RNA Folding Data:

**knn Normalized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.020664 0.684020 0.116505 1.000000

1 0.020860 0.676399 0.116505 1.000000

2 0.021696 0.831993 0.115132 1.000000

3 0.022247 0.827637 0.115132 1.000000

4 0.021860 17.663002 0.109477 1.000000

5 0.021697 17.627014 0.109477 1.000000

6 0.020066 0.673196 0.020744 0.188519

7 0.020075 0.671546 0.116505 1.000000

8 0.022333 0.849804 0.018205 0.189669

9 0.021885 0.823599 0.115132 1.000000

10 0.022091 17.616885 0.020964 0.195949

11 0.021870 17.587198 0.109477 1.000000

12 0.020077 0.662775 0.056456 0.298300

13 0.020101 0.668395 0.056456 1.000000

14 0.021496 0.817372 0.054322 0.300047

15 0.022769 0.817914 0.054322 1.000000

16 0.022074 17.524883 0.051565 0.300268

17 0.022087 17.541156 0.051565 1.000000

18 0.019871 0.668761 0.007318 0.063384

19 0.020071 0.675199 0.055183 1.000000

20 0.024641 0.825859 0.009758 0.053111

21 0.022267 0.821595 0.049284 1.000000

22 0.021863 17.540482 0.009639 0.056124

23 0.021689 17.586786 0.060159 1.000000

24 0.020304 0.672210 0.018661 0.107087

25 0.021280 0.666172 0.018661 1.000000

26 0.021855 0.812959 0.016383 0.092841

27 0.024828 0.820211 0.016383 1.000000

28 0.022695 17.633108 0.016401 0.088174

29 0.023082 17.732374 0.016401 1.000000

param\_kneighborsclassifier\_\_n\_neighbors param\_kneighborsclassifier\_\_p \

0 1 1

1 1 1

2 1 2

3 1 2

4 1 3

5 1 3

6 2 1

7 2 1

8 2 2

9 2 2

10 2 3

11 2 3

12 3 1

13 3 1

14 3 2

15 3 2

16 3 3

17 3 3

18 4 1

19 4 1

20 4 2

21 4 2

22 4 3

23 4 3

24 5 1

25 5 1

26 5 2

27 5 2

28 5 3

29 5 3

param\_kneighborsclassifier\_\_weights \

0 uniform

1 distance

2 uniform

3 distance

4 uniform

5 distance

6 uniform

7 distance

8 uniform

9 distance

10 uniform

11 distance

12 uniform

13 distance

14 uniform

15 distance

16 uniform

17 distance

18 uniform

19 distance

20 uniform

21 distance

22 uniform

23 distance

24 uniform

25 distance

26 uniform

27 distance

28 uniform

29 distance

params rank\_test\_score \

0 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 1

1 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 1

2 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 4

3 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 4

4 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 7

5 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 7

6 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 20

7 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 1

8 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 23

9 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 4

10 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 19

11 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 7

12 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 11

13 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 11

14 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 14

15 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 14

16 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 16

17 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 16

18 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 30

19 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 13

20 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 28

21 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 18

22 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 29

23 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 10

24 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 21

25 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 21

26 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 26

27 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 26

28 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 24

29 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 24

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.128049 ... 0.125828 1.000000

1 0.128049 ... 0.125828 1.000000

2 0.114286 ... 0.156352 1.000000

3 0.114286 ... 0.156352 1.000000

4 0.083871 ... 0.104575 1.000000

5 0.083871 ... 0.104575 1.000000

6 0.034483 ... 0.023256 0.170767

7 0.128049 ... 0.125828 1.000000

8 0.000000 ... 0.023529 0.132939

9 0.114286 ... 0.156352 1.000000

10 0.000000 ... 0.023952 0.152047

11 0.083871 ... 0.104575 1.000000

12 0.069307 ... 0.115942 0.267880

13 0.069307 ... 0.115942 1.000000

14 0.047847 ... 0.040816 0.266497

15 0.047847 ... 0.040816 1.000000

16 0.019417 ... 0.061856 0.265823

17 0.019417 ... 0.061856 1.000000

18 0.012346 ... 0.000000 0.049155

19 0.080000 ... 0.078431 1.000000

20 0.000000 ... 0.012422 0.046012

21 0.058824 ... 0.041026 1.000000

22 0.000000 ... 0.000000 0.046154

23 0.028708 ... 0.068627 1.000000

24 0.035294 ... 0.023121 0.077496

25 0.035294 ... 0.023121 1.000000

26 0.011834 ... 0.024096 0.085672

27 0.011834 ... 0.024096 1.000000

28 0.000000 ... 0.024096 0.065185

29 0.000000 ... 0.024096 1.000000

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.136095 1.000000 0.098160

1 0.136095 1.000000 0.098160

2 0.132132 1.000000 0.118012

3 0.132132 1.000000 0.118012

4 0.142857 1.000000 0.148387

5 0.142857 1.000000 0.148387

6 0.023256 0.181295 0.022727

7 0.136095 1.000000 0.098160

8 0.011628 0.191702 0.044693

9 0.132132 1.000000 0.118012

10 0.022727 0.196862 0.058140

11 0.142857 1.000000 0.148387

12 0.038462 0.281013 0.028571

13 0.038462 1.000000 0.028571

14 0.088670 0.307125 0.074766

15 0.088670 1.000000 0.074766

16 0.067308 0.309553 0.080808

17 0.067308 1.000000 0.080808

18 0.012270 0.066869 0.011976

19 0.048309 1.000000 0.039024

20 0.000000 0.052067 0.024096

21 0.089109 1.000000 0.047847

22 0.000000 0.066869 0.023952

23 0.105769 1.000000 0.069652

24 0.011834 0.113372 0.011494

25 0.011834 1.000000 0.011494

26 0.011765 0.084548 0.022727

27 0.011765 1.000000 0.022727

28 0.012195 0.095930 0.022727

29 0.012195 1.000000 0.022727

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 1.000000 0.000483 0.021129 0.016908

