

Sagar Laud
Project 4 Report

Question 5

Starting training at time 00:52:11.303209 with 16 inputs, 10 outputs, [24] hidden layers, size of training set 7494, and size of test set 3498

Finished after 27 iterations at time 00:54:36.615446 with training error 0.418468 and weight change 0.000078

Feed Forward Test correctly classified 2672, incorrectly classified 826, test percent error 0.763865

Starting training at time 00:54:38.027674 with 16 inputs, 10 outputs, [24] hidden layers, size of training set 7494, and size of test set 3498

Finished after 32 iterations at time 00:57:35.799629 with training error 0.436996 and weight change 0.000077

Feed Forward Test correctly classified 2865, incorrectly classified 633, test percent error 0.819039

Starting training at time 00:57:37.196816 with 16 inputs, 10 outputs, [24] hidden layers, size of training set 7494, and size of test set 3498

Finished after 37 iterations at time 01:01:08.245273 with training error 0.603096 and weight change 0.000076

Feed Forward Test correctly classified 2658, incorrectly classified 840, test percent error 0.759863

Starting training at time 01:01:09.642481 with 16 inputs, 10 outputs, [24] hidden layers, size of training set 7494, and size of test set 3498

Finished after 61 iterations at time 01:06:50.329463 with training error 0.779303 and weight change 0.000079

Feed Forward Test correctly classified 2681, incorrectly classified 817, test percent error 0.766438

Starting training at time 01:06:51.731422 with 16 inputs, 10 outputs, [24] hidden layers, size of training set 7494, and size of test set 3498

Finished after 37 iterations at time 01:10:14.594208 with training error 0.562510 and weight change 0.000077

Feed Forward Test correctly classified 2729, incorrectly classified 769, test percent error 0.780160

Starting training at time 01:10:15.982625 with 21 inputs, 4 outputs, [16] hidden layers, size of training set 200, and size of test set 1528

Finished after 107 iterations at time 01:10:25.501023 with training error 3.314375 and weight change 0.000075

Feed Forward Test correctly classified 989, incorrectly classified 539, test percent error 0.647251

Starting training at time 01:10:25.896201 with 21 inputs, 4 outputs, [16] hidden layers, size of training set 200, and size of test set 1528

Finished after 69 iterations at time 01:10:32.022123 with training error 2.403750 and weight change 0.000078

Feed Forward Test correctly classified 907, incorrectly classified 621, test percent error 0.593586

Starting training at time 01:10:32.408205 with 21 inputs, 4 outputs, [16] hidden layers, size of training set 200, and size of test set 1528

Finished after 120 iterations at time 01:10:43.025392 with training error 4.369375 and weight change 0.000075

Feed Forward Test correctly classified 1118, incorrectly classified 410, test percent error 0.731675

Starting training at time 01:10:43.412834 with 21 inputs, 4 outputs, [16] hidden layers, size of training set 200, and size of test set 1528

Finished after 136 iterations at time 01:10:55.777143 with training error 4.372500 and weight change 0.000067

Feed Forward Test correctly classified 1073, incorrectly classified 455, test percent error 0.702225

Starting training at time 01:10:56.161318 with 21 inputs, 4 outputs, [16] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:11:14.103835 with training error 5.746250 and weight change 0.000089

Feed Forward Test correctly classified 1039, incorrectly classified 489, test percent error 0.679974

Pen max is: 0.819039451115 Pen average is: 0.777873070326 Pen SD is: 0.0216852844694
Car max is: 0.73167539267 Car average is: 0.670942408377 Car SD is: 0.0475266087813

Question 6

With 0:

Starting training at time 01:15:24.331429 with 16 inputs, 10 outputs, [0] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:17:25.790755 with training error 17.994629 and weight change 0.004495

Feed Forward Test correctly classified 364, incorrectly classified 3134, test percent error 0.104059

Starting training at time 01:17:26.015482 with 16 inputs, 10 outputs, [0] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:19:27.280086 with training error 17.996577 and weight change 0.004501

Feed Forward Test correctly classified 0, incorrectly classified 3498, test percent error 0.000000

Starting training at time 01:19:27.503565 with 16 inputs, 10 outputs, [0] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:21:29.991478 with training error 17.998339 and weight change 0.004494

Feed Forward Test correctly classified 0, incorrectly classified 3498, test percent error 0.000000

Starting training at time 01:21:30.227167 with 16 inputs, 10 outputs, [0] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:23:32.094204 with training error 17.999960 and weight change 0.004501

Feed Forward Test correctly classified 364, incorrectly classified 3134, test percent error 0.104059

