000/6000 [==============================] - 216s - loss: 0.1297 - acc: 0.9617 - val\_loss: 0.1308 - val\_acc: 0.9590

Epoch 5/5

6000/6000 [==============================] - 218s - loss: 0.0977 - acc: 0.9672 - val\_loss: 0.1188 - val\_acc: 0.9620

51000/51000 [==============================] - 339s

Dropout Iteration 4

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 224s - loss: 0.8978 - acc: 0.7203 - val\_loss: 0.2701 - val\_acc: 0.9153

Epoch 2/5

6000/6000 [==============================] - 216s - loss: 0.2671 - acc: 0.9225 - val\_loss: 0.1771 - val\_acc: 0.9460

Epoch 3/5

6000/6000 [==============================] - 175s - loss: 0.1847 - acc: 0.9453 - val\_loss: 0.1673 - val\_acc: 0.9437

Epoch 4/5

6000/6000 [==============================] - 176s - loss: 0.1360 - acc: 0.9595 - val\_loss: 0.1530 - val\_acc: 0.9547

Epoch 5/5

6000/6000 [==============================] - 177s - loss: 0.1195 - acc: 0.9633 - val\_loss: 0.1266 - val\_acc: 0.9640

51000/51000 [==============================] - 277s

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 201s - loss: 0.7104 - acc: 0.7754 - val\_loss: 0.2138 - val\_acc: 0.9390

Epoch 2/5

7000/7000 [==============================] - 198s - loss: 0.2191 - acc: 0.9346 - val\_loss: 0.2115 - val\_acc: 0.9323

Epoch 3/5

7000/7000 [==============================] - 199s - loss: 0.1471 - acc: 0.9536 - val\_loss: 0.1366 - val\_acc: 0.9570

Epoch 4/5

7000/7000 [==============================] - 200s - loss: 0.1138 - acc: 0.9643 - val\_loss: 0.1262 - val\_acc: 0.9593

Epoch 5/5

7000/7000 [==============================] - 198s - loss: 0.0939 - acc: 0.9697 - val\_loss: 0.1059 - val\_acc: 0.9667

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.11469032073

Test accuracy: 0.96275

POOLING ITERATION 1

Dropout Iteration 0

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 203s - loss: 0.7398 - acc: 0.7699 - val\_loss: 0.2966 - val\_acc: 0.9043

Epoch 2/5

7000/7000 [==============================] - 202s - loss: 0.2507 - acc: 0.9283 - val\_loss: 0.1608 - val\_acc: 0.9513

Epoch 3/5

7000/7000 [==============================] - 202s - loss: 0.1745 - acc: 0.9481 - val\_loss: 0.1597 - val\_acc: 0.9520

Epoch 4/5

7000/7000 [==============================] - 199s - loss: 0.1274 - acc: 0.9624 - val\_loss: 0.1155 - val\_acc: 0.9680

Epoch 5/5

7000/7000 [==============================] - 202s - loss: 0.1111 - acc: 0.9633 - val\_loss: 0.1260 - val\_acc: 0.9643

51000/51000 [==============================] - 279s

Dropout Iteration 1

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 203s - loss: 0.7527 - acc: 0.7604 - val\_loss: 0.2812 - val\_acc: 0.9083

Epoch 2/5

7000/7000 [==============================] - 199s - loss: 0.2359 - acc: 0.9284 - val\_loss: 0.1419 - val\_acc: 0.9540

Epoch 3/5

7000/7000 [==============================] - 199s - loss: 0.1610 - acc: 0.9547 - val\_loss: 0.1484 - val\_acc: 0.9513

Epoch 4/5

7000/7000 [==============================] - 195s - loss: 0.1289 - acc: 0.9611 - val\_loss: 0.1480 - val\_acc: 0.9510

Epoch 5/5

7000/7000 [==============================] - 199s - loss: 0.0929 - acc: 0.9716 - val\_loss: 0.1798 - val\_acc: 0.9467

51000/51000 [==============================] - 277s

Dropout Iteration 2

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 198s - loss: 0.7040 - acc: 0.7759 - val\_loss: 0.2711 - val\_acc: 0.9180

Epoch 2/5

7000/7000 [==============================] - 203s - loss: 0.2125 - acc: 0.9359 - val\_loss: 0.1523 - val\_acc: 0.9563

