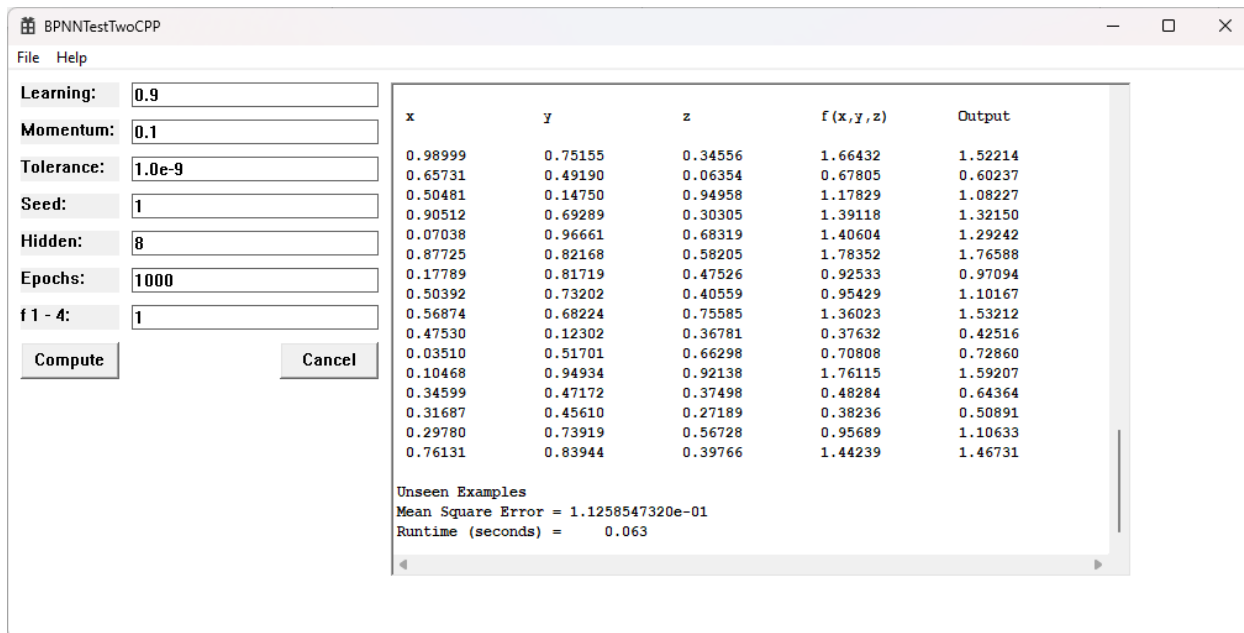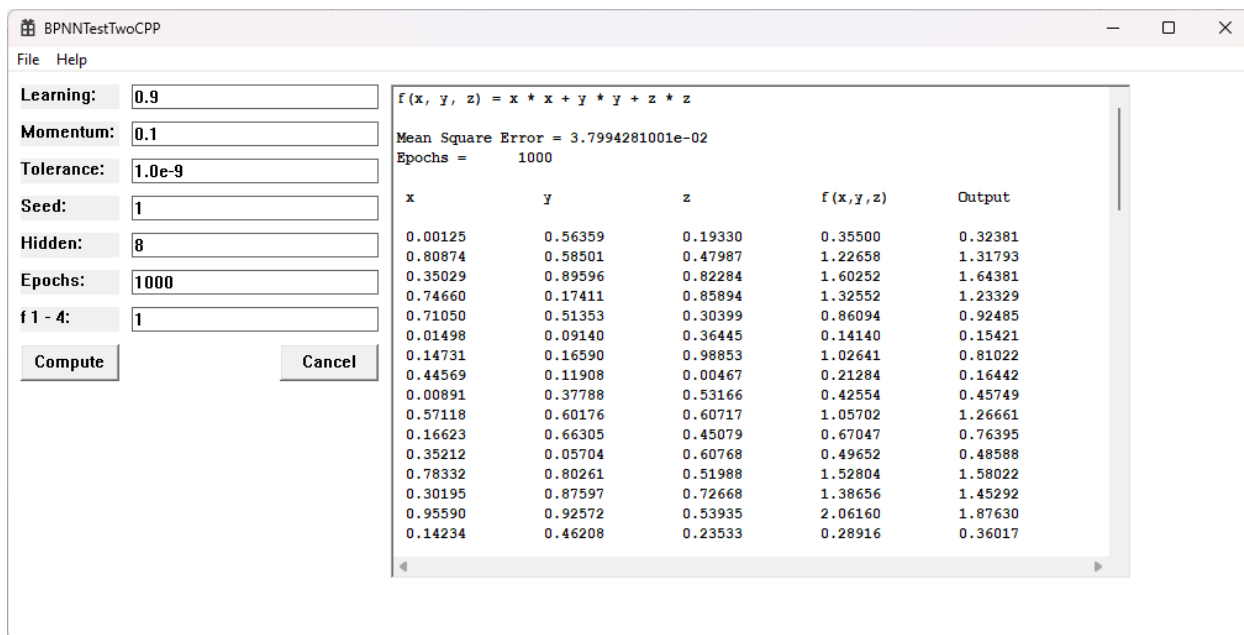Blog Entry © Thursday, September 4, 2025, by James Pate Williams, Jr., C++ Backpropagation Neural Network (BPNN) Function Approximator

Tuesday's blog had test results from my C# backpropagation neural network function approximator. Today we repeated the experiments using a Win32 Release x64 Configuration C++ BPNN. The results are different due to the variation in the pseudo-random generators in the two computer languages.

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	1

Compute   Cancel

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 3.7994281001e-02
Epochs =      1000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.35500        0.32381
0.80874        0.58501        0.47987        1.22658        1.31793
0.35029        0.89596        0.82284        1.60252        1.64381
0.74660        0.17411        0.85894        1.32552        1.23329
0.71050        0.51353        0.30399        0.86094        0.92485
0.01498        0.09140        0.36445        0.14140        0.15421
0.14731        0.16590        0.98853        1.02641        0.81022
0.44569        0.11908        0.00467        0.21284        0.16442
0.00891        0.37788        0.53166        0.42554        0.45749
0.57118        0.60176        0.60717        1.05702        1.26661
0.16623        0.66305        0.45079        0.67047        0.76395
0.35212        0.05704        0.60768        0.49652        0.48588
0.78332        0.80261        0.51988        1.52804        1.58022
0.30195        0.87597        0.72668        1.38656        1.45292
0.95590        0.92572        0.53935        2.06160        1.87630
0.14234        0.46208        0.23533        0.28916        0.36017
```


BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	1

Compute   Cancel

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.66432        1.52214
0.65731        0.49190        0.06354        0.67805        0.60237
0.50481        0.14750        0.94958        1.17829        1.08227
0.90512        0.69289        0.30305        1.39118        1.32150
0.07038        0.96661        0.68319        1.40604        1.29242
0.87725        0.82168        0.58205        1.78352        1.76588
0.17789        0.81719        0.47526        0.92533        0.97094
0.50392        0.73202        0.40559        0.95429        1.10167
0.56874        0.68224        0.75585        1.36023        1.53212
0.47530        0.12302        0.36781        0.37632        0.42516
0.03510        0.51701        0.66298        0.70808        0.72860
0.10468        0.94934        0.92138        1.76115        1.59207
0.34599        0.47172        0.37498        0.48284        0.64364
0.31687        0.45610        0.27189        0.38236        0.50891
0.29780        0.73919        0.56728        0.95689        1.10633
0.76131        0.83944        0.39766        1.44239        1.46731

Unseen Examples
Mean Square Error = 1.1258547320e-01
Runtime (seconds) =      0.063
```

BPNNTestTwoCPP

File Help

Learning: 0.9
Momentum: 0.1
Tolerance: 1.0e-9
Seed: 1
Hidden: 8
Epochs: 5000
f 1 - 4: 1

[Compute]   [Cancel]