1 1.000000 0.000778 0.011451 0.016908

2 1.000000 0.000523 0.002741 0.033549

3 1.000000 0.000407 0.005212 0.033549

4 1.000000 0.000381 0.094299 0.031793

5 1.000000 0.000476 0.022576 0.031793

6 0.191702 0.000038 0.009325 0.011275

7 1.000000 0.000072 0.009402 0.016908

8 0.201991 0.000742 0.064386 0.015193

9 1.000000 0.000751 0.006927 0.033549

10 0.183908 0.000640 0.039424 0.021322

11 1.000000 0.000388 0.029605 0.031793

12 0.297129 0.000025 0.014703 0.033181

13 1.000000 0.000663 0.007153 0.033181

14 0.291878 0.000501 0.008134 0.024633

15 1.000000 0.002247 0.011655 0.024633

16 0.285714 0.000885 0.020993 0.023568

17 1.000000 0.000629 0.028076 0.023568

18 0.073059 0.000393 0.014737 0.005977

19 1.000000 0.000034 0.015310 0.020452

20 0.037094 0.006105 0.005233 0.009049

21 1.000000 0.001472 0.007191 0.025772

22 0.051829 0.000433 0.038972 0.011806

23 1.000000 0.000514 0.094278 0.029200

24 0.116788 0.000398 0.015237 0.009433

25 1.000000 0.001934 0.003269 0.009433

26 0.074405 0.000766 0.010655 0.005756

27 1.000000 0.006506 0.011178 0.005756

28 0.079764 0.001769 0.054443 0.009266

29 1.000000 0.001255 0.233458 0.009266

std\_train\_score

0 0.000000

1 0.000000

2 0.000000

3 0.000000

4 0.000000

5 0.000000

6 0.011555

7 0.000000

8 0.029762

9 0.000000

10 0.026890

11 0.000000

12 0.022484

13 0.000000

14 0.021035

15 0.000000

16 0.021861

17 0.000000

18 0.012314

19 0.000000

20 0.011301

21 0.000000

22 0.006921

23 0.000000

24 0.017634

25 0.000000

26 0.014727

27 0.000000

28 0.013718

29 0.000000

[30 rows x 23 columns]>

Best test set score: 0.12

Best parameters: {'kneighborsclassifier\_\_n\_neighbors': 1, 'kneighborsclassifier\_\_p': 1, 'kneighborsclassifier\_\_weights': 'uniform'}

**kNN Standardized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.021688 0.661165 0.116182 1.000000

1 0.021287 0.659741 0.116182 1.000000

2 0.022676 0.806558 0.107161 1.000000

3 0.023498 0.808147 0.107161 1.000000

4 0.023089 17.427959 0.108337 1.000000

5 0.023078 17.620621 0.108337 1.000000

6 0.021083 0.661975 0.023239 0.191515

7 0.021874 0.666382 0.116182 1.000000

8 0.023688 0.809356 0.013823 0.188131

9 0.023287 0.815184 0.107161 1.000000

10 0.022882 17.492987 0.018534 0.192888

11 0.023298 17.532823 0.108337 1.000000

12 0.021674 0.656768 0.052846 0.298839

13 0.021699 0.668370 0.052846 1.000000

14 0.022893 0.801726 0.044919 0.291397

15 0.023099 0.810756 0.044919 1.000000

16 0.023079 17.493330 0.038017 0.312298

17 0.023277 17.500372 0.038017 1.000000

18 0.022093 0.668970 0.004878 0.061072

19 0.021300 0.677984 0.045852 1.000000

20 0.022700 0.820983 0.014518 0.054867

21 0.023101 0.814754 0.054860 1.000000

22 0.023487 17.499954 0.004805 0.048292

23 0.023304 17.460023 0.038029 1.000000

24 0.021477 0.669880 0.016459 0.098932

25 0.021890 0.666582 0.016459 1.000000

26 0.023286 0.825189 0.030019 0.095624

27 0.023071 0.812968 0.030019 1.000000

28 0.023285 17.508973 0.016309 0.087036

29 0.023262 17.458453 0.016309 1.000000

param\_kneighborsclassifier\_\_n\_neighbors param\_kneighborsclassifier\_\_p \

0 1 1

1 1 1

2 1 2

3 1 2

4 1 3

5 1 3

6 2 1

7 2 1

8 2 2

9 2 2

10 2 3

11 2 3

12 3 1

13 3 1

14 3 2

15 3 2

16 3 3

17 3 3

18 4 1

19 4 1

20 4 2

21 4 2

22 4 3

23 4 3

24 5 1

25 5 1

26 5 2

27 5 2

28 5 3

29 5 3

param\_kneighborsclassifier\_\_weights \

0 uniform

1 distance

2 uniform

3 distance

4 uniform

5 distance

6 uniform

7 distance

8 uniform

9 distance

10 uniform

11 distance

12 uniform

13 distance

14 uniform

15 distance

16 uniform

17 distance

18 uniform

19 distance

20 uniform

21 distance

22 uniform

23 distance

24 uniform

25 distance

26 uniform

27 distance

28 uniform

29 distance

params rank\_test\_score \

0 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 1

1 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 1

2 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 7

3 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 7

4 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 4

5 {'kneighborsclassifier\_\_n\_neighbors': 1, 'knei... 4

6 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 21

7 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 1

8 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 28

9 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 7

10 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 22

11 {'kneighborsclassifier\_\_n\_neighbors': 2, 'knei... 4

12 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 11

13 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 11

14 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 14

15 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 14

16 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 17

17 {'kneighborsclassifier\_\_n\_neighbors': 3, 'knei... 17

18 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 29

19 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 13

20 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 27

21 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 10

22 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 30

23 {'kneighborsclassifier\_\_n\_neighbors': 4, 'knei... 16

24 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 23

25 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 23

26 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 19

27 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 19

28 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 25

29 {'kneighborsclassifier\_\_n\_neighbors': 5, 'knei... 25

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.128440 ... 0.130719 1.000000