Epoch 3/5

7000/7000 [==============================] - 200s - loss: 0.1449 - acc: 0.9551 - val\_loss: 0.1478 - val\_acc: 0.9540

Epoch 4/5

7000/7000 [==============================] - 205s - loss: 0.1117 - acc: 0.9661 - val\_loss: 0.1190 - val\_acc: 0.9663

Epoch 5/5

7000/7000 [==============================] - 205s - loss: 0.0934 - acc: 0.9710 - val\_loss: 0.1158 - val\_acc: 0.9620

51000/51000 [==============================] - 283s

Dropout Iteration 3

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 204s - loss: 0.7911 - acc: 0.7526 - val\_loss: 0.2577 - val\_acc: 0.9197

Epoch 2/5

7000/7000 [==============================] - 204s - loss: 0.2476 - acc: 0.9241 - val\_loss: 0.1747 - val\_acc: 0.9440

Epoch 3/5

7000/7000 [==============================] - 203s - loss: 0.1678 - acc: 0.9517 - val\_loss: 0.1617 - val\_acc: 0.9463

Epoch 4/5

7000/7000 [==============================] - 201s - loss: 0.1345 - acc: 0.9593 - val\_loss: 0.1336 - val\_acc: 0.9600

Epoch 5/5

7000/7000 [==============================] - 206s - loss: 0.1015 - acc: 0.9696 - val\_loss: 0.1498 - val\_acc: 0.9550

51000/51000 [==============================] - 278s

Dropout Iteration 4

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 205s - loss: 0.7210 - acc: 0.7671 - val\_loss: 0.2338 - val\_acc: 0.9263

Epoch 2/5

7000/7000 [==============================] - 207s - loss: 0.2301 - acc: 0.9316 - val\_loss: 0.1478 - val\_acc: 0.9543

Epoch 3/5

7000/7000 [==============================] - 201s - loss: 0.1562 - acc: 0.9537 - val\_loss: 0.1648 - val\_acc: 0.9477

Epoch 4/5

7000/7000 [==============================] - 203s - loss: 0.1192 - acc: 0.9634 - val\_loss: 0.1325 - val\_acc: 0.9600

Epoch 5/5

7000/7000 [==============================] - 206s - loss: 0.0991 - acc: 0.9686 - val\_loss: 0.1171 - val\_acc: 0.9663

51000/51000 [==============================] - 275s

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 231s - loss: 0.7090 - acc: 0.7729 - val\_loss: 0.2395 - val\_acc: 0.9280

Epoch 2/5

8000/8000 [==============================] - 230s - loss: 0.2135 - acc: 0.9375 - val\_loss: 0.1800 - val\_acc: 0.9387

Epoch 3/5

8000/8000 [==============================] - 229s - loss: 0.1445 - acc: 0.9557 - val\_loss: 0.1438 - val\_acc: 0.9520

Epoch 4/5

8000/8000 [==============================] - 229s - loss: 0.1091 - acc: 0.9669 - val\_loss: 0.1381 - val\_acc: 0.9527

Epoch 5/5

8000/8000 [==============================] - 231s - loss: 0.0863 - acc: 0.9711 - val\_loss: 0.1027 - val\_acc: 0.9710

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.103596983492

Test accuracy: 0.96975

POOLING ITERATION 2

Dropout Iteration 0

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 228s - loss: 0.7412 - acc: 0.7645 - val\_loss: 0.2436 - val\_acc: 0.9260

Epoch 2/5

8000/8000 [==============================] - 228s - loss: 0.2025 - acc: 0.9385 - val\_loss: 0.1767 - val\_acc: 0.9523

Epoch 3/5

8000/8000 [==============================] - 231s - loss: 0.1420 - acc: 0.9569 - val\_loss: 0.1655 - val\_acc: 0.9507

Epoch 4/5

8000/8000 [==============================] - 233s - loss: 0.1056 - acc: 0.9671 - val\_loss: 0.1125 - val\_acc: 0.9683

Epoch 5/5

8000/8000 [==============================] - 232s - loss: 0.0814 - acc: 0.9755 - val\_loss: 0.1150 - val\_acc: 0.9673

51000/51000 [==============================] - 282s

Dropout Iteration 1

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 234s - loss: 0.6508 - acc: 0.7956 - val\_loss: 0.1933 - val\_acc: 0.9410