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 3.6101407951e-02
Epochs =      5000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.35500        0.35221
0.80874        0.58501        0.47987        1.22658        1.30509
0.35029        0.89596        0.82284        1.60252        1.65160
0.74660        0.17411        0.85894        1.32552        1.23260
0.71050        0.51353        0.30399        0.86094        0.90490
0.01498        0.09140        0.36445        0.14140        0.19049
0.14731        0.16590        0.98853        1.02641        0.81027
0.44569        0.11908        0.00467        0.21284        0.19467
0.00891        0.37788        0.53166        0.42554        0.47209
0.57118        0.60176        0.60717        1.05702        1.25148
0.16623        0.66305        0.45079        0.67047        0.75417
0.35212        0.05704        0.60768        0.49652        0.49434
0.78332        0.80261        0.51988        1.52804        1.58235
0.30195        0.87597        0.72668        1.38656        1.44137
0.95590        0.92572        0.53935        2.06160        1.91519
0.14234        0.46208        0.23533        0.28916        0.37918
```

BPNNTestTwoCPP

File Help

Learning: 0.9
Momentum: 0.1
Tolerance: 1.0e-9
Seed: 1
Hidden: 8
Epochs: 5000
f 1 - 4: 1

[Compute]   [Cancel]

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.66432        1.52146
0.65731        0.49190        0.06354        0.67805        0.59986
0.50481        0.14750        0.94958        1.17829        1.08077
0.90512        0.69289        0.30305        1.39118        1.30690
0.07038        0.96661        0.68319        1.40604        1.27421
0.87725        0.82168        0.58205        1.78352        1.79319
0.17789        0.81719        0.47526        0.92533        0.95401
0.50392        0.73202        0.40559        0.95429        1.08157
0.56874        0.68224        0.75585        1.36023        1.53603
0.47530        0.12302        0.36781        0.37632        0.43587
0.03510        0.51701        0.66298        0.70808        0.72416
0.10468        0.94934        0.92138        1.76115        1.59400
0.34599        0.47172        0.37498        0.48284        0.64069
0.31687        0.45610        0.27189        0.38236        0.51601
0.29780        0.73919        0.56728        0.95689        1.08712
0.76131        0.83944        0.39766        1.44239        1.45974

Unseen Examples
Mean Square Error = 1.1189159961e-01
Runtime (seconds) =      0.248
```

Window 1

BPNNTestTwoCPP — □ ✕

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	1

Compute   Cancel

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 2.1644272678e-02
Epochs =    10000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.35500       0.29184
0.80874        0.58501        0.47987        1.22658       1.23644
0.35029        0.89596        0.82284        1.60252       1.69174
0.74660        0.17411        0.85894        1.32552       1.28251
0.71050        0.51353        0.30399        0.86094       0.88676
0.01498        0.09140        0.36445        0.14140       0.14951
0.14731        0.16590        0.98853        1.02641       1.01509
0.44569        0.11908        0.00467        0.21284       0.22115
0.00891        0.37788        0.53166        0.42554       0.36823
0.57118        0.60176        0.60717        1.05702       1.13848
0.16623        0.66305        0.45079        0.67047       0.66264
0.35212        0.05704        0.60768        0.49652       0.51292
0.78332        0.80261        0.51988        1.52804       1.59785
0.30195        0.87597        0.72668        1.38656       1.44941
0.95590        0.92572        0.53935        2.06160       1.99256
0.14234        0.46208        0.23533        0.28916       0.30957
```

Window 2

BPNNTestTwoCPP — □ ✕

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	1

Compute   Cancel

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.66432       1.62065
0.65731        0.49190        0.06354        0.67805       0.69207
0.50481        0.14750        0.94958        1.17829       1.23433
0.90512        0.69289        0.30305        1.39118       1.39342
0.07038        0.96661        0.68319        1.40604       1.31873
0.87725        0.82168        0.58205        1.78352       1.79780
0.17789        0.81719        0.47526        0.92533       0.92089
0.50392        0.73202        0.40559        0.95429       1.06594
0.56874        0.68224        0.75585        1.36023       1.46146
0.47530        0.12302        0.36781        0.37632       0.40990
0.03510        0.51701        0.66298        0.70808       0.62608
0.10468        0.94934        0.92138        1.76115       1.69828
0.34599        0.47172        0.37498        0.48284       0.54923
0.31687        0.45610        0.27189        0.38236       0.44930
0.29780        0.73919        0.56728        0.95689       1.01534
0.76131        0.83944        0.39766        1.44239       1.54532

Unseen Examples
Mean Square Error = 6.6384688547e-02
Runtime (seconds) =     0.484
```

Window 1

BPNNTestTwoCPP — File Help

Field	Value
Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	1

[Compute]   [Cancel]

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 1.0125193712e-02
Epochs =     50000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.35500         0.35143
0.80874         0.58501         0.47987         1.22658         1.22726
0.35029         0.89596         0.82284         1.60252         1.63060
0.74660         0.17411         0.85894         1.32552         1.34646
0.71050         0.51353         0.30399         0.86094         0.84008
0.01498         0.09140         0.36445         0.14140         0.19392
0.14731         0.16590         0.98853         1.02641         1.02579
0.44569         0.11908         0.00467         0.21284         0.22687
0.00891         0.37788         0.53166         0.42554         0.40118
0.57118         0.60176         0.60717         1.05702         1.02913
0.16623         0.66305         0.45079         0.67047         0.64330
0.35212         0.05704         0.60768         0.49652         0.49075
0.78332         0.80261         0.51988         1.52804         1.56503
0.30195         0.87597         0.72668         1.38656         1.39729
0.95590         0.92572         0.53935         2.06160         2.07846
0.14234         0.46208         0.23533         0.28916         0.31938
```

Window 2

BPNNTestTwoCPP — File Help

Field	Value
Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	1

[Compute]   [Cancel]

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         1.66432         1.70816
0.65731         0.49190         0.06354         0.67805         0.63329
0.50481         0.14750         0.94958         1.17829         1.19862
0.90512         0.69289         0.30305         1.39118         1.42323
0.07038         0.96661         0.68319         1.40604         1.40642
0.87725         0.82168         0.58205         1.78352         1.81841
0.17789         0.81719         0.47526         0.92533         0.90544
0.50392         0.73202         0.40559         0.95429         0.94761
0.56874         0.68224         0.75585         1.36023         1.35672
0.47530         0.12302         0.36781         0.37632         0.39828
0.03510         0.51701         0.66298         0.70808         0.65433
0.10468         0.94934         0.92138         1.76115         1.79315
0.34599         0.47172         0.37498         0.48284         0.48667
0.31687         0.45610         0.27189         0.38236         0.40404
0.29780         0.73919         0.56728         0.95689         0.93336
0.76131         0.83944         0.39766         1.44239         1.49270

Unseen Examples
Mean Square Error = 3.0618614297e-02
Runtime (seconds) =     2.327
```

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 8.8232930659e-03
Epochs =    100000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.35500       0.35523
0.80874        0.58501        0.47987        1.22658       1.22993
0.35029        0.89596        0.82284        1.60252       1.62184
0.74660        0.17411        0.85894        1.32552       1.32330
0.71050        0.51353        0.30399        0.86094       0.84239
0.01498        0.09140        0.36445        0.14140       0.19623
0.14731        0.16590        0.98853        1.02641       1.02934
0.44569        0.11908        0.00467        0.21284       0.21446
0.00891        0.37788        0.53166        0.42554       0.40294
0.57118        0.60176        0.60717        1.05702       1.02361
0.16623        0.66305        0.45079        0.67047       0.64473
0.35212        0.05704        0.60768        0.49652       0.50100
0.78332        0.80261        0.51988        1.52804       1.56635
0.30195        0.87597        0.72668        1.38656       1.38540
0.95590        0.92572        0.53935        2.06160       2.05963
0.14234        0.46208        0.23533        0.28916       0.30866
```

BPNNTestTwoCPP

File Help

Learning: 0.9

Momentum: 0.1

Tolerance: 1.0e-9

Seed: 1

Hidden: 8

Epochs: 100000

f 1 - 4: 1

Compute   Cancel

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.66432       1.66709
0.65731        0.49190        0.06354        0.67805       0.63421
0.50481        0.14750        0.94958        1.17829       1.18401
0.90512        0.69289        0.30305        1.39118       1.40617
0.07038        0.96661        0.68319        1.40604       1.38093
0.87725        0.82168        0.58205        1.78352       1.81490
0.17789        0.81719        0.47526        0.92533       0.90723
0.50392        0.73202        0.40559        0.95429       0.94126
0.56874        0.68224        0.75585        1.36023       1.35392
0.47530        0.12302        0.36781        0.37632       0.40032
0.03510        0.51701        0.66298        0.70808       0.65550
0.10468        0.94934        0.92138        1.76115       1.78606
0.34599        0.47172        0.37498        0.48284       0.47306
0.31687        0.45610        0.27189        0.38236       0.38731
0.29780        0.73919        0.56728        0.95689       0.92646
0.76131        0.83944        0.39766        1.44239       1.49265

Unseen Examples
Mean Square Error = 2.7241479037e-02
Runtime (seconds) =     4.523
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	500000
f 1 - 4:	1

[Compute] [Cancel]

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 1.9977190605e-03
Epochs =    500000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.35500       0.34476
0.80874        0.58501        0.47987        1.22658       1.22998
0.35029        0.89596        0.82284        1.60252       1.61350
0.74660        0.17411        0.85894        1.32552       1.31569
0.71050        0.51353        0.30399        0.86094       0.86178
0.01498        0.09140        0.36445        0.14140       0.13930
0.14731        0.16590        0.98853        1.02641       1.03446
0.44569        0.11908        0.00467        0.21284       0.20626
0.00891        0.37788        0.53166        0.42554       0.42480
0.57118        0.60176        0.60717        1.05702       1.03945
0.16623        0.66305        0.45079        0.67047       0.68071
0.35212        0.05704        0.60768        0.49652       0.49678
0.78332        0.80261        0.51988        1.52804       1.53620
0.30195        0.87597        0.72668        1.38656       1.38586
0.95590        0.92572        0.53935        2.06160       2.04992
0.14234        0.46208        0.23533        0.28916       0.30088
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	500000
f 1 - 4:	1

[Compute] [Cancel]

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.66432       1.67240
0.65731        0.49190        0.06354        0.67805       0.68199
0.50481        0.14750        0.94958        1.17829       1.17558
0.90512        0.69289        0.30305        1.39118       1.41067
0.07038        0.96661        0.68319        1.40604       1.40315
0.87725        0.82168        0.58205        1.78352       1.79365
0.17789        0.81719        0.47526        0.92533       0.93732
0.50392        0.73202        0.40559        0.95429       0.95355
0.56874        0.68224        0.75585        1.36023       1.35177
0.47530        0.12302        0.36781        0.37632       0.37964
0.03510        0.51701        0.66298        0.70808       0.70587
0.10468        0.94934        0.92138        1.76115       1.75729
0.34599        0.47172        0.37498        0.48284       0.48704
0.31687        0.45610        0.27189        0.38236       0.39228
0.29780        0.73919        0.56728        0.95689       0.95654
0.76131        0.83944        0.39766        1.44239       1.46027

Unseen Examples
Mean Square Error = 8.8810069671e-03
Runtime (seconds) =     22.904
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	1

Compute   Cancel

