Segmented Stacked Autoencoder

Segmentation: 1-35, 36-104, 105-200

Hidden layers: 13, 13, 13 (total 39 instead of 40)

Features: 6, 7, 7 (total 20)

Training: 100 epochs

SVM

kernel = 'rbf', gamma=100, C=100.

Training accuracy: 0.77638640429338102

Validation accuracy: 0.76048780487804879

Test accuracy: 0.77658536585365856

Predicted 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 All

Acctual

1 11 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 13

2 0 196 3 3 0 0 0 0 0 16 74 13 0 0 0 0 305

3 0 19 99 2 0 0 0 0 0 4 37 6 0 0 0 0 167

4 0 12 2 25 0 0 0 0 0 3 6 0 0 0 0 0 48

5 1 0 0 0 82 2 0 0 0 0 2 0 0 3 1 0 91

6 0 0 0 1 0 143 0 0 0 0 0 0 0 0 5 0 149

7 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 5

8 0 0 0 0 0 0 0 103 0 0 0 0 0 0 0 0 103

9 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 2

10 0 9 2 0 2 0 0 0 0 128 37 8 0 0 0 0 186

11 0 30 14 1 1 0 0 0 1 35 401 5 0 0 2 0 490

12 0 21 2 2 0 0 0 0 0 8 15 55 0 0 0 0 103

13 0 0 0 0 0 0 0 0 0 0 1 0 42 0 2 0 45

14 0 0 0 0 4 1 0 0 0 0 1 0 1 238 4 0 249

15 0 0 1 0 5 3 0 0 0 0 0 0 2 17 51 0 79

16 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 13 15

All 12 288 123 34 94 150 5 105 1 194 575 87 45 258 66 13 2050

S-SAE + SVM

Features: 3, 3, 4 (total 10)

Training accuracy: 0.73296470970889571

Validation accuracy: 0.72634146341463413

Test accuracy: 0.72585365853658534

Predicted 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Acctual

0 4 0 0 0 0 0 0 6 0 0 0 0 0 0 0 0

1 0 185 6 1 1 0 0 0 0 20 84 8 0 0 0 0

2 0 18 87 2 0 0 0 0 0 2 53 13 0 0 0 0

3 0 13 0 17 0 2 1 0 0 1 14 1 0 0 0 0

4 0 0 0 0 46 2 0 1 0 0 2 1 0 29 0 0

5 0 0 0 0 0 131 0 0 0 0 0 0 0 0 4 0

6 0 0 0 0 0 0 2 2 0 0 0 0 0 0 0 0

7 0 0 0 0 0 0 0 112 0 0 0 0 0 0 0 0

8 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

9 0 11 6 0 0 1 0 0 0 117 64 4 0 0 0 0

10 0 38 15 0 1 0 0 1 0 23 413 5 0 0 2 0

11 0 11 7 0 0 0 0 0 0 4 20 62 0 0 0 0

12 0 0 0 0 0 1 0 0 0 0 0 0 25 0 4 0

13 0 0 0 0 8 1 0 0 0 0 0 0 0 242 2 0

14 0 0 0 0 6 13 0 0 2 0 0 0 3 21 26 0

15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 19

All 4 276 121 20 62 152 3 122 2 167 650 94 28 292 38 19

Predicted All

Acctual

0 10

1 305

2 175

3 49

4 81

5 135

6 4

7 112

8 1

9 203

10 498

11 104

12 30

13 253

14 71

15 19

All 2050

SAE + SVM – 20 features, 100 epoch

Training accuracy: 0.77882582533745326

Validation accuracy: 0.73999999999999999

S-SAE + SVM + grid search

10 features, 100 epochs

Gama=1000, c=100000

Train accuracy: 0.90339892665474064

Test accuracy: 0.7882926829268293

S-SAE + SVM  
10 features, 2000 epoch  
gamma=100, C=100.  
Train accuracy: 0.8268011058708733  
Validation accuracy: 0.79951219512195126  
Test accuracy: 0.7985365853658537