1 0.128440 ... 0.130719 1.000000

2 0.106918 ... 0.144654 1.000000

3 0.106918 ... 0.144654 1.000000

4 0.066007 ... 0.110032 1.000000

5 0.066007 ... 0.110032 1.000000

6 0.035503 ... 0.022599 0.176046

7 0.128440 ... 0.130719 1.000000

8 0.000000 ... 0.011696 0.135693

9 0.106918 ... 0.144654 1.000000

10 0.000000 ... 0.011561 0.152047

11 0.066007 ... 0.110032 1.000000

12 0.050505 ... 0.104762 0.259740

13 0.050505 ... 0.104762 1.000000

14 0.059406 ... 0.030612 0.251295

15 0.059406 ... 0.030612 1.000000

16 0.009524 ... 0.061856 0.270064

17 0.009524 ... 0.061856 1.000000

18 0.012270 ... 0.000000 0.049231

19 0.061856 ... 0.079208 1.000000

20 0.024096 ... 0.012422 0.052147

21 0.069652 ... 0.050000 1.000000

22 0.000000 ... 0.000000 0.039939

23 0.009901 ... 0.060302 1.000000

24 0.035714 ... 0.023256 0.065967

25 0.035714 ... 0.023256 1.000000

26 0.034682 ... 0.024242 0.096633

27 0.034682 ... 0.024242 1.000000

28 0.000000 ... 0.011976 0.064706

29 0.000000 ... 0.011976 1.000000

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.118694 1.000000 0.112150

1 0.118694 1.000000 0.112150

2 0.126506 1.000000 0.113565

3 0.126506 1.000000 0.113565

4 0.133739 1.000000 0.136364

5 0.133739 1.000000 0.136364

6 0.023669 0.168116 0.022727

7 0.118694 1.000000 0.112150

8 0.011834 0.191702 0.034091

9 0.126506 1.000000 0.113565

10 0.023121 0.183908 0.047059

11 0.133739 1.000000 0.136364

12 0.039604 0.289673 0.019608

13 0.039604 1.000000 0.019608

14 0.058537 0.310894 0.066038

15 0.058537 1.000000 0.066038

16 0.039801 0.342169 0.060302

17 0.039801 1.000000 0.060302

18 0.000000 0.063927 0.012121

19 0.028302 1.000000 0.029126

20 0.000000 0.049005 0.023952

21 0.068966 1.000000 0.075829

22 0.000000 0.054628 0.012048

23 0.059701 1.000000 0.050761

24 0.000000 0.102489 0.011628

25 0.000000 1.000000 0.011628

26 0.034286 0.078717 0.045455

27 0.034286 1.000000 0.045455

28 0.000000 0.084302 0.035088

29 0.000000 1.000000 0.035088

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 1.000000 0.000483 0.012605 0.014303

1 1.000000 0.000404 0.010585 0.014303

2 1.000000 0.000505 0.012480 0.034028

3 1.000000 0.000494 0.004730 0.034028

4 1.000000 0.000024 0.014943 0.026035

5 1.000000 0.000021 0.205513 0.026035

6 0.191702 0.000018 0.007084 0.007543

7 1.000000 0.000744 0.008840 0.014303

8 0.189112 0.000803 0.004321 0.011097

9 1.000000 0.000410 0.009705 0.034028

10 0.191702 0.000412 0.024058 0.016029

11 1.000000 0.000383 0.080438 0.026035

12 0.291407 0.000504 0.006186 0.028250

13 1.000000 0.000495 0.012853 0.028250

14 0.273308 0.000398 0.005996 0.021285

15 1.000000 0.000021 0.007811 0.021285

16 0.290683 0.000633 0.027618 0.021245

17 1.000000 0.000394 0.038391 0.021245

18 0.070015 0.001536 0.008510 0.005975

19 1.000000 0.000408 0.025220 0.020900

20 0.034109 0.000497 0.007901 0.008963

21 1.000000 0.000002 0.006115 0.024111

22 0.034003 0.000488 0.049665 0.005885

23 1.000000 0.000399 0.011317 0.023385

24 0.103093 0.000792 0.016684 0.012115

25 1.000000 0.000400 0.012508 0.012115

26 0.080000 0.000744 0.011956 0.011465

27 1.000000 0.000632 0.007049 0.011465

28 0.074184 0.000408 0.084146 0.015708

29 1.000000 0.000401 0.019570 0.015708

std\_train\_score

0 0.000000

1 0.000000

2 0.000000

3 0.000000

4 0.000000

5 0.000000

6 0.018396

7 0.000000

8 0.029085

9 0.000000

10 0.025715

11 0.000000

12 0.027489

13 0.000000

14 0.028582

15 0.000000

16 0.027747

17 0.000000

18 0.008847

19 0.000000

20 0.013570

21 0.000000

22 0.009502

23 0.000000

24 0.020457

25 0.000000

26 0.014903

27 0.000000

28 0.017207

29 0.000000

[30 rows x 23 columns]>

Best test set score: 0.11

Best parameters: {'kneighborsclassifier\_\_n\_neighbors': 1, 'kneighborsclassifier\_\_p': 1, 'kneighborsclassifier\_\_weights': 'uniform'}