```
f(x, y, z) = x * x + y * y + z * z

Mean Square Error = 1.8479224471e-03
Epochs =    1000000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.35500        0.34467
0.80874        0.58501        0.47987        1.22658        1.23011
0.35029        0.89596        0.82284        1.60252        1.61147
0.74660        0.17411        0.85894        1.32552        1.31690
0.71050        0.51353        0.30399        0.86094        0.86090
0.01498        0.09140        0.36445        0.14140        0.13936
0.14731        0.16590        0.98853        1.02641        1.03526
0.44569        0.11908        0.00467        0.21284        0.20673
0.00891        0.37788        0.53166        0.42554        0.42619
0.57118        0.60176        0.60717        1.05702        1.04221
0.16623        0.66305        0.45079        0.67047        0.67940
0.35212        0.05704        0.60768        0.49652        0.49508
0.78332        0.80261        0.51988        1.52804        1.53644
0.30195        0.87597        0.72668        1.38656        1.38479
0.95590        0.92572        0.53935        2.06160        2.04778
0.14234        0.46208        0.23533        0.28916        0.30060
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	1

Compute   Cancel

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.66432        1.66975
0.65731        0.49190        0.06354        0.67805        0.67968
0.50481        0.14750        0.94958        1.17829        1.17722
0.90512        0.69289        0.30305        1.39118        1.40769
0.07038        0.96661        0.68319        1.40604        1.40306
0.87725        0.82168        0.58205        1.78352        1.79270
0.17789        0.81719        0.47526        0.92533        0.93560
0.50392        0.73202        0.40559        0.95429        0.95349
0.56874        0.68224        0.75585        1.36023        1.35298
0.47530        0.12302        0.36781        0.37632        0.37933
0.03510        0.51701        0.66298        0.70808        0.70733
0.10468        0.94934        0.92138        1.76115        1.75753
0.34599        0.47172        0.37498        0.48284        0.48732
0.31687        0.45610        0.27189        0.38236        0.39207
0.29780        0.73919        0.56728        0.95689        0.95610
0.76131        0.83944        0.39766        1.44239        1.45851

Unseen Examples
Mean Square Error = 7.7270357368e-03
Runtime (seconds) =     46.146
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	2

Compute   Cancel

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 4.1330357938e-02
Epochs =      1000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.32610        0.38795
0.80874        0.58501        0.47987        1.26148        1.41055
0.35029        0.89596        0.82284        1.71016        1.66220
0.74660        0.17411        0.85894        1.41063        1.31919
0.71050        0.51353        0.30399        1.00231        1.03511
0.01498        0.09140        0.36445        0.07175        0.20810
0.14731        0.16590        0.98853        1.14080        0.86312
0.44569        0.11908        0.00467        0.45987        0.24448
0.00891        0.37788        0.53166        0.30199        0.51955
0.57118        0.60176        0.60717        1.15714        1.34066
0.16623        0.66305        0.45079        0.69747        0.82796
0.35212        0.05704        0.60768        0.57978        0.57031
0.78332        0.80261        0.51988        1.56801        1.64861
0.30195        0.87597        0.72668        1.45301        1.48058
0.95590        0.92572        0.53935        1.96975        1.93745
0.14234        0.46208        0.23533        0.36889        0.42910
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	2

Compute   Cancel

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.59608        1.62063
0.65731        0.49190        0.06354        0.89953        0.72231
0.50481        0.14750        0.94958        1.38281        1.15814
0.90512        0.69289        0.30305        1.41305        1.42856
0.07038        0.96661        0.68319        1.32359        1.31395
0.87725        0.82168        0.58205        1.74960        1.83261
0.17789        0.81719        0.47526        0.95305        1.02755
0.50392        0.73202        0.40559        1.10649        1.18324
0.56874        0.68224        0.75585        1.46602        1.58564
0.47530        0.12302        0.36781        0.54019        0.52385
0.03510        0.51701        0.66298        0.59381        0.78257
0.10468        0.94934        0.92138        1.78813        1.59507
0.34599        0.47172        0.37498        0.62124        0.73201
0.31687        0.45610        0.27189        0.54500        0.59759
0.29780        0.73919        0.56728        1.02675        1.16495
0.76131        0.83944        0.39766        1.52886        1.54793

Unseen Examples
Mean Square Error = 1.1809201893e-01
Runtime (seconds) =      0.060
```

BPNNTestTwoCPP

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	5000
f 1 - 4:	2

Compute   Cancel

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 2.0978389729e-02
Epochs =      5000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.32610         0.39588
0.80874         0.58501         0.47987         1.26148         1.30388
0.35029         0.89596         0.82284         1.71016         1.67961
0.74660         0.17411         0.85894         1.41063         1.40111
0.71050         0.51353         0.30399         1.00231         1.00573
0.01498         0.09140         0.36445         0.07175         0.13776
0.14731         0.16590         0.98853         1.14080         1.08517
0.44569         0.11908         0.00467         0.45987         0.33971
0.00891         0.37788         0.53166         0.30199         0.39837
0.57118         0.60176         0.60717         1.15714         1.21072
0.16623         0.66305         0.45079         0.69747         0.70865
0.35212         0.05704         0.60768         0.57978         0.48287
0.78332         0.80261         0.51988         1.56801         1.58080
0.30195         0.87597         0.72668         1.45301         1.42524
0.95590         0.92572         0.53935         1.96975         1.91841
0.14234         0.46208         0.23533         0.36889         0.41842
```

BPNNTestTwoCPP

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	5000
f 1 - 4:	2

Compute   Cancel

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         1.59608         1.63016
0.65731         0.49190         0.06354         0.89953         0.90649
0.50481         0.14750         0.94958         1.38281         1.33711
0.90512         0.69289         0.30305         1.41305         1.45100
0.07038         0.96661         0.68319         1.32359         1.20947
0.87725         0.82168         0.58205         1.74960         1.76823
0.17789         0.81719         0.47526         0.95305         0.91125
0.50392         0.73202         0.40559         1.10649         1.10644
0.56874         0.68224         0.75585         1.46602         1.54636
0.47530         0.12302         0.36781         0.54019         0.42429
0.03510         0.51701         0.66298         0.59381         0.67360
0.10468         0.94934         0.92138         1.78813         1.69080
0.34599         0.47172         0.37498         0.62124         0.63501
0.31687         0.45610         0.27189         0.54500         0.55793
0.29780         0.73919         0.56728         1.02675         1.03072
0.76131         0.83944         0.39766         1.52886         1.52122

Unseen Examples
Mean Square Error = 5.9167186664e-02
Runtime (seconds) =      0.242
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	2

[Compute]   [Cancel]

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 1.2951810704e-02
Epochs =      10000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.32610        0.36348
0.80874        0.58501        0.47987        1.26148        1.26706
0.35029        0.89596        0.82284        1.71016        1.72179
0.74660        0.17411        0.85894        1.41063        1.44118
0.71050        0.51353        0.30399        1.00231        0.98719
0.01498        0.09140        0.36445        0.07175        0.15121
0.14731        0.16590        0.98853        1.14080        1.09442
0.44569        0.11908        0.00467        0.45987        0.41037
0.00891        0.37788        0.53166        0.30199        0.34937
0.57118        0.60176        0.60717        1.15714        1.15395
0.16623        0.66305        0.45079        0.69747        0.67312
0.35212        0.05704        0.60768        0.57978        0.52694
0.78332        0.80261        0.51988        1.56801        1.58308
0.30195        0.87597        0.72668        1.45301        1.45310
0.95590        0.92572        0.53935        1.96975        1.96151
0.14234        0.46208        0.23533        0.36889        0.38806
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	2