Predicted 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 \

Acctual

0 5 0 0 0 0 0 0 2 0 1 0 0 0 0 0

1 0 207 3 3 0 1 0 0 0 15 40 13 0 0 0

2 0 13 108 5 0 0 0 0 0 4 25 5 0 0 0

3 0 11 1 35 0 1 0 0 0 0 3 0 0 0 0

4 0 0 0 4 82 1 0 6 0 0 1 0 0 3 3

5 0 0 0 0 1 153 0 0 0 0 2 0 0 0 2

6 0 0 0 0 0 0 6 0 0 0 0 0 0 0 0

7 1 0 0 0 0 0 0 96 0 0 0 0 0 0 0

8 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0

9 0 7 4 1 0 0 1 0 0 155 33 5 0 0 0

10 0 32 12 4 0 5 0 1 1 37 377 8 0 0 0

11 0 16 6 1 0 0 0 0 0 4 11 77 0 0 0

12 0 0 0 0 0 0 0 0 0 0 1 0 44 0 0

13 0 0 0 0 1 0 0 0 0 0 0 0 0 237 7

14 0 0 1 0 9 15 0 0 0 0 1 0 1 17 38

15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

All 6 286 135 53 93 176 7 105 3 216 494 108 46 257 50

Predicted 15 All

Acctual

0 0 8

1 0 282

2 0 160

3 0 51

4 0 100

5 0 158

6 0 6

7 0 97

8 0 3

9 0 206

10 0 477

11 0 115

12 0 45

13 0 245

14 0 82

15 15 15

All 15 2050

S-SAE + SVM

10 features, 2000 epochs

Gama=1000, c=100000

Train accuracy: 0.99902423158237108  
Validation accuracy: 0.77268292682926831

Test accuracy: 0.75414634146341464

Predicted 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 \

Acctual

0 5 0 0 1 0 0 0 2 0 0 0 0 0 0 0 0

1 0 197 13 7 1 0 0 0 0 7 42 14 0 0 1 0

2 0 17 103 6 0 0 0 0 0 5 26 3 0 0 0 0

3 0 11 5 29 1 2 0 0 0 0 2 1 0 0 0 0

4 1 0 0 2 84 1 0 3 0 0 1 1 0 3 4 0

5 0 0 0 0 1 149 0 0 0 1 1 1 0 1 4 0

6 0 0 0 0 0 0 6 0 0 0 0 0 0 0 0 0

7 3 0 0 0 0 0 0 94 0 0 0 0 0 0 0 0

8 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0

9 0 30 1 3 0 0 1 0 0 136 29 6 0 0 0 0

10 0 51 19 2 0 4 0 0 1 36 357 6 0 0 1 0

11 0 21 9 2 0 1 0 0 0 6 10 66 0 0 0 0

12 0 0 0 0 0 0 0 0 0 1 0 0 43 0 1 0

13 0 0 0 0 1 1 0 0 0 0 0 0 0 218 25 0

14 0 0 2 0 9 16 0 0 0 0 0 0 2 11 42 0

15 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 14

All 9 328 152 52 97 174 7 99 4 192 468 98 45 233 78 14

Predicted All

Acctual

0 8

1 282

2 160

3 51

4 100

5 158

6 6

7 97

8 3

9 206

10 477

11 115

12 45

13 245

14 82

15 15

All 2050

S-SAE + SVM + grid search

10 features, 2000 epochs

Gama=10, c=1000000

Train accuracy: 0.87624003903073666

Validation accuracy: 0.83317073170731704

Test accuracy: 0.82048780487804873

Predicted 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 \

Acctual

0 5 0 0 0 0 0 0 2 0 1 0 0 0 0 0

1 0 215 4 3 0 1 0 0 0 12 38 9 0 0 0

2 0 12 121 5 0 0 0 0 0 2 19 1 0 0 0

3 0 9 1 38 0 2 0 0 0 0 1 0 0 0 0

4 0 0 0 2 92 1 0 2 0 0 1 1 0 1 0

5 0 0 0 0 1 153 0 0 0 0 1 1 0 0 2

6 0 0 0 0 0 0 6 0 0 0 0 0 0 0 0

7 3 0 0 0 0 0 1 93 0 0 0 0 0 0 0

8 0 0 0 0 0 0 0 0 2 0 0 0 1 0 0

9 0 10 3 0 3 0 0 0 0 154 27 9 0 0 0

10 0 36 12 4 1 2 0 0 1 36 377 8 0 0 0

11 0 8 3 2 0 0 0 0 0 9 10 83 0 0 0

12 0 0 1 0 0 0 0 0 0 0 0 0 44 0 0

13 0 0 0 0 3 0 0 0 0 0 0 0 0 236 6

14 0 0 1 0 6 11 0 0 0 0 1 0 2 13 48

15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

All 8 290 146 54 106 170 7 97 3 214 475 112 47 250 56

Predicted 15 All

Acctual

0 0 8

1 0 282

2 0 160

3 0 51

4 0 100

5 0 158

6 0 6

7 0 97

8 0 3

9 0 206

10 0 477

11 0 115

12 0 45

13 0 245

14 0 82

15 15 15

All 15 2050