Parameter Tuning

SgdHinge

λ	η	Accuracy %
1	0.1	70
0.3	0.1	60
0.1	0.1	75
1	0.01	70
0.3	0.01	85
0.1	0.01	80
1	0.001	70
0.3	0.001	75
0.1	0.001	85
1	0.0001	75
0.3	0.0001	85
0.1	0.0001	90

SgdLogistic

λ	η	Accuracy %
1	0.1	OVERFLOW
0.3	0.1	OVERFLOW
0.1	0.1	OVERFLOW
1	0.01	OVERFLOW
0.3	0.01	OVERFLOW
0.1	0.01	OVERFLOW
1	0.001	80
0.3	0.001	75
0.1	0.001	85
1	0.0001	85
0.3	0.0001	90
0.1	0.0001	85

Output for SgdHinge CV 1 λ = .1 , η = 0.0001
CROSS VALIDATION 0
pre-training loss: 53.0
24.1100661392
0.0310333604907
0.0309676387988
post-loss: 0.0309676387988

Output for SgdHinge CV 1 $\lambda = .3$, $\eta = 0.0001$
CROSS VALIDATION 0
pre-training loss: 53.0
34.6812033164
0.0846119694421
0.0840755289122
0.0835424894194
0.083012829401
0.0824865274312
0.0819635622198
0.0814439126119
0.0809275575864
0.0804144762558
0.0799046478647
0.0793980517894
0.0788946675371
0.0783944747448
0.0778974531786
0.077403582733
0.0769128434297
0.0764252154173
0.0759406789702
0.0754592144879
0.0749808024941
0.074505423636
0.0740330586834
0.0735636885282
0.0730972941834
0.0726338567823
0.0721733575778
0.0717157779417
0.0712610993641
0.0708093034521
0.0703603719296
0.0699142866364
0.0694710295273
0.0690305826717
0.0685929282525
0.0681580485656
0.0677259260192
0.0672965431331
0.0668698825378
0.0664459269739
0.0660246592914
0.0656060624493
0.0651901195143
0.0647768136608
0.0643661281694
0.0639580464272
0.0635525519264
0.0631496282638
0.0627492591402
0.06235142836
0.0619561198299
0.0615633175589
0.0611730056573

0.0607851683362
0.0603997899066
0.0600168547791
0.0596363474633
0.0592582525668
0.0588825547948
0.0585092389495
0.0581382899295
0.0577696927291
0.0574034324378
0.0570394942395
0.0566778634122
0.056318525327
0.0559614654481
0.0556066693314
0.0552541226249
0.0549038110672
0.0545557204874
0.0542098368045
0.0538661460269
0.0535246342513
0.053185287663
0.0528480925347
0.052513035226
0.0521801021833
0.0518492799385
0.0515205551093
0.0511939143981
0.0508693445914
0.0505468325597
0.0502263652568
0.049907929719
0.049591513065
0.049277102495
0.0489646852903
0.0486542488131
0.0483457805056
0.0480392678894
0.0477346985656
0.0474320602136
0.0471313405911
0.0468325275332
0.0465356089524
0.0462405728377
0.0459474072542
0.0456561003427
0.0453666403192
post-loss: 0.0453666403192

Output for SgdLogistic CV 1 λ = 0.3 , η = 0.0001
CROSS VALIDATION 0
pre-training loss: 36.7368005697
1.33618459629
0.0583519377137
0.0549772635344
0.0529286463137

0.0514723290426
0.0503449262626
0.0494231825681
0.0486402822884
0.0479563610577
0.0473459555946
0.0467919443858
0.0462823424769
0.0458084837158
0.0453639314636
0.0449437959292
0.0445442901134
0.0441624317286
0.0437958376369
0.0434425787306
0.0431010753609
0.0427700206023
0.0424483230268
0.0421350634028
0.0418294614978
0.0415308503245
0.0412386559413
0.0409523814537
0.0406715942241
0.040395915563
0.0401250123522
0.0398585901905
0.0395963877466
0.0393381720768
0.0390837347203
0.0388328884243
0.0385854643841
0.0383413099041
0.0381002864079
0.0378622677374
0.0376271386922
0.0373947937721
0.0371651360885
0.03693807642
0.0367135323902
0.0364914277485
0.0362716917409
0.0360542585559
0.035839066837
0.0356260592517
0.0354151821089
0.0352063850204
0.0349996205983
0.0347948441859
0.0345920136168
0.0343910889992
0.0341920325217
0.0339948082801
0.0337993821195
0.0336057214934
0.0334137953358