[Compute]   [Cancel]

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.59608        1.62280
0.65731        0.49190        0.06354        0.89953        0.89515
0.50481        0.14750        0.94958        1.38281        1.38553
0.90512        0.69289        0.30305        1.41305        1.43669
0.07038        0.96661        0.68319        1.32359        1.28572
0.87725        0.82168        0.58205        1.74960        1.76660
0.17789        0.81719        0.47526        0.95305        0.91563
0.50392        0.73202        0.40559        1.10649        1.09296
0.56874        0.68224        0.75585        1.46602        1.49576
0.47530        0.12302        0.36781        0.54019        0.48918
0.03510        0.51701        0.66298        0.59381        0.60544
0.10468        0.94934        0.92138        1.78813        1.78290
0.34599        0.47172        0.37498        0.62124        0.60336
0.31687        0.45610        0.27189        0.54500        0.53343
0.29780        0.73919        0.56728        1.02675        1.00466
0.76131        0.83944        0.39766        1.52886        1.54511

Unseen Examples
Mean Square Error = 2.4316346139e-02
Runtime (seconds) =      0.476
```

BPNNTestTwoCPP

File   Help

Learning: `0.9`

Momentum: `0.1`

Tolerance: `1.0e-9`

Seed: `1`

Hidden: `8`

Epochs: `50000`

f 1 - 4: `2`

[Compute]   [Cancel]

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 1.0120525821e-02
Epochs =      50000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.32610        0.34841
0.80874        0.58501        0.47987        1.26148        1.25834
0.35029        0.89596        0.82284        1.71016        1.75042
0.74660        0.17411        0.85894        1.41063        1.43174
0.71050        0.51353        0.30399        1.00231        0.99115
0.01498        0.09140        0.36445        0.07175        0.16722
0.14731        0.16590        0.98853        1.14080        1.13002
0.44569        0.11908        0.00467        0.45987        0.45839
0.00891        0.37788        0.53166        0.30199        0.31473
0.57118        0.60176        0.60717        1.15714        1.13203
0.16623        0.66305        0.45079        0.69747        0.66292
0.35212        0.05704        0.60768        0.57978        0.55734
0.78332        0.80261        0.51988        1.56801        1.59241
0.30195        0.87597        0.72668        1.45301        1.46566
0.95590        0.92572        0.53935        1.96975        1.97839
0.14234        0.46208        0.23533        0.36889        0.37374
```

BPNNTestTwoCPP

File   Help

Learning: `0.9`

Momentum: `0.1`

Tolerance: `1.0e-9`

Seed: `1`

Hidden: `8`

Epochs: `50000`

f 1 - 4: `2`

[Compute]   [Cancel]

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.59608        1.60200
0.65731        0.49190        0.06354        0.89953        0.88139
0.50481        0.14750        0.94958        1.38281        1.41614
0.90512        0.69289        0.30305        1.41305        1.42020
0.07038        0.96661        0.68319        1.32359        1.30689
0.87725        0.82168        0.58205        1.74960        1.77230
0.17789        0.81719        0.47526        0.95305        0.93641
0.50392        0.73202        0.40559        1.10649        1.10579
0.56874        0.68224        0.75585        1.46602        1.47503
0.47530        0.12302        0.36781        0.54019        0.54446
0.03510        0.51701        0.66298        0.59381        0.54763
0.10468        0.94934        0.92138        1.78813        1.82311
0.34599        0.47172        0.37498        0.62124        0.60136
0.31687        0.45610        0.27189        0.54500        0.53221
0.29780        0.73919        0.56728        1.02675        1.00297
0.76131        0.83944        0.39766        1.52886        1.56487

Unseen Examples
Mean Square Error = 2.3013976715e-02
Runtime (seconds) =      2.350
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	2

Compute   Cancel

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 9.2456114110e-03
Epochs =     100000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.32610        0.36626
0.80874        0.58501        0.47987        1.26148        1.25776
0.35029        0.89596        0.82284        1.71016        1.74096
0.74660        0.17411        0.85894        1.41063        1.40835
0.71050        0.51353        0.30399        1.00231        0.99198
0.01498        0.09140        0.36445        0.07175        0.15633
0.14731        0.16590        0.98853        1.14080        1.13061
0.44569        0.11908        0.00467        0.45987        0.46594
0.00891        0.37788        0.53166        0.30199        0.30284
0.57118        0.60176        0.60717        1.15714        1.13087
0.16623        0.66305        0.45079        0.69747        0.66687
0.35212        0.05704        0.60768        0.57978        0.57346
0.78332        0.80261        0.51988        1.56801        1.59059
0.30195        0.87597        0.72668        1.45301        1.45478
0.95590        0.92572        0.53935        1.96975        1.97372
0.14234        0.46208        0.23533        0.36889        0.35709
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	2

Compute   Cancel

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.59608        1.58945
0.65731        0.49190        0.06354        0.89953        0.87046
0.50481        0.14750        0.94958        1.38281        1.41076
0.90512        0.69289        0.30305        1.41305        1.41242
0.07038        0.96661        0.68319        1.32359        1.29355
0.87725        0.82168        0.58205        1.74960        1.77177
0.17789        0.81719        0.47526        0.95305        0.94395
0.50392        0.73202        0.40559        1.10649        1.09201
0.56874        0.68224        0.75585        1.46602        1.47864
0.47530        0.12302        0.36781        0.54019        0.55947
0.03510        0.51701        0.66298        0.59381        0.54396
0.10468        0.94934        0.92138        1.78813        1.79916
0.34599        0.47172        0.37498        0.62124        0.58526
0.31687        0.45610        0.27189        0.54500        0.51144
0.29780        0.73919        0.56728        1.02675        0.99758
0.76131        0.83944        0.39766        1.52886        1.55049

Unseen Examples
Mean Square Error = 2.5290675644e-02
Runtime (seconds) =      4.602
```

Window 1

BPNNTestTwoCPP — File Help

Learning: `0.9`
Momentum: `0.1`
Tolerance: `1.0e-9`
Seed: `1`
Hidden: `8`
Epochs: `500000`
f 1 - 4: `2`

[Compute] [Cancel]

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 5.2799870543e-03
Epochs =    500000

x               y               z               f(x,y,z)      Output

0.00125         0.56359         0.19330         0.32610       0.31680
0.80874         0.58501         0.47987         1.26148       1.24583
0.35029         0.89596         0.82284         1.71016       1.71402
0.74660         0.17411         0.85894         1.41063       1.40292
0.71050         0.51353         0.30399         1.00231       0.99498
0.01498         0.09140         0.36445         0.07175       0.09901
0.14731         0.16590         0.98853         1.14080       1.15502
0.44569         0.11908         0.00467         0.45987       0.44957
0.00891         0.37788         0.53166         0.30199       0.30691
0.57118         0.60176         0.60717         1.15714       1.12310
0.16623         0.66305         0.45079         0.69747       0.71129
0.35212         0.05704         0.60768         0.57978       0.59943
0.78332         0.80261         0.51988         1.56801       1.56166
0.30195         0.87597         0.72668         1.45301       1.44501
0.95590         0.92572         0.53935         1.96975       1.97228
0.14234         0.46208         0.23533         0.36889       0.37563
```

Window 2

BPNNTestTwoCPP — File Help

Learning: `0.9`
Momentum: `0.1`
Tolerance: `1.0e-9`
Seed: `1`
Hidden: `8`
Epochs: `500000`
f 1 - 4: `2`

[Compute] [Cancel]

```
x               y               z               f(x,y,z)      Output

0.98999         0.75155         0.34556         1.59608       1.57906
0.65731         0.49190         0.06354         0.89953       0.90314
0.50481         0.14750         0.94958         1.38281       1.39178
0.90512         0.69289         0.30305         1.41305       1.39302
0.07038         0.96661         0.68319         1.32359       1.30934
0.87725         0.82168         0.58205         1.74960       1.76981
0.17789         0.81719         0.47526         0.95305       0.96623
0.50392         0.73202         0.40559         1.10649       1.09882
0.56874         0.68224         0.75585         1.46602       1.45369
0.47530         0.12302         0.36781         0.54019       0.57049
0.03510         0.51701         0.66298         0.59381       0.57031
0.10468         0.94934         0.92138         1.78813       1.80533
0.34599         0.47172         0.37498         0.62124       0.63346
0.31687         0.45610         0.27189         0.54500       0.56035
0.29780         0.73919         0.56728         1.02675       1.02031
0.76131         0.83944         0.39766         1.52886       1.50081

Unseen Examples
Mean Square Error = 1.7248012493e-02
Runtime (seconds) =    23.105
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	2

[Compute]   [Cancel]