Starting training at time 01:23:32.327882 with 16 inputs, 10 outputs, [0] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:25:34.397199 with training error 17.997972 and weight change 0.004500

Feed Forward Test correctly classified 0, incorrectly classified 3498, test percent error 0.000000

Starting training at time 01:25:34.622528 with 21 inputs, 4 outputs, [0] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:25:36.069660 with training error 21.707500 and weight change 0.005312

Feed Forward Test correctly classified 56, incorrectly classified 1472, test percent error 0.036649

Starting training at time 01:25:36.112610 with 21 inputs, 4 outputs, [0] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:25:37.545340 with training error 21.350625 and weight change 0.005375

Feed Forward Test correctly classified 56, incorrectly classified 1472, test percent error 0.036649

Starting training at time 01:25:37.588932 with 21 inputs, 4 outputs, [0] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:25:39.031763 with training error 22.261875 and weight change 0.005500

Feed Forward Test correctly classified 0, incorrectly classified 1528, test percent error 0.000000

Starting training at time 01:25:39.074768 with 21 inputs, 4 outputs, [0] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:25:40.495739 with training error 21.373750 and weight change 0.005562

Feed Forward Test correctly classified 0, incorrectly classified 1528, test percent error 0.000000

Starting training at time 01:25:40.538597 with 21 inputs, 4 outputs, [0] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:25:42.004703 with training error 21.305625 and weight change 0.005437

Feed Forward Test correctly classified 0, incorrectly classified 1528, test percent error 0.000000

Pen max is: 0.10405946255 Pen average is: 0.04162378502 Pen SD is: 0.0509785172312

Car max is: 0.0366492146597 Car average is: 0.0146596858639 Car SD is: 0.017954375078

With 5:

Starting training at time 01:27:14.307476 with 16 inputs, 10 outputs, [5] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:32:39.874541 with training error 6.691346 and weight change 0.000230

Feed Forward Test correctly classified 2477, incorrectly classified 1021, test percent error 0.708119

Starting training at time 01:32:40.332509 with 16 inputs, 10 outputs, [5] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:38:11.300336 with training error 6.838858 and weight change 0.000293

Feed Forward Test correctly classified 1520, incorrectly classified 1978, test percent error 0.434534

Starting training at time 01:38:11.761950 with 16 inputs, 10 outputs, [5] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:43:36.875276 with training error 7.245630 and weight change 0.000289

Feed Forward Test correctly classified 1843, incorrectly classified 1655, test percent error 0.526872

Starting training at time 01:43:37.343837 with 16 inputs, 10 outputs, [5] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:48:59.047053 with training error 7.357639 and weight change 0.000277

Feed Forward Test correctly classified 1923, incorrectly classified 1575, test percent error 0.549743

Starting training at time 01:48:59.506168 with 16 inputs, 10 outputs, [5] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 01:54:23.501387 with training error 8.405177 and weight change 0.000346

Feed Forward Test correctly classified 1683, incorrectly classified 1815, test percent error 0.481132

Starting training at time 01:54:23.978729 with 21 inputs, 4 outputs, [5] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:54:30.832251 with training error 8.921875 and weight change 0.000173

Feed Forward Test correctly classified 1038, incorrectly classified 490, test percent error 0.679319

Starting training at time 01:54:31.001008 with 21 inputs, 4 outputs, [5] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:54:38.176352 with training error 7.227500 and weight change 0.000153

Feed Forward Test correctly classified 1065, incorrectly classified 463, test percent error 0.696990

Starting training at time 01:54:38.335623 with 21 inputs, 4 outputs, [5] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:54:45.367264 with training error 7.829375 and weight change 0.000139

Feed Forward Test correctly classified 1039, incorrectly classified 489, test percent error 0.679974

Starting training at time 01:54:45.517788 with 21 inputs, 4 outputs, [5] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:54:52.396442 with training error 10.423125 and weight change 0.000218

Feed Forward Test correctly classified 1027, incorrectly classified 501, test percent error 0.672120

Starting training at time 01:54:52.548384 with 21 inputs, 4 outputs, [5] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 01:54:59.461898 with training error 12.006250 and weight change 0.000210

Feed Forward Test correctly classified 913, incorrectly classified 615, test percent error 0.597513

Pen max is: 0.7081189251 Pen average is: 0.54008004574 Pen SD is: 0.0928651691737

Car max is: 0.696989528796 Car average is: 0.665183246073 Car SD is: 0.0348069111781

With 10:

Starting training at time 01:57:05.590853 with 16 inputs, 10 outputs, [10] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 02:06:03.244678 with training error 3.494282 and weight change 0.000086

Feed Forward Test correctly classified 2856, incorrectly classified 642, test percent error 0.816467

Starting training at time 02:06:03.948715 with 16 inputs, 10 outputs, [10] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 02:15:18.744431 with training error 3.582653 and weight change 0.000103

Feed Forward Test correctly classified 2432, incorrectly classified 1066, test percent error 0.695254

Starting training at time 02:15:19.522465 with 16 inputs, 10 outputs, [10] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 02:25:32.491372 with training error 3.326715 and weight change 0.000108

Feed Forward Test correctly classified 2723, incorrectly classified 775, test percent error 0.778445

Starting training at time 02:25:33.232035 with 16 inputs, 10 outputs, [10] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 02:35:29.821977 with training error 3.511869 and weight change 0.000101

Feed Forward Test correctly classified 2873, incorrectly classified 625, test percent error 0.821326

Starting training at time 02:35:30.591524 with 16 inputs, 10 outputs, [10] hidden layers, size of training set 7494, and size of test set 3498

Finished after 200 iterations at time 02:45:27.552002 with training error 3.471097 and weight change 0.000121

Feed Forward Test correctly classified 2557, incorrectly classified 941, test percent error 0.730989

Starting training at time 02:45:28.406771 with 21 inputs, 4 outputs, [10] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 02:45:41.801740 with training error 7.370625 and weight change 0.000136

Feed Forward Test correctly classified 897, incorrectly classified 631, test percent error 0.587042

Starting training at time 02:45:42.086343 with 21 inputs, 4 outputs, [10] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 02:45:55.280787 with training error 8.145625 and weight change 0.000137

Feed Forward Test correctly classified 991, incorrectly classified 537, test percent error 0.648560

Starting training at time 02:45:55.551404 with 21 inputs, 4 outputs, [10] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 02:46:09.168310 with training error 8.995625 and weight change 0.000120

Feed Forward Test correctly classified 1024, incorrectly classified 504, test percent error 0.670157

Starting training at time 02:46:09.459487 with 21 inputs, 4 outputs, [10] hidden layers, size of training set 200, and size of test set 1528

Finished after 174 iterations at time 02:46:21.545608 with training error 6.462500 and weight change 0.000080

Feed Forward Test correctly classified 1055, incorrectly classified 473, test percent error 0.690445

Starting training at time 02:46:21.833702 with 21 inputs, 4 outputs, [10] hidden layers, size of training set 200, and size of test set 1528

Finished after 200 iterations at time 02:46:35.443280 with training error 9.021250 and weight change 0.000124

Feed Forward Test correctly classified 1027, incorrectly classified 501, test percent error 0.672120

Pen max is: 0.82132647227 Pen average is: 0.768496283591 Pen SD is: 0.048912787762

Car max is: 0.690445026178 Car average is: 0.653664921466 Car SD is: 0.0358610080255

With 15:

Starting training at time 02:47:20.902381 with 16 inputs, 10 outputs, [15] hidden layers, size of training set 7494, and size of test set 3498

Finished after 119 iterations at time 02:55:28.909434 with training error 1.830658 and weight change 0.000079

Feed Forward Test correctly classified 2745, incorrectly classified 753, test percent error 0.784734

Starting training at time 02:55:29.886958 with 16 inputs, 10 outputs, [15] hidden layers, size of training set 7494, and size of test set 3498

Finished after 142 iterations at time 03:04:19.379628 with training error 2.136109 and weight change 0.000080

Feed Forward Test correctly classified 2890, incorrectly classified 608, test percent error 0.826186

Starting training at time 03:04:20.352144 with 16 inputs, 10 outputs, [15] hidden layers, size of training set 7494, and size of test set 3498

Finished after 139 iterations at time 03:13:13.640242 with training error 2.271697 and weight change 0.000080

Feed Forward Test correctly classified 2934, incorrectly classified 564, test percent error 0.838765

Starting training at time 03:13:14.707063 with 16 inputs, 10 outputs, [15] hidden layers, size of training set 7494, and size of test set 3498

Finished after 139 iterations at time 03:22:06.769272 with training error 1.836789 and weight change 0.000080

Feed Forward Test correctly classified 2806, incorrectly classified 692, test percent error 0.802173

Starting training at time 03:22:07.727513 with 16 inputs, 10 outputs, [15] hidden layers, size of training set 7494, and size of test set 3498

Finished after 110 iterations at time 03:28:47.611795 with training error 1.675434 and weight change 0.000080
Feed Forward Test correctly classified 2821, incorrectly classified 677, test percent error 0.806461