**RF Normalized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.620650 0.004412 0.002500 0.888474

1 3.064559 0.017446 0.000000 0.995389

2 6.241499 0.035096 0.000000 0.999842

3 0.625663 0.004420 0.002439 0.888322

4 3.061350 0.017447 0.000000 0.993310

5 6.197270 0.032086 0.000000 0.999208

6 0.612822 0.004827 0.007347 0.873007

7 3.057324 0.017046 0.000000 0.978164

8 6.101430 0.032487 0.000000 0.994748

9 0.549069 0.004410 0.005000 0.781255

10 2.694776 0.016245 0.000000 0.874570

11 5.361268 0.030891 0.000000 0.916601

12 0.549053 0.004828 0.005000 0.781255

13 2.693564 0.016245 0.000000 0.874570

14 5.368478 0.030082 0.000000 0.916601

15 0.547673 0.004804 0.005000 0.781255

16 2.691575 0.016051 0.000000 0.874570

17 5.371676 0.031100 0.000000 0.916601

18 0.483897 0.004409 0.000000 0.575588

19 2.450929 0.015448 0.000000 0.442180

20 4.941729 0.029098 0.000000 0.366763

21 0.482902 0.004426 0.000000 0.575588

22 2.451303 0.015450 0.000000 0.442180

23 4.935710 0.028886 0.000000 0.366763

24 0.483502 0.004209 0.000000 0.575588

25 2.450325 0.015445 0.000000 0.442180

26 4.930507 0.029094 0.000000 0.366763

param\_randomforestclassifier\_\_min\_samples\_leaf \

0 1

1 1

2 1

3 1

4 1

5 1

6 1

7 1

8 1

9 2

10 2

11 2

12 2

13 2

14 2

15 2

16 2

17 2

18 3

19 3

20 3

21 3

22 3

23 3

24 3

25 3

26 3

param\_randomforestclassifier\_\_min\_samples\_split \

0 2

1 2

2 2

3 3

4 3

5 3

6 4

7 4

8 4

9 2

10 2

11 2

12 3

13 3

14 3

15 4

16 4

17 4

18 2

19 2

20 2

21 3

22 3

23 3

24 4

25 4

26 4

param\_randomforestclassifier\_\_n\_estimators \

0 10

1 50

2 100

3 10

4 50

5 100

6 10

7 50

8 100

9 10

10 50

11 100

12 10

13 50

14 100

15 10

16 50

17 100

18 10

19 50

20 100

21 10

22 50

23 100

24 10

25 50

26 100

params rank\_test\_score \

0 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 5

1 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

2 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

3 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 6

4 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

5 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

6 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 1

7 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

8 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

9 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

10 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

11 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

12 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

13 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

14 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

15 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

16 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

17 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

18 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

19 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

20 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

21 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

22 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

23 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

24 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

25 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

26 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.012500 ... 0.0 0.892200

1 0.000000 ... 0.0 0.996825

2 0.000000 ... 0.0 1.000000

3 0.012195 ... 0.0 0.891228

4 0.000000 ... 0.0 0.992829

5 0.000000 ... 0.0 0.999208

6 0.000000 ... 0.0 0.871429

7 0.000000 ... 0.0 0.977346

8 0.000000 ... 0.0 0.992026

9 0.012579 ... 0.0 0.793893

10 0.000000 ... 0.0 0.882405

11 0.000000 ... 0.0 0.925170

12 0.012579 ... 0.0 0.793893

13 0.000000 ... 0.0 0.882405

14 0.000000 ... 0.0 0.925170

15 0.012579 ... 0.0 0.793893

16 0.000000 ... 0.0 0.882405

17 0.000000 ... 0.0 0.925170

18 0.000000 ... 0.0 0.582960

19 0.000000 ... 0.0 0.420000

20 0.000000 ... 0.0 0.385696

21 0.000000 ... 0.0 0.582960

22 0.000000 ... 0.0 0.420000

23 0.000000 ... 0.0 0.385696

24 0.000000 ... 0.0 0.582960

25 0.000000 ... 0.0 0.420000

26 0.000000 ... 0.0 0.385696

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.000000 0.878438 0.0

1 0.000000 0.996029 0.0

2 0.000000 1.000000 0.0

3 0.000000 0.879433 0.0

4 0.000000 0.992829 0.0

5 0.000000 0.998415 0.0

6 0.012195 0.864331 0.0

7 0.000000 0.976518 0.0

8 0.000000 0.995231 0.0

9 0.000000 0.790431 0.0

10 0.000000 0.887324 0.0

11 0.000000 0.928814 0.0

12 0.000000 0.790431 0.0

13 0.000000 0.887324 0.0

14 0.000000 0.928814 0.0

15 0.000000 0.790431 0.0

16 0.000000 0.887324 0.0

17 0.000000 0.928814 0.0

18 0.000000 0.581369 0.0

19 0.000000 0.489845 0.0

20 0.000000 0.379487 0.0

21 0.000000 0.581369 0.0

22 0.000000 0.489845 0.0

23 0.000000 0.379487 0.0

24 0.000000 0.581369 0.0

25 0.000000 0.489845 0.0

26 0.000000 0.379487 0.0

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 0.888303 0.029384 4.911669e-04 0.005000