Epoch 2/5

8000/8000 [==============================] - 233s - loss: 0.2070 - acc: 0.9381 - val\_loss: 0.1483 - val\_acc: 0.9573

Epoch 3/5

8000/8000 [==============================] - 234s - loss: 0.1397 - acc: 0.9606 - val\_loss: 0.1501 - val\_acc: 0.9503

Epoch 4/5

8000/8000 [==============================] - 232s - loss: 0.1006 - acc: 0.9688 - val\_loss: 0.1662 - val\_acc: 0.9517

Epoch 5/5

8000/8000 [==============================] - 227s - loss: 0.0829 - acc: 0.9739 - val\_loss: 0.1121 - val\_acc: 0.9667

51000/51000 [==============================] - 287s

Dropout Iteration 2

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 226s - loss: 0.6842 - acc: 0.7789 - val\_loss: 0.2628 - val\_acc: 0.9187

Epoch 2/5

8000/8000 [==============================] - 227s - loss: 0.2071 - acc: 0.9377 - val\_loss: 0.1671 - val\_acc: 0.9500

Epoch 3/5

8000/8000 [==============================] - 235s - loss: 0.1410 - acc: 0.9565 - val\_loss: 0.1317 - val\_acc: 0.9603

Epoch 4/5

8000/8000 [==============================] - 231s - loss: 0.1096 - acc: 0.9682 - val\_loss: 0.1496 - val\_acc: 0.9540

Epoch 5/5

8000/8000 [==============================] - 232s - loss: 0.0904 - acc: 0.9712 - val\_loss: 0.1373 - val\_acc: 0.9610

51000/51000 [==============================] - 278s

Dropout Iteration 3

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 226s - loss: 0.6686 - acc: 0.7887 - val\_loss: 0.2691 - val\_acc: 0.9200

Epoch 2/5

8000/8000 [==============================] - 227s - loss: 0.2117 - acc: 0.9365 - val\_loss: 0.1799 - val\_acc: 0.9440

Epoch 3/5

8000/8000 [==============================] - 225s - loss: 0.1365 - acc: 0.9611 - val\_loss: 0.1318 - val\_acc: 0.9593

Epoch 4/5

8000/8000 [==============================] - 227s - loss: 0.1032 - acc: 0.9670 - val\_loss: 0.1012 - val\_acc: 0.9693

Epoch 5/5

8000/8000 [==============================] - 226s - loss: 0.0892 - acc: 0.9695 - val\_loss: 0.1198 - val\_acc: 0.9657

51000/51000 [==============================] - 284s

Dropout Iteration 4

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 225s - loss: 0.6273 - acc: 0.8035 - val\_loss: 0.1945 - val\_acc: 0.9393

Epoch 2/5

8000/8000 [==============================] - 225s - loss: 0.1871 - acc: 0.9445 - val\_loss: 0.1975 - val\_acc: 0.9387

Epoch 3/5

8000/8000 [==============================] - 225s - loss: 0.1279 - acc: 0.9605 - val\_loss: 0.1742 - val\_acc: 0.9483

Epoch 4/5

8000/8000 [==============================] - 225s - loss: 0.1022 - acc: 0.9695 - val\_loss: 0.1201 - val\_acc: 0.9640

Epoch 5/5

8000/8000 [==============================] - 227s - loss: 0.0789 - acc: 0.9759 - val\_loss: 0.1011 - val\_acc: 0.9703

51000/51000 [==============================] - 281s

Train on 9000 samples, validate on 3000 samples

Epoch 1/5

9000/9000 [==============================] - 261s - loss: 0.6761 - acc: 0.7922 - val\_loss: 0.2019 - val\_acc: 0.9420

Epoch 2/5

9000/9000 [==============================] - 253s - loss: 0.2032 - acc: 0.9381 - val\_loss: 0.1383 - val\_acc: 0.9593

Epoch 3/5

9000/9000 [==============================] - 258s - loss: 0.1360 - acc: 0.9579 - val\_loss: 0.1224 - val\_acc: 0.9667

Epoch 4/5

9000/9000 [==============================] - 248s - loss: 0.1068 - acc: 0.9673 - val\_loss: 0.1135 - val\_acc: 0.9703

Epoch 5/5

9000/9000 [==============================] - 251s - loss: 0.0852 - acc: 0.9730 - val\_loss: 0.1078 - val\_acc: 0.9687

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.117002345711

Test accuracy: 0.96325

**4. Bayes SEGNET**In [**15**]: run Bayes\_Segnet.py

Using Theano backend.