Starting training at time 03:28:48.613344 with 21 inputs, 4 outputs, [15] hidden layers, size of training set 200, and size of test set 1528
Finished after 94 iterations at time 03:28:56.609338 with training error 3.118125 and weight change 0.000061
Feed Forward Test correctly classified 975, incorrectly classified 553, test percent error 0.638089

Starting training at time 03:28:56.973991 with 21 inputs, 4 outputs, [15] hidden layers, size of training set 200, and size of test set 1528
Finished after 113 iterations at time 03:29:06.626095 with training error 4.146250 and weight change 0.000076
Feed Forward Test correctly classified 1013, incorrectly classified 515, test percent error 0.662958

Starting training at time 03:29:06.994002 with 21 inputs, 4 outputs, [15] hidden layers, size of training set 200, and size of test set 1528
Finished after 99 iterations at time 03:29:15.670143 with training error 3.107500 and weight change 0.000067
Feed Forward Test correctly classified 1048, incorrectly classified 480, test percent error 0.685864

Starting training at time 03:29:16.041179 with 21 inputs, 4 outputs, [15] hidden layers, size of training set 200, and size of test set 1528
Finished after 116 iterations at time 03:29:25.918118 with training error 3.880625 and weight change 0.000073
Feed Forward Test correctly classified 1040, incorrectly classified 488, test percent error 0.680628

Starting training at time 03:29:26.284763 with 21 inputs, 4 outputs, [15] hidden layers, size of training set 200, and size of test set 1528
Finished after 155 iterations at time 03:29:39.503775 with training error 5.344375 and weight change 0.000074
Feed Forward Test correctly classified 1017, incorrectly classified 511, test percent error 0.665576

Pen max is: 0.838765008576 Pen average is: 0.81166380789 Pen SD is: 0.0189089423683
Car max is: 0.685863874346 Car average is: 0.666623036649 Car SD is: 0.0167037452014

With 20:

Starting training at time 03:30:36.221146 with 16 inputs, 10 outputs, [20] hidden layers, size of training set 7494, and size of test set 3498

Finished after 51 iterations at time 03:34:35.010683 with training error 0.783113 and weight change 0.000078

Feed Forward Test correctly classified 2718, incorrectly classified 780, test percent error 0.777015

Starting training at time 03:34:36.216498 with 16 inputs, 10 outputs, [20] hidden layers, size of training set 7494, and size of test set 3498

Finished after 43 iterations at time 03:38:04.103536 with training error 0.680311 and weight change 0.000078

Feed Forward Test correctly classified 2724, incorrectly classified 774, test percent error 0.778731

Starting training at time 03:38:05.307323 with 16 inputs, 10 outputs, [20] hidden layers, size of training set 7494, and size of test set 3498

Finished after 59 iterations at time 03:42:59.469837 with training error 0.833814 and weight change 0.000079

Feed Forward Test correctly classified 2798, incorrectly classified 700, test percent error 0.799886

Starting training at time 03:43:00.693232 with 16 inputs, 10 outputs, [20] hidden layers, size of training set 7494, and size of test set 3498

Finished after 35 iterations at time 03:45:53.721772 with training error 0.547171 and weight change 0.000079

Feed Forward Test correctly classified 2823, incorrectly classified 675, test percent error 0.807033

Starting training at time 03:45:54.940306 with 16 inputs, 10 outputs, [20] hidden layers, size of training set 7494, and size of test set 3498

Finished after 46 iterations at time 03:49:33.105603 with training error 0.732506 and weight change 0.000079

Feed Forward Test correctly classified 2803, incorrectly classified 695, test percent error 0.801315

Starting training at time 03:49:34.330033 with 21 inputs, 4 outputs, [20] hidden layers, size of training set 200, and size of test set 1528

Finished after 73 iterations at time 03:49:42.634117 with training error 2.790625 and weight change 0.000076

Feed Forward Test correctly classified 1050, incorrectly classified 478, test percent error 0.687173

Starting training at time 03:49:43.126931 with 21 inputs, 4 outputs, [20] hidden layers, size of training set 200, and size of test set 1528

Finished after 106 iterations at time 03:49:55.135851 with training error 3.775625 and weight change 0.000073

Feed Forward Test correctly classified 1070, incorrectly classified 458, test percent error 0.700262

Starting training at time 03:49:55.625755 with 21 inputs, 4 outputs, [20] hidden layers, size of training set 200, and size of test set 1528