1 0.995231 0.108609 8.203626e-04 0.000000

2 1.000000 0.170114 5.527543e-03 0.000000

3 0.888303 0.031267 4.855994e-04 0.004878

4 0.994431 0.092135 4.909728e-04 0.000000

5 1.000000 0.137521 5.135693e-07 0.000000

6 0.877442 0.033902 3.915488e-04 0.009809

7 0.982287 0.119816 6.336162e-04 0.000000

8 0.996825 0.202567 4.914198e-04 0.000000

9 0.771623 0.028732 4.894750e-04 0.006124

10 0.872435 0.092912 4.008121e-04 0.000000

11 0.915952 0.108966 7.540371e-04 0.000000

12 0.771623 0.029103 1.159214e-03 0.006124

13 0.872435 0.092173 4.009753e-04 0.000000

14 0.915952 0.111755 2.702510e-05 0.000000

15 0.771623 0.028129 3.968957e-04 0.006124

16 0.872435 0.090259 1.533356e-05 0.000000

17 0.915952 0.112824 1.996705e-03 0.000000

18 0.553776 0.017812 4.898938e-04 0.000000

19 0.437577 0.052742 7.991657e-04 0.000000

20 0.373230 0.098491 3.589909e-05 0.000000

21 0.553776 0.018958 4.772704e-04 0.000000

22 0.437577 0.051852 4.860040e-04 0.000000

23 0.373230 0.097397 3.842116e-04 0.000000

24 0.553776 0.019105 4.020290e-04 0.000000

25 0.437577 0.049989 4.728855e-04 0.000000

26 0.373230 0.097921 1.994274e-05 0.000000

std\_train\_score

0 0.005217

1 0.001060

2 0.000317

3 0.004626

4 0.000641

5 0.000501

6 0.005913

7 0.002955

8 0.001723

9 0.009811

10 0.009139

11 0.010133

12 0.009811

13 0.009139

14 0.010133

15 0.009811

16 0.009139

17 0.010133

18 0.011067

19 0.024784

20 0.016286

21 0.011067

22 0.024784

23 0.016286

24 0.011067

25 0.024784

26 0.016286

[27 rows x 23 columns]>

Test set score: 0.00

Best parameters: {'randomforestclassifier\_\_min\_samples\_leaf': 1, 'randomforestclassifier\_\_min\_samples\_split': 4, 'randomforestclassifier\_\_n\_estimators': 10}

**RF Standardized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.622885 0.004614 0.002484 0.888861

1 3.083996 0.016856 0.000000 0.995389

2 6.151572 0.032490 0.000000 0.999842

3 0.624056 0.004409 0.002439 0.888322

4 3.057735 0.017047 0.000000 0.993310

5 6.152354 0.032519 0.000000 0.999208

6 0.610228 0.004609 0.007347 0.873007

7 3.054742 0.017054 0.000000 0.978164

8 6.086151 0.033907 0.000000 0.994748

9 0.548871 0.004227 0.005000 0.781255

10 2.695970 0.015650 0.000000 0.875762

11 5.360049 0.030293 0.000000 0.917535

12 0.548061 0.004216 0.005000 0.781255

13 2.691166 0.016244 0.000000 0.875762

14 5.360250 0.030675 0.000000 0.917535

15 0.549670 0.004418 0.005000 0.781255

16 2.692756 0.016058 0.000000 0.875762

17 5.366290 0.030281 0.000000 0.917535

18 0.485494 0.004231 0.000000 0.575588

19 2.478988 0.016042 0.000000 0.442967

20 4.932721 0.029085 0.000000 0.367201

21 0.483479 0.004411 0.000000 0.575588

22 2.451521 0.015444 0.000000 0.442967

23 4.948219 0.029087 0.000000 0.367201

24 0.485494 0.004416 0.000000 0.575588

25 2.452313 0.015055 0.000000 0.442967

26 4.950382 0.029278 0.000000 0.367201

param\_randomforestclassifier\_\_min\_samples\_leaf \

0 1

1 1

2 1

3 1

4 1

5 1

6 1

7 1

8 1

9 2

10 2

11 2

12 2

13 2

14 2

15 2

16 2

17 2

18 3

19 3

20 3

21 3

22 3

23 3

24 3

25 3

26 3

param\_randomforestclassifier\_\_min\_samples\_split \

0 2

1 2

2 2

3 3

4 3

5 3

6 4

7 4

8 4

9 2

10 2

11 2

12 3

13 3

14 3

15 4

16 4

17 4

18 2

19 2

20 2

21 3

22 3

23 3

24 4

25 4

26 4

param\_randomforestclassifier\_\_n\_estimators \

0 10

1 50

2 100

3 10

4 50

5 100

6 10

7 50

8 100

9 10

10 50

11 100

12 10

13 50

14 100

15 10

16 50

17 100

18 10

19 50

20 100

21 10

22 50

23 100

24 10

25 50

26 100

params rank\_test\_score \

0 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 5

1 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

2 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

3 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 6

4 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

5 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

6 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 1

7 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

8 {'randomforestclassifier\_\_min\_samples\_leaf': 1... 7

9 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

10 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

11 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

12 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

13 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

14 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

15 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 2

16 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

17 {'randomforestclassifier\_\_min\_samples\_leaf': 2... 7

18 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

19 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

20 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

21 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

22 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

23 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

24 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

25 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

26 {'randomforestclassifier\_\_min\_samples\_leaf': 3... 7

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.012422 ... 0.0 0.892200

1 0.000000 ... 0.0 0.996825

2 0.000000 ... 0.0 1.000000

3 0.012195 ... 0.0 0.891228

4 0.000000 ... 0.0 0.992829

5 0.000000 ... 0.0 0.999208

6 0.000000 ... 0.0 0.871429

7 0.000000 ... 0.0 0.977346

8 0.000000 ... 0.0 0.992026

9 0.012579 ... 0.0 0.793893

10 0.000000 ... 0.0 0.886344

11 0.000000 ... 0.0 0.923339

12 0.012579 ... 0.0 0.793893

13 0.000000 ... 0.0 0.886344

14 0.000000 ... 0.0 0.923339

15 0.012579 ... 0.0 0.793893

16 0.000000 ... 0.0 0.886344

17 0.000000 ... 0.0 0.923339

18 0.000000 ... 0.0 0.582960

19 0.000000 ... 0.0 0.420000

20 0.000000 ... 0.0 0.385696

21 0.000000 ... 0.0 0.582960

22 0.000000 ... 0.0 0.420000

23 0.000000 ... 0.0 0.385696

24 0.000000 ... 0.0 0.582960

25 0.000000 ... 0.0 0.420000

26 0.000000 ... 0.0 0.385696

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.000000 0.878438 0.0

1 0.000000 0.996029 0.0

2 0.000000 1.000000 0.0

3 0.000000 0.879433 0.0

4 0.000000 0.992829 0.0

5 0.000000 0.998415 0.0

6 0.012195 0.864331 0.0

7 0.000000 0.976518 0.0

8 0.000000 0.995231 0.0

9 0.000000 0.790431 0.0

10 0.000000 0.887324 0.0

11 0.000000 0.928814 0.0

12 0.000000 0.790431 0.0

13 0.000000 0.887324 0.0

14 0.000000 0.928814 0.0

15 0.000000 0.790431 0.0

16 0.000000 0.887324 0.0

17 0.000000 0.928814 0.0

18 0.000000 0.581369 0.0

19 0.000000 0.489845 0.0

20 0.000000 0.379487 0.0

21 0.000000 0.581369 0.0

22 0.000000 0.489845 0.0

23 0.000000 0.379487 0.0

24 0.000000 0.581369 0.0

25 0.000000 0.489845 0.0

26 0.000000 0.379487 0.0

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 0.888303 0.029488 0.000481 0.004969