X\_train shape: (6000, 1, 28, 28)

6000 train samples

POOLING ITERATION 0

Dropout Iteration 0

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 281s - loss: 0.8886 - acc: 0.7215 - val\_loss: 0.2762 - val\_acc: 0.9143

Epoch 2/5

6000/6000 [==============================] - 273s - loss: 0.2689 - acc: 0.9183 - val\_loss: 0.2788 - val\_acc: 0.9040

Epoch 3/5

6000/6000 [==============================] - 273s - loss: 0.1915 - acc: 0.9410 - val\_loss: 0.1561 - val\_acc: 0.9507

Epoch 4/5

6000/6000 [==============================] - 276s - loss: 0.1384 - acc: 0.9565 - val\_loss: 0.1397 - val\_acc: 0.9587

Epoch 5/5

6000/6000 [==============================] - 278s - loss: 0.1115 - acc: 0.9657 - val\_loss: 0.1184 - val\_acc: 0.9673

51000/51000 [==============================] - 446s

Dropout Iteration 1

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 279s - loss: 0.8488 - acc: 0.7232 - val\_loss: 0.2926 - val\_acc: 0.9100

Epoch 2/5

6000/6000 [==============================] - 282s - loss: 0.2663 - acc: 0.9190 - val\_loss: 0.2292 - val\_acc: 0.9253

Epoch 3/5

6000/6000 [==============================] - 279s - loss: 0.1777 - acc: 0.9455 - val\_loss: 0.1499 - val\_acc: 0.9527

Epoch 4/5

6000/6000 [==============================] - 283s - loss: 0.1377 - acc: 0.9583 - val\_loss: 0.1428 - val\_acc: 0.9543

Epoch 5/5

6000/6000 [==============================] - 281s - loss: 0.1127 - acc: 0.9677 - val\_loss: 0.1247 - val\_acc: 0.9617

51000/51000 [==============================] - 447s

Dropout Iteration 2

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 279s - loss: 0.8173 - acc: 0.7435 - val\_loss: 0.2493 - val\_acc: 0.9290

Epoch 2/5

6000/6000 [==============================] - 274s - loss: 0.2661 - acc: 0.9232 - val\_loss: 0.2111 - val\_acc: 0.9370

Epoch 3/5

6000/6000 [==============================] - 282s - loss: 0.1648 - acc: 0.9490 - val\_loss: 0.2011 - val\_acc: 0.9383

Epoch 4/5

6000/6000 [==============================] - 280s - loss: 0.1319 - acc: 0.9612 - val\_loss: 0.1224 - val\_acc: 0.9623

Epoch 5/5

6000/6000 [==============================] - 280s - loss: 0.1125 - acc: 0.9658 - val\_loss: 0.1236 - val\_acc: 0.9607

51000/51000 [==============================] - 447s

Dropout Iteration 3

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 277s - loss: 0.8970 - acc: 0.7158 - val\_loss: 0.2880 - val\_acc: 0.9160

Epoch 2/5

6000/6000 [==============================] - 266s - loss: 0.2632 - acc: 0.9208 - val\_loss: 0.1757 - val\_acc: 0.9473

Epoch 3/5

6000/6000 [==============================] - 220s - loss: 0.1840 - acc: 0.9432 - val\_loss: 0.1376 - val\_acc: 0.9567

Epoch 4/5

6000/6000 [==============================] - 220s - loss: 0.1426 - acc: 0.9583 - val\_loss: 0.1244 - val\_acc: 0.9603

Epoch 5/5

6000/6000 [==============================] - 217s - loss: 0.1095 - acc: 0.9672 - val\_loss: 0.1218 - val\_acc: 0.9617

51000/51000 [==============================] - 345s

Dropout Iteration 4

Train on 6000 samples, validate on 3000 samples

Epoch 1/5

6000/6000 [==============================] - 216s - loss: 0.9050 - acc: 0.7182 - val\_loss: 0.2571 - val\_acc: 0.9283