Finished after 87 iterations at time 03:50:05.433487 with training error 3.555000 and weight change 0.000070

Feed Forward Test correctly classified 970, incorrectly classified 558, test percent error 0.634817

Starting training at time 03:50:05.918094 with 21 inputs, 4 outputs, [20] hidden layers, size of training set 200, and size of test set 1528

Finished after 81 iterations at time 03:50:15.165873 with training error 2.460625 and weight change 0.000064

Feed Forward Test correctly classified 1078, incorrectly classified 450, test percent error 0.705497

Starting training at time 03:50:15.652648 with 21 inputs, 4 outputs, [20] hidden layers, size of training set 200, and size of test set 1528

Finished after 100 iterations at time 03:50:26.833361 with training error 3.035000 and weight change 0.000070

Feed Forward Test correctly classified 1023, incorrectly classified 505, test percent error 0.669503

Pen max is: 0.807032590051 Pen average is: 0.792795883362 Pen SD is: 0.0124288079973

Car max is: 0.705497382199 Car average is: 0.67945026178 Car SD is: 0.02554335385

With 25:

Starting training at time 03:55:27.386205 with 16 inputs, 10 outputs, [25] hidden layers, size of training set 7494, and size of test set 3498

Finished after 36 iterations at time 03:58:57.166037 with training error 0.614745 and weight change 0.000079

Feed Forward Test correctly classified 2773, incorrectly classified 725, test percent error 0.792739

Starting training at time 03:58:58.654893 with 16 inputs, 10 outputs, [25] hidden layers, size of training set 7494, and size of test set 3498

Finished after 33 iterations at time 04:02:20.142224 with training error 0.450107 and weight change 0.000080
Feed Forward Test correctly classified 2935, incorrectly classified 563, test percent error 0.839051

Starting training at time 04:02:21.626214 with 16 inputs, 10 outputs, [25] hidden layers, size of training set 7494, and size of test set 3498
Finished after 40 iterations at time 04:06:24.127130 with training error 0.590246 and weight change 0.000079
Feed Forward Test correctly classified 2781, incorrectly classified 717, test percent error 0.795026

Starting training at time 04:06:25.668937 with 16 inputs, 10 outputs, [25] hidden layers, size of training set 7494, and size of test set 3498
Finished after 21 iterations at time 04:08:35.557489 with training error 0.332346 and weight change 0.000080
Feed Forward Test correctly classified 2844, incorrectly classified 654, test percent error 0.813036

Starting training at time 04:08:37.090331 with 16 inputs, 10 outputs, [25] hidden layers, size of training set 7494, and size of test set 3498
Finished after 50 iterations at time 04:13:51.401457 with training error 0.720450 and weight change 0.000079
Feed Forward Test correctly classified 2848, incorrectly classified 650, test percent error 0.814180

Starting training at time 04:13:52.959900 with 21 inputs, 4 outputs, [25] hidden layers, size of training set 200, and size of test set 1528
Finished after 31 iterations at time 04:13:57.586850 with training error 1.275000 and weight change 0.000076
Feed Forward Test correctly classified 996, incorrectly classified 532, test percent error 0.651832

Starting training at time 04:13:58.339704 with 21 inputs, 4 outputs, [25] hidden layers, size of training set 200, and size of test set 1528
Finished after 64 iterations at time 04:14:08.299867 with training error 1.695625 and weight change 0.000074
Feed Forward Test correctly classified 1101, incorrectly classified 427, test percent error 0.720550

Starting training at time 04:14:08.925778 with 21 inputs, 4 outputs, [25] hidden layers, size of training set 200, and size of test set 1528

Finished after 61 iterations at time 04:14:18.785660 with training error 1.832500 and weight change 0.000068

Feed Forward Test correctly classified 1042, incorrectly classified 486, test percent error 0.681937

Starting training at time 04:14:19.454337 with 21 inputs, 4 outputs, [25] hidden layers, size of training set 200, and size of test set 1528

Finished after 45 iterations at time 04:14:26.670619 with training error 1.513125 and weight change 0.000061

Feed Forward Test correctly classified 1041, incorrectly classified 487, test percent error 0.681283

Starting training at time 04:14:27.393790 with 21 inputs, 4 outputs, [25] hidden layers, size of training set 200, and size of test set 1528

Finished after 49 iterations at time 04:14:35.159062 with training error 1.583125 and weight change 0.000076

Feed Forward Test correctly classified 945, incorrectly classified 583, test percent error 0.618455

Pen max is: 0.839050886221 Pen average is: 0.810806174957 Pen SD is: 0.0166707606378