```
f(x, y, z) = x + y * y + z * z * z

Mean Square Error = 1.8944509593e-03
Epochs =   1000000

x            y            z            f(x,y,z)    Output

0.00125      0.56359      0.19330      0.32610     0.32493
0.80874      0.58501      0.47987      1.26148     1.25456
0.35029      0.89596      0.82284      1.71016     1.71535
0.74660      0.17411      0.85894      1.41063     1.40556
0.71050      0.51353      0.30399      1.00231     1.00462
0.01498      0.09140      0.36445      0.07175     0.07589
0.14731      0.16590      0.98853      1.14080     1.15365
0.44569      0.11908      0.00467      0.45987     0.45070
0.00891      0.37788      0.53166      0.30199     0.30908
0.57118      0.60176      0.60717      1.15714     1.14540
0.16623      0.66305      0.45079      0.69747     0.70501
0.35212      0.05704      0.60768      0.57978     0.57758
0.78332      0.80261      0.51988      1.56801     1.56143
0.30195      0.87597      0.72668      1.45301     1.45161
0.95590      0.92572      0.53935      1.96975     1.96391
0.14234      0.46208      0.23533      0.36889     0.36170
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	2

[Compute]   [Cancel]

```
x            y            z            f(x,y,z)    Output

0.98999      0.75155      0.34556      1.59608     1.59729
0.65731      0.49190      0.06354      0.89953     0.91682
0.50481      0.14750      0.94958      1.38281     1.37792
0.90512      0.69289      0.30305      1.41305     1.41445
0.07038      0.96661      0.68319      1.32359     1.32829
0.87725      0.82168      0.58205      1.74960     1.75808
0.17789      0.81719      0.47526      0.95305     0.96661
0.50392      0.73202      0.40559      1.10649     1.11430
0.56874      0.68224      0.75585      1.46602     1.46161
0.47530      0.12302      0.36781      0.54019     0.51832
0.03510      0.51701      0.66298      0.59381     0.59725
0.10468      0.94934      0.92138      1.78813     1.79116
0.34599      0.47172      0.37498      0.62124     0.62170
0.31687      0.45610      0.27189      0.54500     0.53762
0.29780      0.73919      0.56728      1.02675     1.03722
0.76131      0.83944      0.39766      1.52886     1.51525

Unseen Examples
Mean Square Error = 9.7901490229e-03
Runtime (seconds) =    45.609
```

File   Help

Learning: 0.9

Momentum: 0.1

Tolerance: 1.0e-9

Seed: 1

Hidden: 8

Epochs: 1000

f 1 - 4:   3

Compute   Cancel

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 4.5078215711e-02
Epochs =      1000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.32485         0.27920
0.80874         0.58501         0.47987         1.03780         1.15009
0.35029         0.89596         0.82284         1.48008         1.50958
0.74660         0.17411         0.85894         1.17109         1.05568
0.71050         0.51353         0.30399         0.75521         0.78985
0.01498         0.09140         0.36445         0.05699         0.10975
0.14731         0.16590         0.98853         1.01511         0.70785
0.44569         0.11908         0.00467         0.20631         0.10867
0.00891         0.37788         0.53166         0.29316         0.40079
0.57118         0.60176         0.60717         0.89475         1.12519
0.16623         0.66305         0.45079         0.55874         0.68576
0.35212         0.05704         0.60768         0.34910         0.39688
0.78332         0.80261         0.51988         1.33743         1.41244
0.30195         0.87597         0.72668         1.24085         1.32833
0.95590         0.92572         0.53935         1.79466         1.69311
0.14234         0.46208         0.23533         0.24674         0.30103
```

File   Help

Learning: 0.9

Momentum: 0.1

Tolerance: 1.0e-9

Seed: 1

Hidden: 8

Epochs: 1000

f 1 - 4:   3

Compute   Cancel

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         1.43374         1.33867
0.65731         0.49190         0.06354         0.64383         0.50084
0.50481         0.14750         0.94958         1.12215         0.93263
0.90512         0.69289         0.30305         1.21980         1.15158
0.07038         0.96661         0.68319         1.25816         1.19942
0.87725         0.82168         0.58205         1.54694         1.58771
0.17789         0.81719         0.47526         0.80664         0.88240
0.50392         0.73202         0.40559         0.84590         0.97734
0.56874         0.68224         0.75585         1.20359         1.37723
0.47530         0.12302         0.36781         0.28239         0.33831
0.03510         0.51701         0.66298         0.55995         0.65291
0.10468         0.94934         0.92138         1.69439         1.48103
0.34599         0.47172         0.37498         0.39258         0.55434
0.31687         0.45610         0.27189         0.32686         0.43236
0.29780         0.73919         0.56728         0.81633         0.99696
0.76131         0.83944         0.39766         1.29276         1.30740

Unseen Examples
Mean Square Error = 1.2643331710e-01
Runtime (seconds) =      0.067
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	5000
f 1 - 4:	3

[Compute]   [Cancel]

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 2.4850162111e-02
Epochs =      5000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.32485       0.27349
0.80874        0.58501        0.47987        1.03780       1.05988
0.35029        0.89596        0.82284        1.48008       1.52463
0.74660        0.17411        0.85894        1.17109       1.10661
0.71050        0.51353        0.30399        0.75521       0.77493
0.01498        0.09140        0.36445        0.05699       0.05409
0.14731        0.16590        0.98853        1.01511       0.96915
0.44569        0.11908        0.00467        0.20631       0.16370
0.00891        0.37788        0.53166        0.29316       0.29143
0.57118        0.60176        0.60717        0.89475       0.99120
0.16623        0.66305        0.45079        0.55874       0.57028
0.35212        0.05704        0.60768        0.34910       0.32485
0.78332        0.80261        0.51988        1.33743       1.37449
0.30195        0.87597        0.72668        1.24085       1.27063
0.95590        0.92572        0.53935        1.79466       1.71914
0.14234        0.46208        0.23533        0.24674       0.27729
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	5000
f 1 - 4:	3

[Compute]   [Cancel]

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.43374       1.41229
0.65731        0.49190        0.06354        0.64383       0.66919
0.50481        0.14750        0.94958        1.12215       1.11257
0.90512        0.69289        0.30305        1.21980       1.22587
0.07038        0.96661        0.68319        1.25816       1.10604
0.87725        0.82168        0.58205        1.54694       1.55119
0.17789        0.81719        0.47526        0.80664       0.77771
0.50392        0.73202        0.40559        0.84590       0.92139
0.56874        0.68224        0.75585        1.20359       1.32213
0.47530        0.12302        0.36781        0.28239       0.24768
0.03510        0.51701        0.66298        0.55995       0.55073
0.10468        0.94934        0.92138        1.69439       1.58195
0.34599        0.47172        0.37498        0.39258       0.46078
0.31687        0.45610        0.27189        0.32686       0.38900
0.29780        0.73919        0.56728        0.81633       0.86871
0.76131        0.83944        0.39766        1.29276       1.33164

Unseen Examples
Mean Square Error = 6.6932602578e-02
Runtime (seconds) =      0.248
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	3

[Compute] [Cancel]

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 1.4104589257e-02
Epochs =     10000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.32485         0.25814
0.80874         0.58501         0.47987         1.03780         1.02455
0.35029         0.89596         0.82284         1.48008         1.54920
0.74660         0.17411         0.85894         1.17109         1.18376
0.71050         0.51353         0.30399         0.75521         0.74954
0.01498         0.09140         0.36445         0.05699         0.06854
0.14731         0.16590         0.98853         1.01511         0.97215
0.44569         0.11908         0.00467         0.20631         0.22466
0.00891         0.37788         0.53166         0.29316         0.24722
0.57118         0.60176         0.60717         0.89475         0.90067
0.16623         0.66305         0.45079         0.55874         0.53102
0.35212         0.05704         0.60768         0.34910         0.36272
0.78332         0.80261         0.51988         1.33743         1.36416
0.30195         0.87597         0.72668         1.24085         1.28476
0.95590         0.92572         0.53935         1.79466         1.78477
0.14234         0.46208         0.23533         0.24674         0.24556
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	3

[Compute] [Cancel]

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         1.43374         1.43943
0.65731         0.49190         0.06354         0.64383         0.64394
0.50481         0.14750         0.94958         1.12215         1.15771
0.90512         0.69289         0.30305         1.21980         1.22790
0.07038         0.96661         0.68319         1.25816         1.22164
0.87725         0.82168         0.58205         1.54694         1.55088
0.17789         0.81719         0.47526         0.80664         0.78387
0.50392         0.73202         0.40559         0.84590         0.87509
0.56874         0.68224         0.75585         1.20359         1.23048
0.47530         0.12302         0.36781         0.28239         0.31012
0.03510         0.51701         0.66298         0.55995         0.48843
0.10468         0.94934         0.92138         1.69439         1.71973
0.34599         0.47172         0.37498         0.39258         0.41057
0.31687         0.45610         0.27189         0.32686         0.34869
0.29780         0.73919         0.56728         0.81633         0.82114
0.76131         0.83944         0.39766         1.29276         1.34165

Unseen Examples
Mean Square Error = 3.0151374990e-02
Runtime (seconds) =     0.488
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	3

[Compute] [Cancel]

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 9.4606721466e-03
Epochs =    50000

x               y               z               f(x,y,z)      Output

0.00125         0.56359         0.19330         0.32485       0.30958
0.80874         0.58501         0.47987         1.03780       1.03593
0.35029         0.89596         0.82284         1.48008       1.50071
0.74660         0.17411         0.85894         1.17109       1.19497
0.71050         0.51353         0.30399         0.75521       0.74608
0.01498         0.09140         0.36445         0.05699       0.12567
0.14731         0.16590         0.98853         1.01511       1.01555
0.44569         0.11908         0.00467         0.20631       0.20834
0.00891         0.37788         0.53166         0.29316       0.30567
0.57118         0.60176         0.60717         0.89475       0.86134
0.16623         0.66305         0.45079         0.55874       0.54514
0.35212         0.05704         0.60768         0.34910       0.34630
0.78332         0.80261         0.51988         1.33743       1.36583
0.30195         0.87597         0.72668         1.24085       1.23861
0.95590         0.92572         0.53935         1.79466       1.80670
0.14234         0.46208         0.23533         0.24674       0.26422
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	3

[Compute] [Cancel]