Epoch 2/5

6000/6000 [==============================] - 214s - loss: 0.2693 - acc: 0.9202 - val\_loss: 0.1863 - val\_acc: 0.9400

Epoch 3/5

6000/6000 [==============================] - 182s - loss: 0.1853 - acc: 0.9447 - val\_loss: 0.1487 - val\_acc: 0.9567

Epoch 4/5

6000/6000 [==============================] - 174s - loss: 0.1367 - acc: 0.9615 - val\_loss: 0.1347 - val\_acc: 0.9623

Epoch 5/5

6000/6000 [==============================] - 177s - loss: 0.1269 - acc: 0.9590 - val\_loss: 0.1218 - val\_acc: 0.9667

51000/51000 [==============================] - 277s

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 199s - loss: 0.7744 - acc: 0.7571 - val\_loss: 0.2592 - val\_acc: 0.9227

Epoch 2/5

7000/7000 [==============================] - 199s - loss: 0.2418 - acc: 0.9284 - val\_loss: 0.1917 - val\_acc: 0.9393

Epoch 3/5

7000/7000 [==============================] - 200s - loss: 0.1691 - acc: 0.9513 - val\_loss: 0.1483 - val\_acc: 0.9553

Epoch 4/5

7000/7000 [==============================] - 200s - loss: 0.1232 - acc: 0.9613 - val\_loss: 0.1593 - val\_acc: 0.9567

Epoch 5/5

7000/7000 [==============================] - 197s - loss: 0.1116 - acc: 0.9651 - val\_loss: 0.1298 - val\_acc: 0.9627

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.143465352416

Test accuracy: 0.954

POOLING ITERATION 1

Dropout Iteration 0

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 202s - loss: 0.7627 - acc: 0.7587 - val\_loss: 0.2234 - val\_acc: 0.9327

Epoch 2/5

7000/7000 [==============================] - 202s - loss: 0.2346 - acc: 0.9301 - val\_loss: 0.1577 - val\_acc: 0.9500

Epoch 3/5

7000/7000 [==============================] - 201s - loss: 0.1640 - acc: 0.9529 - val\_loss: 0.1660 - val\_acc: 0.9467

Epoch 4/5

7000/7000 [==============================] - 198s - loss: 0.1203 - acc: 0.9623 - val\_loss: 0.1456 - val\_acc: 0.9607

Epoch 5/5

7000/7000 [==============================] - 199s - loss: 0.1021 - acc: 0.9667 - val\_loss: 0.1224 - val\_acc: 0.9627

51000/51000 [==============================] - 279s

Dropout Iteration 1

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 203s - loss: 0.7267 - acc: 0.7690 - val\_loss: 0.2644 - val\_acc: 0.9197

Epoch 2/5

7000/7000 [==============================] - 201s - loss: 0.2309 - acc: 0.9303 - val\_loss: 0.1993 - val\_acc: 0.9393

Epoch 3/5

7000/7000 [==============================] - 199s - loss: 0.1534 - acc: 0.9576 - val\_loss: 0.1505 - val\_acc: 0.9527

Epoch 4/5

7000/7000 [==============================] - 196s - loss: 0.1256 - acc: 0.9626 - val\_loss: 0.1173 - val\_acc: 0.9633

Epoch 5/5

7000/7000 [==============================] - 196s - loss: 0.0946 - acc: 0.9724 - val\_loss: 0.1259 - val\_acc: 0.9657

51000/51000 [==============================] - 278s

Dropout Iteration 2

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 199s - loss: 0.7125 - acc: 0.7689 - val\_loss: 0.2242 - val\_acc: 0.9333

Epoch 2/5

7000/7000 [==============================] - 202s - loss: 0.2014 - acc: 0.9401 - val\_loss: 0.1432 - val\_acc: 0.9537

Epoch 3/5

7000/7000 [==============================] - 200s - loss: 0.1420 - acc: 0.9563 - val\_loss: 0.1300 - val\_acc: 0.9610

Epoch 4/5

7000/7000 [==============================] - 206s - loss: 0.1132 - acc: 0.9663 - val\_loss: 0.1420 - val\_acc: 0.9590

Epoch 5/5

7000/7000 [==============================] - 203s - loss: 0.0872 - acc: 0.9731 - val\_loss: 0.1164 - val\_acc: 0.9697