1 0.995231 0.114445 0.000407 0.000000

2 1.000000 0.188549 0.000490 0.000000

3 0.888303 0.033162 0.000490 0.004878

4 0.994431 0.096804 0.000609 0.000000

5 1.000000 0.165608 0.000808 0.000000

6 0.877442 0.037401 0.000488 0.009809

7 0.982287 0.116561 0.000018 0.000000

8 0.996825 0.203013 0.002243 0.000000

9 0.771623 0.028551 0.000394 0.006124

10 0.872435 0.094383 0.000481 0.000000

11 0.915952 0.111708 0.000376 0.000000

12 0.771623 0.027977 0.000400 0.006124

13 0.872435 0.092275 0.000382 0.000000

14 0.915952 0.110047 0.000469 0.000000

15 0.771623 0.025031 0.000485 0.006124

16 0.872435 0.091092 0.000022 0.000000

17 0.915952 0.118395 0.000402 0.000000

18 0.553776 0.017210 0.000389 0.000000

19 0.433705 0.079156 0.000621 0.000000

20 0.371134 0.096599 0.000016 0.000000

21 0.553776 0.018580 0.000475 0.000000

22 0.433705 0.048416 0.000456 0.000000

23 0.371134 0.100628 0.000614 0.000000

24 0.553776 0.019507 0.000483 0.000000

25 0.433705 0.051320 0.000018 0.000000

26 0.371134 0.101042 0.000381 0.000000

std\_train\_score

0 0.005542

1 0.001060

2 0.000317

3 0.004626

4 0.000641

5 0.000501

6 0.005913

7 0.002955

8 0.001723

9 0.009811

10 0.009663

11 0.009782

12 0.009811

13 0.009663

14 0.009782

15 0.009811

16 0.009663

17 0.009782

18 0.011067

19 0.024158

20 0.015457

21 0.011067

22 0.024158

23 0.015457

24 0.011067

25 0.024158

26 0.015457

[27 rows x 23 columns]>

Test set score: 0.00

Best parameters: {'randomforestclassifier\_\_min\_samples\_leaf': 1, 'randomforestclassifier\_\_min\_samples\_split': 4, 'randomforestclassifier\_\_n\_estimators': 10}