```
x               y               z               f(x,y,z)      Output

0.98999         0.75155         0.34556         1.43374       1.43027
0.65731         0.49190         0.06354         0.64383       0.63283
0.50481         0.14750         0.94958         1.12215       1.13914
0.90512         0.69289         0.30305         1.21980       1.22696
0.07038         0.96661         0.68319         1.25816       1.24548
0.87725         0.82168         0.58205         1.54694       1.57637
0.17789         0.81719         0.47526         0.80664       0.79580
0.50392         0.73202         0.40559         0.84590       0.84567
0.56874         0.68224         0.75585         1.20359       1.18965
0.47530         0.12302         0.36781         0.28239       0.29928
0.03510         0.51701         0.66298         0.55995       0.53111
0.10468         0.94934         0.92138         1.69439       1.73088
0.34599         0.47172         0.37498         0.39258       0.39913
0.31687         0.45610         0.27189         0.32686       0.34042
0.29780         0.73919         0.56728         0.81633       0.79646
0.76131         0.83944         0.39766         1.29276       1.33932

Unseen Examples
Mean Square Error = 2.0991624746e-02
Runtime (seconds) =    2.327
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	3

[Compute]   [Cancel]

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 8.0830746672e-03
Epochs =    100000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.32485         0.29868
0.80874         0.58501         0.47987         1.03780         1.03305
0.35029         0.89596         0.82284         1.48008         1.49185
0.74660         0.17411         0.85894         1.17109         1.19147
0.71050         0.51353         0.30399         0.75521         0.74839
0.01498         0.09140         0.36445         0.05699         0.12005
0.14731         0.16590         0.98853         1.01511         0.99612
0.44569         0.11908         0.00467         0.20631         0.19909
0.00891         0.37788         0.53166         0.29316         0.32656
0.57118         0.60176         0.60717         0.89475         0.86508
0.16623         0.66305         0.45079         0.55874         0.54888
0.35212         0.05704         0.60768         0.34910         0.35451
0.78332         0.80261         0.51988         1.33743         1.35664
0.30195         0.87597         0.72668         1.24085         1.23490
0.95590         0.92572         0.53935         1.79466         1.79168
0.14234         0.46208         0.23533         0.24674         0.25521
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	3

[Compute]   [Cancel]

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         1.43374         1.42151
0.65731         0.49190         0.06354         0.64383         0.65419
0.50481         0.14750         0.94958         1.12215         1.12326
0.90512         0.69289         0.30305         1.21980         1.22545
0.07038         0.96661         0.68319         1.25816         1.25844
0.87725         0.82168         0.58205         1.54694         1.56466
0.17789         0.81719         0.47526         0.80664         0.79374
0.50392         0.73202         0.40559         0.84590         0.84230
0.56874         0.68224         0.75585         1.20359         1.18808
0.47530         0.12302         0.36781         0.28239         0.29166
0.03510         0.51701         0.66298         0.55995         0.55995
0.10468         0.94934         0.92138         1.69439         1.72749
0.34599         0.47172         0.37498         0.39258         0.39630
0.31687         0.45610         0.27189         0.32686         0.33361
0.29780         0.73919         0.56728         0.81633         0.79797
0.76131         0.83944         0.39766         1.29276         1.33097

Unseen Examples
Mean Square Error = 1.5933737651e-02
Runtime (seconds) =      4.540
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	500000
f 1 - 4:	3

Compute   Cancel

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 2.4501473019e-03
Epochs =    500000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.32485       0.31527
0.80874        0.58501        0.47987        1.03780       1.04032
0.35029        0.89596        0.82284        1.48008       1.48512
0.74660        0.17411        0.85894        1.17109       1.16159
0.71050        0.51353        0.30399        0.75521       0.75883
0.01498        0.09140        0.36445        0.05699       0.05332
0.14731        0.16590        0.98853        1.01511       1.01744
0.44569        0.11908        0.00467        0.20631       0.18252
0.00891        0.37788        0.53166        0.29316       0.29477
0.57118        0.60176        0.60717        0.89475       0.88351
0.16623        0.66305        0.45079        0.55874       0.55910
0.35212        0.05704        0.60768        0.34910       0.35166
0.78332        0.80261        0.51988        1.33743       1.34292
0.30195        0.87597        0.72668        1.24085       1.24275
0.95590        0.92572        0.53935        1.79466       1.78222
0.14234        0.46208        0.23533        0.24674       0.25725
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	500000
f 1 - 4:	3

Compute   Cancel

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        1.43374       1.43080
0.65731        0.49190        0.06354        0.64383       0.64831
0.50481        0.14750        0.94958        1.12215       1.12216
0.90512        0.69289        0.30305        1.21980       1.22569
0.07038        0.96661        0.68319        1.25816       1.27723
0.87725        0.82168        0.58205        1.54694       1.55319
0.17789        0.81719        0.47526        0.80664       0.80470
0.50392        0.73202        0.40559        0.84590       0.84824
0.56874        0.68224        0.75585        1.20359       1.19484
0.47530        0.12302        0.36781        0.28239       0.28595
0.03510        0.51701        0.66298        0.55995       0.55703
0.10468        0.94934        0.92138        1.69439       1.68618
0.34599        0.47172        0.37498        0.39258       0.39913
0.31687        0.45610        0.27189        0.32686       0.33855
0.29780        0.73919        0.56728        0.81633       0.81000
0.76131        0.83944        0.39766        1.29276       1.29656

Unseen Examples
Mean Square Error = 7.3929607895e-03
Runtime (seconds) =    22.870
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	3

Compute   Cancel

```
f(x, y, z) = x * sin(x) + y * y + z * z * z

Mean Square Error = 2.0902688528e-03
Epochs =   1000000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.32485        0.31657
0.80874        0.58501        0.47987        1.03780        1.03789
0.35029        0.89596        0.82284        1.48008        1.48322
0.74660        0.17411        0.85894        1.17109        1.16523
0.71050        0.51353        0.30399        0.75521        0.75848
0.01498        0.09140        0.36445        0.05699        0.05286
0.14731        0.16590        0.98853        1.01511        1.00871
0.44569        0.11908        0.00467        0.20631        0.18347
0.00891        0.37788        0.53166        0.29316        0.29110
0.57118        0.60176        0.60717        0.89475        0.89122
0.16623        0.66305        0.45079        0.55874        0.55691
0.35212        0.05704        0.60768        0.34910        0.34550
0.78332        0.80261        0.51988        1.33743        1.34007
0.30195        0.87597        0.72668        1.24085        1.24312
0.95590        0.92572        0.53935        1.79466        1.79080
0.14234        0.46208        0.23533        0.24674        0.25862
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	3

Compute   Cancel

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        1.43374        1.42362
0.65731        0.49190        0.06354        0.64383        0.64431
0.50481        0.14750        0.94958        1.12215        1.12566
0.90512        0.69289        0.30305        1.21980        1.22006
0.07038        0.96661        0.68319        1.25816        1.27694
0.87725        0.82168        0.58205        1.54694        1.54895
0.17789        0.81719        0.47526        0.80664        0.80130
0.50392        0.73202        0.40559        0.84590        0.84720
0.56874        0.68224        0.75585        1.20359        1.19875
0.47530        0.12302        0.36781        0.28239        0.28376
0.03510        0.51701        0.66298        0.55995        0.55045
0.10468        0.94934        0.92138        1.69439        1.69277
0.34599        0.47172        0.37498        0.39258        0.40178
0.31687        0.45610        0.27189        0.32686        0.33969
0.29780        0.73919        0.56728        0.81633        0.80960
0.76131        0.83944        0.39766        1.29276        1.29731

Unseen Examples
Mean Square Error = 7.6450677902e-03
Runtime (seconds) =    46.831
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	4

[Compute]   [Cancel]

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 3.8556647899e-02
Epochs =      1000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.10886        0.00288
0.80874        0.58501        0.47987        0.62202        0.60063
0.35029        0.89596        0.82284        0.95424        1.00307
0.74660        0.17411        0.85894        0.31435        0.46477
0.71050        0.51353        0.30399        0.31640        0.30830
0.01498        0.09140        0.36445        0.03381       -0.10286
0.14731        0.16590        0.98853        0.18917        0.22298
0.44569        0.11908        0.00467        0.00087       -0.10617
0.00891        0.37788        0.53166        0.20134        0.05306
0.57118        0.60176        0.60717        0.63254        0.57781
0.16623        0.66305        0.45079        0.34772        0.26569
0.35212        0.05704        0.60768        0.04928        0.03240
0.78332        0.80261        0.51988        0.88700        0.88970
0.30195        0.87597        0.72668        0.80395        0.84245
0.95590        0.92572        0.53935        1.24537        1.18286
0.14234        0.46208        0.23533        0.12513        0.01401
```