Car max is: 0.72054973822 Car average is: 0.670811518325 Car SD is: 0.0340842320683

With 30:

Starting training at time 04:15:13.039602 with 16 inputs, 10 outputs, [30] hidden layers, size of training set 7494, and size of test set 3498

Finished after 22 iterations at time 04:18:00.052504 with training error 0.320303 and weight change 0.000075

Feed Forward Test correctly classified 2796, incorrectly classified 702, test percent error 0.799314

Starting training at time 04:18:01.965162 with 16 inputs, 10 outputs, [30] hidden layers, size of training set 7494, and size of test set 3498

Finished after 22 iterations at time 04:21:03.051008 with training error 0.284061 and weight change 0.000078

Feed Forward Test correctly classified 2718, incorrectly classified 780, test percent error 0.777015

Starting training at time 04:21:04.928008 with 16 inputs, 10 outputs, [30] hidden layers, size of training set 7494, and size of test set 3498

Finished after 39 iterations at time 04:26:03.196988 with training error 0.478243 and weight change 0.000077

Feed Forward Test correctly classified 2845, incorrectly classified 653, test percent error 0.813322

Starting training at time 04:26:05.180191 with 16 inputs, 10 outputs, [30] hidden layers, size of training set 7494, and size of test set 3498

Finished after 33 iterations at time 04:30:18.648497 with training error 0.460448 and weight change 0.000078

Feed Forward Test correctly classified 2741, incorrectly classified 757, test percent error 0.783591

Starting training at time 04:30:20.507615 with 16 inputs, 10 outputs, [30] hidden layers, size of training set 7494, and size of test set 3498

Finished after 18 iterations at time 04:32:36.802333 with training error 0.260855 and weight change 0.000080

Feed Forward Test correctly classified 2893, incorrectly classified 605, test percent error 0.827044

Starting training at time 04:32:38.642265 with 21 inputs, 4 outputs, [30] hidden layers, size of training set 200, and size of test set 1528

Finished after 46 iterations at time 04:32:47.253170 with training error 1.468125 and weight change 0.000065

Feed Forward Test correctly classified 1044, incorrectly classified 484, test percent error 0.683246

Starting training at time 04:32:48.047879 with 21 inputs, 4 outputs, [30] hidden layers, size of training set 200, and size of test set 1528

Finished after 70 iterations at time 04:33:01.197032 with training error 2.198125 and weight change 0.000080

Feed Forward Test correctly classified 1096, incorrectly classified 432, test percent error 0.717277

Starting training at time 04:33:01.952248 with 21 inputs, 4 outputs, [30] hidden layers, size of training set 200, and size of test set 1528

Finished after 49 iterations at time 04:33:11.001712 with training error 1.761250 and weight change 0.000060

Feed Forward Test correctly classified 1090, incorrectly classified 438, test percent error 0.713351

Starting training at time 04:33:11.760471 with 21 inputs, 4 outputs, [30] hidden layers, size of training set 200, and size of test set 1528

Finished after 82 iterations at time 04:33:26.958602 with training error 2.282500 and weight change 0.000076

Feed Forward Test correctly classified 1051, incorrectly classified 477, test percent error 0.687827

Starting training at time 04:33:27.708512 with 21 inputs, 4 outputs, [30] hidden layers, size of training set 200, and size of test set 1528

Finished after 44 iterations at time 04:33:35.883913 with training error 1.570625 and weight change 0.000080

Feed Forward Test correctly classified 1078, incorrectly classified 450, test percent error 0.705497

Pen max is: 0.827044025157 Pen average is: 0.800057175529 Pen SD is: 0.0184762790116
Car max is: 0.717277486911 Car average is: 0.701439790576 Car SD is: 0.0136050120002

With 35:

Starting training at time 04:35:00.800688 with 16 inputs, 10 outputs, [35] hidden layers, size of training set 7494, and size of test set 3498

Finished after 24 iterations at time 04:38:19.785769 with training error 0.294762 and weight change 0.000080

Feed Forward Test correctly classified 2798, incorrectly classified 700, test percent error 0.799886

Starting training at time 04:38:21.927520 with 16 inputs, 10 outputs, [35] hidden layers, size of training set 7494, and size of test set 3498

Finished after 13 iterations at time 04:40:08.329708 with training error 0.189065 and weight change 0.000079

Feed Forward Test correctly classified 2730, incorrectly classified 768, test percent error 0.780446

Starting training at time 04:40:10.297323 with 16 inputs, 10 outputs, [35] hidden layers, size of training set 7494, and size of test set 3498