0.0332235739449
0.033035028879
0.0328481328605
0.0326628596901
0.0324791841677
0.0322970820211
0.0321165298404
0.0319375050186
0.0317599856977
0.0315839507182
0.0314093795743
0.0312362523722
0.0310645497924
0.0308942530543
0.0307253438848
0.0305578044891
0.0303916175238
0.0302267660725
0.0300632336231
0.0299010040475
0.0297400615825
0.0295803908124
0.0294219766532
0.0292648043381
0.0291088594038
0.0289541276784
0.0288005952701
0.0286482485568
0.0284970741762
0.0283470590175
0.0281981902131
0.0280504551307
0.0279038413669
0.0277583367406
0.0276139292868
0.0274706072512
0.0273283590851
0.0271871734403
0.0270470391644
0.0269079452969
post-loss: 0.0269079452969

Test Data Accuracy
SgdHinge λ = .1 , η = 0.0001 : 79.4117647059%
SgdLogistic λ = 0.3 , η = 0.0001 : 85.2941176471%

Inspecting the Model's Parameters
After condensing the weight vector into an array of length 4698 (55 weights added together). We then go to each voxel's columns and add these together and get an array of length 25. This array is:

[0.31890528 -1.44394759 0.03605529 -0.48233207 -0.23038953 -0.59357947
  0.18754192 -0.24781533 -0.06638723 0.00898124 -0.79487202 1.07243108
 -0.23451673 -1.74148481 0.17014497 -0.64164205 -0.5798957   0.09876853
 -0.76835663 -0.28933193 -0.14316507 -0.72489183 0.15289313 -0.31810861
  0.13672555]

sorting this gives us the indexes:

[13 1 10 18 21 15 5 16 3 23 19 7 12 4 20 8 9 2 17 24 22 14 6 0 11]

and array:

[-1.74148481 -1.44394759 -0.79487202 -0.76835663 -0.72489183 -0.64164205
 -0.59357947 -0.5798957 -0.48233207 -0.31810861 -0.28933193 -0.24781533
 -0.23451673 -0.23038953 -0.14316507 -0.06638723 0.00898124 0.03605529
  0.09876853 0.13672555 0.15289313 0.17014497 0.18754192 0.31890528
  1.07243108]

the names associated with this are:

[array([u'RDLPFC'],
    dtype='<U6'), array([u'LDLPFC'],
    dtype='<U6'), array([u'LSPL'],
    dtype='<U4'), array([u'ROPER'],
    dtype='<U5'), array([u'RSPL'],
    dtype='<U4'), array([u'RIPL'],
    dtype='<U4'), array([u'LIPS'],
    dtype='<U4'), array([u'RIPS'],
    dtype='<U4'), array([u'LIFG'],
    dtype='<U4'), array([u'RTRIA'],
    dtype='<U5'), array([u'RPPREC'],
    dtype='<U6'), array([u'LOPER'],
    dtype='<U5'), array([u'LTRIA'],
    dtype='<U5'), array([u'LIPL'],
    dtype='<U4'), array([u'RSGA'],
    dtype='<U4'), array([u'LPPREC'],
    dtype='<U6'), array([u'LSGA'],
    dtype='<U4'), array([u'LFEF'],
    dtype='<U4'), array([u'RIT'],
    dtype='<U3'), array([u'SMA'],
    dtype='<U3'), array([u'RT'],
    dtype='<U2'), array([u'RFEF'],
    dtype='<U4'), array([u'LIT'],
    dtype='<U3'), array([u'CALC'],
    dtype='<U4'), array([u'LT'],
    dtype='<U2')]

These are more after running with different parameters:

[array([u'RDLPFC'],
    dtype='<U6'), array([u'LDLPFC'],
    dtype='<U6'), array([u'LSPL'],
    dtype='<U4'), array([u'ROPER'],
    dtype='<U5'), array([u'RIPL'],
    dtype='<U4'), array([u'LIFG'],
    dtype='<U4'), array([u'RSPL'],
    dtype='<U4'), array([u'LIPS'],
    dtype='<U4'), array([u'RIPS'],
    dtype='<U4'), array([u'CALC'],
    dtype='<U4'), array([u'LOPER'],
    dtype='<U5'), array([u'LPPREC'],
    dtype='<U6'), array([u'RT'],

          dtype='<U2'), array([u'LFEF'],
          dtype='<U4'), array([u'RPPREC'],
          dtype='<U6'), array([u'LIPL'],
          dtype='<U4'), array([u'RTRIA'],
          dtype='<U5'), array([u'LTRIA'],
          dtype='<U5'), array([u'RSGA'],
          dtype='<U4'), array([u'SMA'],
          dtype='<U3'), array([u'RFEF'],
          dtype='<U4'), array([u'LIT'],
          dtype='<U3'), array([u'RIT'],
          dtype='<U3'), array([u'LSGA'],
          dtype='<U4'), array([u'LT'],
          dtype='<U2')]
[-1.77332111 -1.6099