BPNNTestTwoCPP

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000
f 1 - 4:	4

[Compute]   [Cancel]

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        0.69109        0.78963
0.65731        0.49190        0.06354        0.06030        0.11534
0.50481        0.14750        0.94958        0.23127        0.36853
0.90512        0.69289        0.30305        0.51531        0.61506
0.07038        0.96661        0.68319        0.65814        0.73130
0.87725        0.82168        0.58205        1.10653        1.04331
0.17789        0.81719        0.47526        0.45242        0.43460
0.50392        0.73202        0.40559        0.48424        0.48847
0.56874        0.68224        0.75585        0.87087        0.82739
0.47530        0.12302        0.36781        0.07276        0.00154
0.03510        0.51701        0.66298        0.34810        0.22961
0.10468        0.94934        0.92138        0.85204        0.98676
0.34599        0.47172        0.37498        0.24871        0.15308
0.31687        0.45610        0.27189        0.16981        0.07794
0.29780        0.73919        0.56728        0.54838        0.51205
0.76131        0.83944        0.39766        0.70152        0.78453

Unseen Examples
Mean Square Error = 8.5206052385e-02
Runtime (seconds) =     0.062
```

BPNNTestTwoCPP

File Help

Learning: `0.9`

Momentum: `0.1`

Tolerance: `1.0e-9`

Seed: `1`

Hidden: `8`

Epochs: `5000`

f 1 - 4: `4`

[Compute] [Cancel]

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 2.8361749133e-02
Epochs =      5000

x                y                z                f(x,y,z)      Output

0.00125          0.56359          0.19330          0.10886       0.08177
0.80874          0.58501          0.47987          0.62202       0.56414
0.35029          0.89596          0.82284          0.95424       1.00879
0.74660          0.17411          0.85894          0.31435       0.43968
0.71050          0.51353          0.30399          0.31640       0.27320
0.01498          0.09140          0.36445          0.03381      -0.01277
0.14731          0.16590          0.98853          0.18917       0.25874
0.44569          0.11908          0.00467          0.00087      -0.05520
0.00891          0.37788          0.53166          0.20134       0.12600
0.57118          0.60176          0.60717          0.63254       0.54328
0.16623          0.66305          0.45079          0.34772       0.27906
0.35212          0.05704          0.60768          0.04928       0.07603
0.78332          0.80261          0.51988          0.88700       0.89777
0.30195          0.87597          0.72668          0.80395       0.81765
0.95590          0.92572          0.53935          1.24537       1.29704
0.14234          0.46208          0.23533          0.12513       0.07547
```

BPNNTestTwoCPP

File Help

Learning: `0.9`

Momentum: `0.1`

Tolerance: `1.0e-9`

Seed: `1`

Hidden: `8`

Epochs: `5000`

f 1 - 4: `4`

[Compute] [Cancel]

```
x                y                z                f(x,y,z)      Output

0.98999          0.75155          0.34556          0.69109       0.78564
0.65731          0.49190          0.06354          0.06030       0.10820
0.50481          0.14750          0.94958          0.23127       0.35694
0.90512          0.69289          0.30305          0.51531       0.57524
0.07038          0.96661          0.68319          0.65814       0.69637
0.87725          0.82168          0.58205          1.10653       1.10780
0.17789          0.81719          0.47526          0.45242       0.41865
0.50392          0.73202          0.40559          0.48424       0.44963
0.56874          0.68224          0.75585          0.87087       0.82104
0.47530          0.12302          0.36781          0.07276       0.03633
0.03510          0.51701          0.66298          0.34810       0.26818
0.10468          0.94934          0.92138          0.85204       0.97337
0.34599          0.47172          0.37498          0.24871       0.17038
0.31687          0.45610          0.27189          0.16981       0.11094
0.29780          0.73919          0.56728          0.54838       0.48448
0.76131          0.83944          0.39766          0.70152       0.76433

Unseen Examples
Mean Square Error = 6.9359456547e-02
Runtime (seconds) =      0.251
```

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	4

Compute   Cancel

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 2.1510078550e-02
Epochs =     10000

x               y               z               f(x,y,z)        Output

0.00125         0.56359         0.19330         0.10886         0.10635
0.80874         0.58501         0.47987         0.62202         0.56834
0.35029         0.89596         0.82284         0.95424         0.99588
0.74660         0.17411         0.85894         0.31435         0.39721
0.71050         0.51353         0.30399         0.31640         0.27931
0.01498         0.09140         0.36445         0.03381         0.00875
0.14731         0.16590         0.98853         0.18917         0.24830
0.44569         0.11908         0.00467         0.00087        -0.04926
0.00891         0.37788         0.53166         0.20134         0.16653
0.57118         0.60176         0.60717         0.63254         0.56003
0.16623         0.66305         0.45079         0.34772         0.30275
0.35212         0.05704         0.60768         0.04928         0.07364
0.78332         0.80261         0.51988         0.88700         0.88875
0.30195         0.87597         0.72668         0.80395         0.80330
0.95590         0.92572         0.53935         1.24537         1.30114
0.14234         0.46208         0.23533         0.12513         0.10308
```

File   Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	10000
f 1 - 4:	4

Compute   Cancel

```
x               y               z               f(x,y,z)        Output

0.98999         0.75155         0.34556         0.69109         0.76636
0.65731         0.49190         0.06354         0.06030         0.10975
0.50481         0.14750         0.94958         0.23127         0.31891
0.90512         0.69289         0.30305         0.51531         0.55733
0.07038         0.96661         0.68319         0.65814         0.66031
0.87725         0.82168         0.58205         1.10653         1.11593
0.17789         0.81719         0.47526         0.45242         0.41611
0.50392         0.73202         0.40559         0.48424         0.44748
0.56874         0.68224         0.75585         0.87087         0.83688
0.47530         0.12302         0.36781         0.07276         0.04237
0.03510         0.51701         0.66298         0.34810         0.30916
0.10468         0.94934         0.92138         0.85204         0.94737
0.34599         0.47172         0.37498         0.24871         0.19617
0.31687         0.45610         0.27189         0.16981         0.13479
0.29780         0.73919         0.56728         0.54838         0.49492
0.76131         0.83944         0.39766         0.70152         0.73359

Unseen Examples
Mean Square Error = 5.0545809365e-02
Runtime (seconds) =      0.454
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	4

Compute   Cancel

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 4.3091260911e-03
Epochs =    50000

x                y                z                f(x,y,z)         Output

0.00125          0.56359          0.19330          0.10886          0.11621
0.80874          0.58501          0.47987          0.62202          0.60889
0.35029          0.89596          0.82284          0.95424          0.96511
0.74660          0.17411          0.85894          0.31435          0.31853
0.71050          0.51353          0.30399          0.31640          0.31685
0.01498          0.09140          0.36445          0.03381          0.02730
0.14731          0.16590          0.98853          0.18917          0.18055
0.44569          0.11908          0.00467          0.00087         -0.02965
0.00891          0.37788          0.53166          0.20134          0.21269
0.57118          0.60176          0.60717          0.63254          0.62258
0.16623          0.66305          0.45079          0.34772          0.35960
0.35212          0.05704          0.60768          0.04928          0.05706
0.78332          0.80261          0.51988          0.88700          0.87188
0.30195          0.87597          0.72668          0.80395          0.79909
0.95590          0.92572          0.53935          1.24537          1.24906
0.14234          0.46208          0.23533          0.12513          0.13983
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	50000
f 1 - 4:	4