51000/51000 [==============================] - 284s

Dropout Iteration 3

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 204s - loss: 0.7339 - acc: 0.7709 - val\_loss: 0.2502 - val\_acc: 0.9263

Epoch 2/5

7000/7000 [==============================] - 204s - loss: 0.2180 - acc: 0.9373 - val\_loss: 0.1575 - val\_acc: 0.9563

Epoch 3/5

7000/7000 [==============================] - 204s - loss: 0.1531 - acc: 0.9530 - val\_loss: 0.1354 - val\_acc: 0.9577

Epoch 4/5

7000/7000 [==============================] - 201s - loss: 0.1179 - acc: 0.9650 - val\_loss: 0.1226 - val\_acc: 0.9630

Epoch 5/5

7000/7000 [==============================] - 205s - loss: 0.0869 - acc: 0.9721 - val\_loss: 0.1211 - val\_acc: 0.9630

51000/51000 [==============================] - 279s

Dropout Iteration 4

Train on 7000 samples, validate on 3000 samples

Epoch 1/5

7000/7000 [==============================] - 203s - loss: 0.7495 - acc: 0.7600 - val\_loss: 0.2469 - val\_acc: 0.9207

Epoch 2/5

7000/7000 [==============================] - 209s - loss: 0.2374 - acc: 0.9270 - val\_loss: 0.2013 - val\_acc: 0.9323

Epoch 3/5

7000/7000 [==============================] - 201s - loss: 0.1660 - acc: 0.9536 - val\_loss: 0.1424 - val\_acc: 0.9563

Epoch 4/5

7000/7000 [==============================] - 203s - loss: 0.1439 - acc: 0.9581 - val\_loss: 0.1363 - val\_acc: 0.9620

Epoch 5/5

7000/7000 [==============================] - 205s - loss: 0.0987 - acc: 0.9709 - val\_loss: 0.1255 - val\_acc: 0.9590

51000/51000 [==============================] - 276s

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 230s - loss: 0.6479 - acc: 0.7938 - val\_loss: 0.2304 - val\_acc: 0.9300

Epoch 2/5

8000/8000 [==============================] - 229s - loss: 0.1918 - acc: 0.9424 - val\_loss: 0.1652 - val\_acc: 0.9503

Epoch 3/5

8000/8000 [==============================] - 229s - loss: 0.1321 - acc: 0.9596 - val\_loss: 0.1420 - val\_acc: 0.9553

Epoch 4/5

8000/8000 [==============================] - 229s - loss: 0.1007 - acc: 0.9690 - val\_loss: 0.1406 - val\_acc: 0.9573

Epoch 5/5

8000/8000 [==============================] - 230s - loss: 0.0809 - acc: 0.9735 - val\_loss: 0.1079 - val\_acc: 0.9670

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.107779722989

Test accuracy: 0.9625

POOLING ITERATION 2

Dropout Iteration 0

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 227s - loss: 0.6916 - acc: 0.7826 - val\_loss: 0.2083 - val\_acc: 0.9340

Epoch 2/5

8000/8000 [==============================] - 227s - loss: 0.2126 - acc: 0.9359 - val\_loss: 0.1570 - val\_acc: 0.9517

Epoch 3/5

8000/8000 [==============================] - 231s - loss: 0.1366 - acc: 0.9564 - val\_loss: 0.1140 - val\_acc: 0.9690

Epoch 4/5

8000/8000 [==============================] - 233s - loss: 0.1080 - acc: 0.9663 - val\_loss: 0.1270 - val\_acc: 0.9627

Epoch 5/5

8000/8000 [==============================] - 232s - loss: 0.0874 - acc: 0.9728 - val\_loss: 0.1283 - val\_acc: 0.9620

51000/51000 [==============================] - 281s

Dropout Iteration 1

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 235s - loss: 0.7141 - acc: 0.7764 - val\_loss: 0.1985 - val\_acc: 0.9367

Epoch 2/5

8000/8000 [==============================] - 232s - loss: 0.2174 - acc: 0.9354 - val\_loss: 0.1591 - val\_acc: 0.9513

Epoch 3/5

8000/8000 [==============================] - 233s - loss: 0.1445 - acc: 0.9579 - val\_loss: 0.1188 - val\_acc: 0.9660