[array([u'RDLPFC'],
          dtype='<U6'), array([u'LDLPFC'],
          dtype='<U6'), array([u'ROPER'],
          dtype='<U5'), array([u'LIFG'],
          dtype='<U4'), array([u'LIPS'],
          dtype='<U4'), array([u'RIPL'],
          dtype='<U4'), array([u'LSPL'],
          dtype='<U4'), array([u'RIPS'],
          dtype='<U4'), array([u'LOPER'],
          dtype='<U5'), array([u'LIPL'],
          dtype='<U4'), array([u'LTRIA'],
          dtype='<U5'), array([u'RSPL'],
          dtype='<U4'), array([u'LFEF'],
          dtype='<U4'), array([u'RSGA'],
          dtype='<U4'), array([u'RPPREC'],
          dtype='<U6'), array([u'RT'],
          dtype='<U2'), array([u'RTRIA'],
          dtype='<U5'), array([u'LPPREC'],
          dtype='<U6'), array([u'LSGA'],
          dtype='<U4'), array([u'RFEF'],
          dtype='<U4'), array([u'LIT'],
          dtype='<U3'), array([u'RIT'],
          dtype='<U3'), array([u'SMA'],
          dtype='<U3'), array([u'CALC'],
          dtype='<U4'), array([u'LT'],
          dtype='<U2')]

[array([u'CALC'],
          dtype='<U4'), array([u'RDLPFC'],
          dtype='<U6'), array([u'LDLPFC'],
          dtype='<U6'), array([u'LSPL'],
          dtype='<U4'), array([u'RIPL'],
          dtype='<U4'), array([u'LIPS'],
          dtype='<U4'), array([u'RT'],
          dtype='<U2'), array([u'RSPL'],
          dtype='<U4'), array([u'LIPL'],
          dtype='<U4'), array([u'ROPER'],
          dtype='<U5'), array([u'RIPS'],
          dtype='<U4'), array([u'RPPREC'],
          dtype='<U6'), array([u'RTRIA'],
          dtype='<U5'), array([u'RSGA'],

```
        dtype='<U4'), array([u'LPPREC'],
        dtype='<U6'), array([u'LIFG'],
        dtype='<U4'), array([u'LOPER'],
        dtype='<U5'), array([u'SMA'],
        dtype='<U3'), array([u'LTRIA'],
        dtype='<U5'), array([u'LSGA'],
        dtype='<U4'), array([u'RFEF'],
        dtype='<U4'), array([u'LIT'],
        dtype='<U3'), array([u'LFEF'],
        dtype='<U4'), array([u'RIT'],
        dtype='<U3'), array([u'LT'],
        dtype='<U2')]

[array([u'RDLPFC'],
        dtype='<U6'), array([u'LDLPFC'],
        dtype='<U6'), array([u'LSPL'],
        dtype='<U4'), array([u'RSPL'],
        dtype='<U4'), array([u'LIPS'],
        dtype='<U4'), array([u'RIPL'],
        dtype='<U4'), array([u'CALC'],
        dtype='<U4'), array([u'SMA'],
        dtype='<U3'), array([u'RPPREC'],
        dtype='<U6'), array([u'LIFG'],
        dtype='<U4'), array([u'ROPER'],
        dtype='<U5'), array([u'LIPL'],
        dtype='<U4'), array([u'LPPREC'],
        dtype='<U6'), array([u'LOPER'],
        dtype='<U5'), array([u'RSGA'],
        dtype='<U4'), array([u'RTRIA'],
        dtype='<U5'), array([u'RIPS'],
        dtype='<U4'), array([u'LTRIA'],
        dtype='<U5'), array([u'LFEF'],
        dtype='<U4'), array([u'LSGA'],
        dtype='<U4'), array([u'RFEF'],
        dtype='<U4'), array([u'RIT'],
        dtype='<U3'), array([u'LIT'],
        dtype='<U3'), array([u'RT'],
        dtype='<U2'), array([u'LT'],
        dtype='<U2')]
```

We only care about the most positive and negative so the most important consistent ROIS are:

for negative:
RDLPFC
LDLPFC

for positive:
LT