Compute   Cancel

```
x                y                z                f(x,y,z)         Output

0.98999          0.75155          0.34556          0.69109          0.67640
0.65731          0.49190          0.06354          0.06030          0.08103
0.50481          0.14750          0.94958          0.23127          0.23097
0.90512          0.69289          0.30305          0.51531          0.49799
0.07038          0.96661          0.68319          0.65814          0.65142
0.87725          0.82168          0.58205          1.10653          1.10971
0.17789          0.81719          0.47526          0.45242          0.45356
0.50392          0.73202          0.40559          0.48424          0.47513
0.56874          0.68224          0.75585          0.87087          0.87258
0.47530          0.12302          0.36781          0.07276          0.07633
0.03510          0.51701          0.66298          0.34810          0.35328
0.10468          0.94934          0.92138          0.85204          0.86793
0.34599          0.47172          0.37498          0.24871          0.26272
0.31687          0.45610          0.27189          0.16981          0.18617
0.29780          0.73919          0.56728          0.54838          0.54558
0.76131          0.83944          0.39766          0.70152          0.67120

Unseen Examples
Mean Square Error = 1.3161165355e-02
Runtime (seconds) =     2.322
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	4

Compute Cancel

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 3.2529810829e-03
Epochs =    100000

x                y                z                f(x,y,z)         Output

0.00125          0.56359          0.19330          0.10886          0.10817
0.80874          0.58501          0.47987          0.62202          0.60448
0.35029          0.89596          0.82284          0.95424          0.95759
0.74660          0.17411          0.85894          0.31435          0.31377
0.71050          0.51353          0.30399          0.31640          0.31451
0.01498          0.09140          0.36445          0.03381          0.02624
0.14731          0.16590          0.98853          0.18917          0.18271
0.44569          0.11908          0.00467          0.00087         -0.01463
0.00891          0.37788          0.53166          0.20134          0.20461
0.57118          0.60176          0.60717          0.63254          0.62239
0.16623          0.66305          0.45079          0.34772          0.35886
0.35212          0.05704          0.60768          0.04928          0.05888
0.78332          0.80261          0.51988          0.88700          0.87311
0.30195          0.87597          0.72668          0.80395          0.80031
0.95590          0.92572          0.53935          1.24537          1.25184
0.14234          0.46208          0.23533          0.12513          0.13233
```

BPNNTestTwoCPP

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	100000
f 1 - 4:	4

Compute Cancel

```
x                y                z                f(x,y,z)         Output

0.98999          0.75155          0.34556          0.69109          0.67116
0.65731          0.49190          0.06354          0.06030          0.08090
0.50481          0.14750          0.94958          0.23127          0.22702
0.90512          0.69289          0.30305          0.51531          0.49379
0.07038          0.96661          0.68319          0.65814          0.65543
0.87725          0.82168          0.58205          1.10653          1.10923
0.17789          0.81719          0.47526          0.45242          0.45933
0.50392          0.73202          0.40559          0.48424          0.47726
0.56874          0.68224          0.75585          0.87087          0.87189
0.47530          0.12302          0.36781          0.07276          0.08162
0.03510          0.51701          0.66298          0.34810          0.35154
0.10468          0.94934          0.92138          0.85204          0.85514
0.34599          0.47172          0.37498          0.24871          0.25644
0.31687          0.45610          0.27189          0.16981          0.18009
0.29780          0.73919          0.56728          0.54838          0.54863
0.76131          0.83944          0.39766          0.70152          0.67396

Unseen Examples
Mean Square Error = 1.2349132630e-02
Runtime (seconds) =     4.585
```

File   Help

Learning: 0.9

Momentum: 0.1

Tolerance: 1.0e-9

Seed: 1

Hidden: 8

Epochs: 500000

f 1 - 4:   4

Compute   Cancel

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 1.3784794751e-03
Epochs =     500000

x              y              z              f(x,y,z)       Output

0.00125        0.56359        0.19330        0.10886        0.10546
0.80874        0.58501        0.47987        0.62202        0.62320
0.35029        0.89596        0.82284        0.95424        0.95020
0.74660        0.17411        0.85894        0.31435        0.31362
0.71050        0.51353        0.30399        0.31640        0.31453
0.01498        0.09140        0.36445        0.03381        0.03601
0.14731        0.16590        0.98853        0.18917        0.18742
0.44569        0.11908        0.00467        0.00087       -0.00460
0.00891        0.37788        0.53166        0.20134        0.19960
0.57118        0.60176        0.60717        0.63254        0.63217
0.16623        0.66305        0.45079        0.34772        0.35213
0.35212        0.05704        0.60768        0.04928        0.05233
0.78332        0.80261        0.51988        0.88700        0.88559
0.30195        0.87597        0.72668        0.80395        0.79619
0.95590        0.92572        0.53935        1.24537        1.24595
0.14234        0.46208        0.23533        0.12513        0.12545
```

BPNNTestTwoCPP

File   Help

Learning: 0.9

Momentum: 0.1

Tolerance: 1.0e-9

Seed: 1

Hidden: 8

Epochs: 500000

f 1 - 4:   4

Compute   Cancel

```
x              y              z              f(x,y,z)       Output

0.98999        0.75155        0.34556        0.69109        0.69148
0.65731        0.49190        0.06354        0.06030        0.06878
0.50481        0.14750        0.94958        0.23127        0.22825
0.90512        0.69289        0.30305        0.51531        0.51210
0.07038        0.96661        0.68319        0.65814        0.65713
0.87725        0.82168        0.58205        1.10653        1.10628
0.17789        0.81719        0.47526        0.45242        0.45956
0.50392        0.73202        0.40559        0.48424        0.48505
0.56874        0.68224        0.75585        0.87087        0.86621
0.47530        0.12302        0.36781        0.07276        0.07613
0.03510        0.51701        0.66298        0.34810        0.35449
0.10468        0.94934        0.92138        0.85204        0.85605
0.34599        0.47172        0.37498        0.24871        0.24783
0.31687        0.45610        0.27189        0.16981        0.17001
0.29780        0.73919        0.56728        0.54838        0.55139
0.76131        0.83944        0.39766        0.70152        0.69711

Unseen Examples
Mean Square Error = 4.0585155353e-03
Runtime (seconds) =     22.848
```

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	4

Compute   Cancel

```
f(x, y, z) = exp(X) * sin(y * z)

Mean Square Error = 1.2715969485e-03
Epochs =   1000000

x              y              z              f(x,y,z)      Output

0.00125        0.56359        0.19330        0.10886        0.10611
0.80874        0.58501        0.47987        0.62202        0.62335
0.35029        0.89596        0.82284        0.95424        0.95061
0.74660        0.17411        0.85894        0.31435        0.31359
0.71050        0.51353        0.30399        0.31640        0.31464
0.01498        0.09140        0.36445        0.03381        0.03622
0.14731        0.16590        0.98853        0.18917        0.18793
0.44569        0.11908        0.00467        0.00087       -0.00530
0.00891        0.37788        0.53166        0.20134        0.19957
0.57118        0.60176        0.60717        0.63254        0.63190
0.16623        0.66305        0.45079        0.34772        0.35122
0.35212        0.05704        0.60768        0.04928        0.05221
0.78332        0.80261        0.51988        0.88700        0.88725
0.30195        0.87597        0.72668        0.80395        0.79794
0.95590        0.92572        0.53935        1.24537        1.24511
0.14234        0.46208        0.23533        0.12513        0.12586
```

File Help

Learning:	0.9
Momentum:	0.1
Tolerance:	1.0e-9
Seed:	1
Hidden:	8
Epochs:	1000000
f 1 - 4:	4

Compute   Cancel

```
x              y              z              f(x,y,z)      Output

0.98999        0.75155        0.34556        0.69109        0.69196
0.65731        0.49190        0.06354        0.06030        0.06886
0.50481        0.14750        0.94958        0.23127        0.22799
0.90512        0.69289        0.30305        0.51531        0.51293
0.07038        0.96661        0.68319        0.65814        0.65724
0.87725        0.82168        0.58205        1.10653        1.10684
0.17789        0.81719        0.47526        0.45242        0.45882
0.50392        0.73202        0.40559        0.48424        0.48580
0.56874        0.68224        0.75585        0.87087        0.86614
0.47530        0.12302        0.36781        0.07276        0.07555
0.03510        0.51701        0.66298        0.34810        0.35328
0.10468        0.94934        0.92138        0.85204        0.85449
0.34599        0.47172        0.37498        0.24871        0.24767
0.31687        0.45610        0.27189        0.16981        0.17019
0.29780        0.73919        0.56728        0.54838        0.55152
0.76131        0.83944        0.39766        0.70152        0.69886

Unseen Examples
Mean Square Error = 3.6736508836e-03
Runtime (seconds) =     45.808
```

```
Comparison of Two Function Approximators
Backpropagation Neural Networks
Unseen Examples
C#                                           C++
Function    Epochs    RMSE       Runtime    Function    Epochs    RMSE       Runtime
       1      1000    1.23E-01     0.119           1      1000    1.13E-01     0.063
       1      5000    3.54E-02     0.463           1      5000    1.12E-01     0.248
       1     10000    3.55E-02     0.920           1     10000    6.64E-02     0.484
       1     50000    2.55E-02     4.469           1     50000    3.06E-02     2.327
       1    100000    2.42E-02     9.104           1    100000    2.72E-02     4.523
       1    500000    2.19E-02    45.882           1    500000    8.88E-03    22.904
       1   1000000    2.31E-02    90.586           1   1000000    7.73E-03    46.146
```

I leave it up to reader to do comparisons of the other three functions.