Finished after 23 iterations at time 04:43:21.240759 with training error 0.332026 and weight change 0.000080

Feed Forward Test correctly classified 2858, incorrectly classified 640, test percent error 0.817038

Starting training at time 04:43:23.239641 with 16 inputs, 10 outputs, [35] hidden layers, size of training set 7494, and size of test set 3498

Finished after 16 iterations at time 04:45:29.459524 with training error 0.220236 and weight change 0.000075

Feed Forward Test correctly classified 2736, incorrectly classified 762, test percent error 0.782161

Starting training at time 04:45:31.560967 with 16 inputs, 10 outputs, [35] hidden layers, size of training set 7494, and size of test set 3498

Finished after 16 iterations at time 04:47:39.534954 with training error 0.205031 and weight change 0.000078

Feed Forward Test correctly classified 2688, incorrectly classified 810, test percent error 0.768439

Starting training at time 04:47:41.534597 with 21 inputs, 4 outputs, [35] hidden layers, size of training set 200, and size of test set 1528

Finished after 49 iterations at time 04:47:51.032002 with training error 1.568125 and weight change 0.000071

Feed Forward Test correctly classified 1026, incorrectly classified 502, test percent error 0.671466

Starting training at time 04:47:51.869771 with 21 inputs, 4 outputs, [35] hidden layers, size of training set 200, and size of test set 1528

Finished after 39 iterations at time 04:47:59.535483 with training error 1.361875 and weight change 0.000076

Feed Forward Test correctly classified 1014, incorrectly classified 514, test percent error 0.663613

Starting training at time 04:48:00.355951 with 21 inputs, 4 outputs, [35] hidden layers, size of training set 200, and size of test set 1528

Finished after 25 iterations at time 04:48:05.331456 with training error 0.827500 and weight change 0.000064

Feed Forward Test correctly classified 1038, incorrectly classified 490, test percent error 0.679319

Starting training at time 04:48:06.327389 with 21 inputs, 4 outputs, [35] hidden layers, size of training set 200, and size of test set 1528

Finished after 56 iterations at time 04:48:17.334059 with training error 1.600625 and weight change 0.000060

Feed Forward Test correctly classified 989, incorrectly classified 539, test percent error 0.647251

Starting training at time 04:48:18.160612 with 21 inputs, 4 outputs, [35] hidden layers, size of training set 200, and size of test set 1528

Finished after 70 iterations at time 04:48:31.741572 with training error 2.220000 and weight change 0.000068

Feed Forward Test correctly classified 1005, incorrectly classified 523, test percent error 0.657723

Pen max is: 0.817038307604 Pen average is: 0.789594053745 Pen SD is: 0.0170033524653

Car max is: 0.679319371728 Car average is: 0.66387434555 Car SD is: 0.0110491673248

With 40:

Starting training at time 04:48:49.975951 with 16 inputs, 10 outputs, [40] hidden layers, size of training set 7494, and size of test set 3498

Finished after 15 iterations at time 04:51:02.038054 with training error 0.190866 and weight change 0.000079

Feed Forward Test correctly classified 2661, incorrectly classified 837, test percent error 0.760720

Starting training at time 04:51:04.208907 with 16 inputs, 10 outputs, [40] hidden layers, size of training set 7494, and size of test set 3498

Finished after 15 iterations at time 04:53:17.389938 with training error 0.177175 and weight change 0.000076

Feed Forward Test correctly classified 2650, incorrectly classified 848, test percent error 0.757576

Starting training at time 04:53:19.580728 with 16 inputs, 10 outputs, [40] hidden layers, size of training set 7494, and size of test set 3498

Finished after 13 iterations at time 04:55:13.425241 with training error 0.169456 and weight change 0.000077

Feed Forward Test correctly classified 2827, incorrectly classified 671, test percent error 0.808176

Starting training at time 04:55:15.599745 with 16 inputs, 10 outputs, [40] hidden layers, size of training set 7494, and size of test set 3498

Finished after 13 iterations at time 04:57:09.900103 with training error 0.174513 and weight change 0.000075

Feed Forward Test correctly classified 2865, incorrectly classified 633, test percent error 0.819039

Starting training at time 04:57:12.099988 with 16 inputs, 10 outputs, [40] hidden layers, size of training set 7494, and size of test set 3498

Finished after 18 iterations at time 04:59:52.133203 with training error 0.187744 and weight change 0.000079

Feed Forward Test correctly classified 2967, incorrectly classified 531, test percent error 0.848199

Starting training at time 04:59:54.292015 with 21 inputs, 4 outputs, [40] hidden layers, size of training set 200, and size of test set 1528