**SVC Normalized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.550865 0.119554 0.000000 0.000000

1 0.565698 0.121339 0.000000 0.000000

2 0.551073 0.119327 0.000000 0.000000

3 0.557676 0.123136 0.000000 0.000000

4 0.567710 0.122735 0.000000 0.000000

5 0.816368 0.178682 0.000000 0.000000

6 0.547473 0.119728 0.000000 0.000000

7 0.547537 0.119493 0.000000 0.000000

8 0.562519 0.122925 0.000000 0.000000

9 1.495192 0.286785 0.000000 0.000000

10 2.707810 0.602414 0.000000 0.000000

11 2.620166 0.604022 0.000000 0.000000

12 0.547863 0.119107 0.000000 0.000000

13 0.551279 0.120129 0.000000 0.000000

14 1.028952 0.190299 0.000000 0.000000

15 2.216703 0.347742 0.000000 0.000000

16 2.866424 0.603629 0.000000 0.000000

17 2.772375 0.604433 0.000000 0.000000

18 0.552271 0.119933 0.000000 0.000000

19 0.804728 0.165666 0.000000 0.000000

20 1.999503 0.224824 0.000000 0.000000

21 2.126656 0.352970 0.000000 0.000000

22 2.895693 0.606243 0.000000 1.000000

23 2.821895 0.605855 0.000000 1.000000

24 0.784102 0.162840 0.000000 0.000000

25 2.425452 0.234434 0.000000 0.000000

26 2.805863 0.216995 0.000000 0.000000

27 3.076175 0.361796 0.034473 0.996983

28 3.416078 0.605250 0.000000 1.000000

29 3.293166 0.603836 0.000000 1.000000

30 1.770108 0.256098 0.000000 0.000000

31 6.693194 0.212574 0.000000 0.000000

32 3.784856 0.213408 0.000000 0.005673

33 3.118895 0.359566 0.027343 1.000000

34 3.444369 0.615852 0.000000 1.000000

35 3.406668 0.621060 0.000000 1.000000

param\_svc\_\_C param\_svc\_\_gamma params \

0 0.001 0.001 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.001}

1 0.001 0.01 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.01}

2 0.001 0.1 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.1}

3 0.001 1 {'svc\_\_C': 0.001, 'svc\_\_gamma': 1}

4 0.001 10 {'svc\_\_C': 0.001, 'svc\_\_gamma': 10}

5 0.001 100 {'svc\_\_C': 0.001, 'svc\_\_gamma': 100}

6 0.01 0.001 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.001}

7 0.01 0.01 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.01}

8 0.01 0.1 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.1}

9 0.01 1 {'svc\_\_C': 0.01, 'svc\_\_gamma': 1}

10 0.01 10 {'svc\_\_C': 0.01, 'svc\_\_gamma': 10}

11 0.01 100 {'svc\_\_C': 0.01, 'svc\_\_gamma': 100}

12 0.1 0.001 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.001}

13 0.1 0.01 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.01}

14 0.1 0.1 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.1}

15 0.1 1 {'svc\_\_C': 0.1, 'svc\_\_gamma': 1}

16 0.1 10 {'svc\_\_C': 0.1, 'svc\_\_gamma': 10}

17 0.1 100 {'svc\_\_C': 0.1, 'svc\_\_gamma': 100}

18 1 0.001 {'svc\_\_C': 1, 'svc\_\_gamma': 0.001}

19 1 0.01 {'svc\_\_C': 1, 'svc\_\_gamma': 0.01}

20 1 0.1 {'svc\_\_C': 1, 'svc\_\_gamma': 0.1}

21 1 1 {'svc\_\_C': 1, 'svc\_\_gamma': 1}

22 1 10 {'svc\_\_C': 1, 'svc\_\_gamma': 10}

23 1 100 {'svc\_\_C': 1, 'svc\_\_gamma': 100}

24 10 0.001 {'svc\_\_C': 10, 'svc\_\_gamma': 0.001}

25 10 0.01 {'svc\_\_C': 10, 'svc\_\_gamma': 0.01}

26 10 0.1 {'svc\_\_C': 10, 'svc\_\_gamma': 0.1}

27 10 1 {'svc\_\_C': 10, 'svc\_\_gamma': 1}

28 10 10 {'svc\_\_C': 10, 'svc\_\_gamma': 10}

29 10 100 {'svc\_\_C': 10, 'svc\_\_gamma': 100}

30 100 0.001 {'svc\_\_C': 100, 'svc\_\_gamma': 0.001}

31 100 0.01 {'svc\_\_C': 100, 'svc\_\_gamma': 0.01}

32 100 0.1 {'svc\_\_C': 100, 'svc\_\_gamma': 0.1}

33 100 1 {'svc\_\_C': 100, 'svc\_\_gamma': 1}

34 100 10 {'svc\_\_C': 100, 'svc\_\_gamma': 10}

35 100 100 {'svc\_\_C': 100, 'svc\_\_gamma': 100}

rank\_test\_score split0\_test\_score split0\_train\_score ... \

0 3 0.000000 0.000000 ...

1 3 0.000000 0.000000 ...

2 3 0.000000 0.000000 ...

3 3 0.000000 0.000000 ...

4 3 0.000000 0.000000 ...

5 3 0.000000 0.000000 ...

6 3 0.000000 0.000000 ...

7 3 0.000000 0.000000 ...

8 3 0.000000 0.000000 ...

9 3 0.000000 0.000000 ...

10 3 0.000000 0.000000 ...

11 3 0.000000 0.000000 ...

12 3 0.000000 0.000000 ...

13 3 0.000000 0.000000 ...

14 3 0.000000 0.000000 ...

15 3 0.000000 0.000000 ...

16 3 0.000000 0.000000 ...

17 3 0.000000 0.000000 ...

18 3 0.000000 0.000000 ...

19 3 0.000000 0.000000 ...

20 3 0.000000 0.000000 ...

21 3 0.000000 0.000000 ...

22 3 0.000000 1.000000 ...

23 3 0.000000 1.000000 ...

24 3 0.000000 0.000000 ...

25 3 0.000000 0.000000 ...

26 3 0.000000 0.000000 ...

27 1 0.076503 0.995231 ...

28 3 0.000000 1.000000 ...

29 3 0.000000 1.000000 ...

30 3 0.000000 0.000000 ...

31 3 0.000000 0.000000 ...

32 3 0.000000 0.000000 ...

33 2 0.063158 1.000000 ...

34 3 0.000000 1.000000 ...

35 3 0.000000 1.000000 ...