Epoch 4/5

8000/8000 [==============================] - 232s - loss: 0.1085 - acc: 0.9673 - val\_loss: 0.1206 - val\_acc: 0.9623

Epoch 5/5

8000/8000 [==============================] - 227s - loss: 0.0921 - acc: 0.9720 - val\_loss: 0.1128 - val\_acc: 0.9673

51000/51000 [==============================] - 288s

Dropout Iteration 2

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 228s - loss: 0.6843 - acc: 0.7855 - val\_loss: 0.2577 - val\_acc: 0.9167

Epoch 2/5

8000/8000 [==============================] - 224s - loss: 0.2024 - acc: 0.9393 - val\_loss: 0.1500 - val\_acc: 0.9533

Epoch 3/5

8000/8000 [==============================] - 234s - loss: 0.1381 - acc: 0.9615 - val\_loss: 0.1631 - val\_acc: 0.9477

Epoch 4/5

8000/8000 [==============================] - 231s - loss: 0.1116 - acc: 0.9643 - val\_loss: 0.1229 - val\_acc: 0.9617

Epoch 5/5

8000/8000 [==============================] - 232s - loss: 0.0853 - acc: 0.9734 - val\_loss: 0.1342 - val\_acc: 0.9580

51000/51000 [==============================] - 279s

Dropout Iteration 3

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 226s - loss: 0.6955 - acc: 0.7824 - val\_loss: 0.2764 - val\_acc: 0.9113

Epoch 2/5

8000/8000 [==============================] - 228s - loss: 0.2087 - acc: 0.9371 - val\_loss: 0.1760 - val\_acc: 0.9423

Epoch 3/5

8000/8000 [==============================] - 224s - loss: 0.1423 - acc: 0.9564 - val\_loss: 0.1397 - val\_acc: 0.9533

Epoch 4/5

8000/8000 [==============================] - 228s - loss: 0.1024 - acc: 0.9696 - val\_loss: 0.1369 - val\_acc: 0.9593

Epoch 5/5

8000/8000 [==============================] - 225s - loss: 0.0827 - acc: 0.9748 - val\_loss: 0.1069 - val\_acc: 0.9657

51000/51000 [==============================] - 284s

Dropout Iteration 4

Train on 8000 samples, validate on 3000 samples

Epoch 1/5

8000/8000 [==============================] - 225s - loss: 0.7271 - acc: 0.7619 - val\_loss: 0.2869 - val\_acc: 0.9103

Epoch 2/5

8000/8000 [==============================] - 226s - loss: 0.2143 - acc: 0.9346 - val\_loss: 0.1614 - val\_acc: 0.9477

Epoch 3/5

8000/8000 [==============================] - 223s - loss: 0.1430 - acc: 0.9557 - val\_loss: 0.1426 - val\_acc: 0.9523

Epoch 4/5

8000/8000 [==============================] - 225s - loss: 0.1110 - acc: 0.9669 - val\_loss: 0.1540 - val\_acc: 0.9497

Epoch 5/5

8000/8000 [==============================] - 227s - loss: 0.0899 - acc: 0.9723 - val\_loss: 0.1489 - val\_acc: 0.9537

51000/51000 [==============================] - 282s

Train on 9000 samples, validate on 3000 samples

Epoch 1/5

9000/9000 [==============================] - 261s - loss: 0.6229 - acc: 0.8064 - val\_loss: 0.2188 - val\_acc: 0.9340

Epoch 2/5

9000/9000 [==============================] - 254s - loss: 0.1945 - acc: 0.9413 - val\_loss: 0.1415 - val\_acc: 0.9563

Epoch 3/5

9000/9000 [==============================] - 258s - loss: 0.1288 - acc: 0.9626 - val\_loss: 0.1524 - val\_acc: 0.9553

Epoch 4/5

9000/9000 [==============================] - 250s - loss: 0.0985 - acc: 0.9707 - val\_loss: 0.1130 - val\_acc: 0.9663

Epoch 5/5

9000/9000 [==============================] - 249s - loss: 0.0741 - acc: 0.9758 - val\_loss: 0.1338 - val\_acc: 0.9647

EVALUATING THE MODEL ON TEST SET

Evaluating Test Accuracy

Test score: 0.12337507987

Test accuracy: 0.965