Finished after 28 iterations at time 05:00:00.409279 with training error 1.021875 and weight change 0.000077

Feed Forward Test correctly classified 1036, incorrectly classified 492, test percent error 0.678010

Starting training at time 05:00:01.352193 with 21 inputs, 4 outputs, [40] hidden layers, size of training set 200, and size of test set 1528

Finished after 29 iterations at time 05:00:07.663735 with training error 0.971875 and weight change 0.000073

Feed Forward Test correctly classified 1050, incorrectly classified 478, test percent error 0.687173

Starting training at time 05:00:08.582662 with 21 inputs, 4 outputs, [40] hidden layers, size of training set 200, and size of test set 1528

Finished after 30 iterations at time 05:00:15.109556 with training error 1.059375 and weight change 0.000066

Feed Forward Test correctly classified 1026, incorrectly classified 502, test percent error 0.671466

Starting training at time 05:00:16.026606 with 21 inputs, 4 outputs, [40] hidden layers, size of training set 200, and size of test set 1528

Finished after 43 iterations at time 05:00:25.505290 with training error 1.343750 and weight change 0.000073

Feed Forward Test correctly classified 1048, incorrectly classified 480, test percent error 0.685864

Starting training at time 05:00:26.422824 with 21 inputs, 4 outputs, [40] hidden layers, size of training set 200, and size of test set 1528

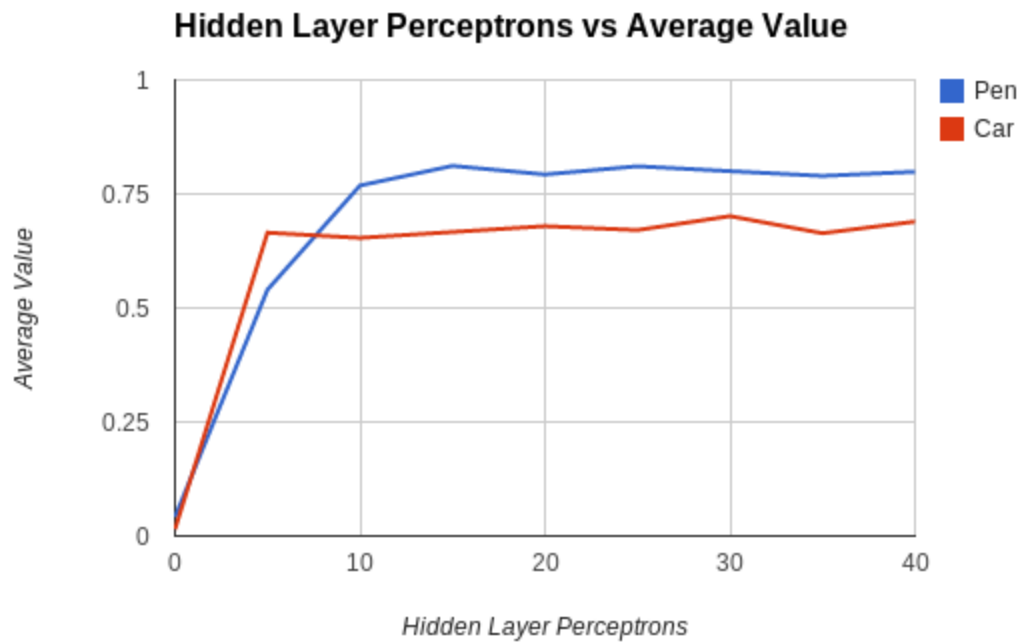
Finished after 45 iterations at time 05:00:36.530197 with training error 1.351250 and weight change 0.000070

Feed Forward Test correctly classified 1107, incorrectly classified 421, test percent error 0.724476

Pen max is: 0.84819897084 Pen average is: 0.798742138365 Pen SD is: 0.0348920662501
Car max is: 0.724476439791 Car average is: 0.689397905759 Car SD is: 0.0184345988392

Perceptrons	Pen	Car
0	0.04162378502	0.01465968586
5	0.5400800457	0.6651832461
10	0.7684962836	0.6536649215
15	0.8116638079	0.6666230366
20	0.7927958834	0.6794502618

25	0.810806175	0.6708115183
30	0.8000571755	0.7014397906
35	0.7895940537	0.6638743456
40	0.7987421384	0.6893979058



This data indicates that more perceptrons allow us to find a better function to use for classification. With more hidden layer perceptrons, the neural network has more weights with which to find a better fit. It is worth noting that after a certain point the average value levels off.