split2\_test\_score split2\_train\_score split3\_test\_score \

0 0.000000 0.000000 0.000000

1 0.000000 0.000000 0.000000

2 0.000000 0.000000 0.000000

3 0.000000 0.000000 0.000000

4 0.000000 0.000000 0.000000

5 0.000000 0.000000 0.000000

6 0.000000 0.000000 0.000000

7 0.000000 0.000000 0.000000

8 0.000000 0.000000 0.000000

9 0.000000 0.000000 0.000000

10 0.000000 0.000000 0.000000

11 0.000000 0.000000 0.000000

12 0.000000 0.000000 0.000000

13 0.000000 0.000000 0.000000

14 0.000000 0.000000 0.000000

15 0.000000 0.000000 0.000000

16 0.000000 0.000000 0.000000

17 0.000000 0.000000 0.000000

18 0.000000 0.000000 0.000000

19 0.000000 0.000000 0.000000

20 0.000000 0.000000 0.000000

21 0.000000 0.000000 0.000000

22 0.000000 1.000000 0.000000

23 0.000000 1.000000 0.000000

24 0.000000 0.000000 0.000000

25 0.000000 0.000000 0.000000

26 0.000000 0.000000 0.000000

27 0.042781 0.996029 0.021053

28 0.000000 1.000000 0.000000

29 0.000000 1.000000 0.000000

30 0.000000 0.000000 0.000000

31 0.000000 0.000000 0.000000

32 0.000000 0.009449 0.000000

33 0.032258 1.000000 0.020408

34 0.000000 1.000000 0.000000

35 0.000000 1.000000 0.000000

split3\_train\_score split4\_test\_score split4\_train\_score std\_fit\_time \

0 0.000000 0.000000 0.000000 0.003271

1 0.000000 0.000000 0.000000 0.035593

2 0.000000 0.000000 0.000000 0.005760

3 0.000000 0.000000 0.000000 0.007216

4 0.000000 0.000000 0.000000 0.005320

5 0.000000 0.000000 0.000000 0.001968

6 0.000000 0.000000 0.000000 0.004540

7 0.000000 0.000000 0.000000 0.001746

8 0.000000 0.000000 0.000000 0.008257

9 0.000000 0.000000 0.000000 0.015348

10 0.000000 0.000000 0.000000 0.012441

11 0.000000 0.000000 0.000000 0.008176

12 0.000000 0.000000 0.000000 0.003563

13 0.000000 0.000000 0.000000 0.000969

14 0.000000 0.000000 0.000000 0.012334

15 0.000000 0.000000 0.000000 0.141101

16 0.000000 0.000000 0.000000 0.008476

17 0.000000 0.000000 0.000000 0.008224

18 0.000000 0.000000 0.000000 0.001619

19 0.000000 0.000000 0.000000 0.013302

20 0.000000 0.000000 0.000000 0.021619

21 0.000000 0.000000 0.000000 0.025014

22 1.000000 0.000000 1.000000 0.011391

23 1.000000 0.000000 1.000000 0.015606

24 0.000000 0.000000 0.000000 0.013544

25 0.000000 0.000000 0.000000 0.028738

26 0.000000 0.000000 0.000000 0.046190

27 0.997621 0.010753 0.997621 0.020136

28 1.000000 0.000000 1.000000 0.023829

29 1.000000 0.000000 1.000000 0.043472

30 0.000000 0.000000 0.000000 0.027605

31 0.000000 0.000000 0.000000 0.088698

32 0.006309 0.000000 0.003160 0.097842

33 1.000000 0.010363 1.000000 0.026759

34 1.000000 0.000000 1.000000 0.060685

35 1.000000 0.000000 1.000000 0.056611

std\_score\_time std\_test\_score std\_train\_score

0 0.000404 0.000000 0.000000

1 0.004539 0.000000 0.000000

2 0.000635 0.000000 0.000000

3 0.002400 0.000000 0.000000

4 0.001020 0.000000 0.000000

5 0.002394 0.000000 0.000000

6 0.001210 0.000000 0.000000

7 0.000758 0.000000 0.000000

8 0.002590 0.000000 0.000000

9 0.002979 0.000000 0.000000

10 0.000985 0.000000 0.000000

11 0.002090 0.000000 0.000000

12 0.000725 0.000000 0.000000

13 0.000769 0.000000 0.000000

14 0.002311 0.000000 0.000000

15 0.005101 0.000000 0.000000

16 0.002277 0.000000 0.000000

17 0.001172 0.000000 0.000000

18 0.000484 0.000000 0.000000

19 0.001466 0.000000 0.000000

20 0.002152 0.000000 0.000000

21 0.004529 0.000000 0.000000

22 0.001495 0.000000 0.000000

23 0.002643 0.000000 0.000000

24 0.002257 0.000000 0.000000

25 0.001180 0.000000 0.000000

26 0.003718 0.000000 0.000000

27 0.003322 0.023462 0.001170

28 0.001613 0.000000 0.000000

29 0.002631 0.000000 0.000000

30 0.001024 0.000000 0.000000

31 0.002446 0.000000 0.000000

32 0.003003 0.000000 0.003672

33 0.004024 0.019627 0.000000

34 0.017468 0.000000 0.000000

35 0.007356 0.000000 0.000000

[36 rows x 22 columns]>

Test set score: 0.04

Best parameters: {'svc\_\_C': 10, 'svc\_\_gamma': 1}

**SVC Standardized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.549463 0.119517 0.000000 0.000000

1 0.548874 0.120105 0.000000 0.000000

2 0.574138 0.123937 0.000000 0.000000

3 0.813765 0.178090 0.000000 0.000000

4 1.309295 0.310028 0.000000 0.000000

5 1.293841 0.307243 0.000000 0.000000

6 0.552085 0.119328 0.000000 0.000000

7 1.098908 0.220231 0.000000 0.000000

8 2.687146 0.596812 0.000000 0.000000

9 2.628576 0.604629 0.000000 0.000000

10 4.183935 1.051015 0.000000 0.000000

11 4.150262 1.039953 0.000000 0.000000

12 0.803742 0.163248 0.000000 0.000000

13 2.021970 0.289000 0.000000 0.000000

14 2.861403 0.600824 0.000000 0.000000

15 2.796447 0.603387 0.000000 0.000000

16 4.336163 1.053823 0.000000 0.000000

17 4.297849 1.038169 0.000000 0.000000

18 1.773534 0.218792 0.000000 0.000000

19 1.953997 0.292981 0.000000 0.000000

20 2.901926 0.602424 0.000000 1.000000

21 2.872454 0.601812 0.000000 1.000000

22 4.415150 1.050202 0.000000 1.000000

23 4.365634 1.038584 0.000000 1.000000

24 3.080810 0.208161 0.000000 0.000000

25 2.212084 0.296806 0.016600 0.728557

26 3.275919 0.609036 0.000000 1.000000

27 3.290969 0.603008 0.000000 1.000000

28 4.971439 1.048810 0.000000 1.000000

29 4.903650 1.039570 0.000000 1.000000

30 4.523616 0.202355 0.000000 0.000000

31 4.181715 0.311456 0.050676 1.000000

32 3.267280 0.602632 0.000000 1.000000

33 3.295580 0.600824 0.000000 1.000000

34 4.955980 1.047800 0.000000 1.000000

35 4.917880 1.036591 0.000000 1.000000

param\_svc\_\_C param\_svc\_\_gamma params \

0 0.001 0.001 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.001}

1 0.001 0.01 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.01}

2 0.001 0.1 {'svc\_\_C': 0.001, 'svc\_\_gamma': 0.1}

3 0.001 1 {'svc\_\_C': 0.001, 'svc\_\_gamma': 1}

4 0.001 10 {'svc\_\_C': 0.001, 'svc\_\_gamma': 10}

5 0.001 100 {'svc\_\_C': 0.001, 'svc\_\_gamma': 100}

6 0.01 0.001 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.001}

7 0.01 0.01 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.01}

8 0.01 0.1 {'svc\_\_C': 0.01, 'svc\_\_gamma': 0.1}

9 0.01 1 {'svc\_\_C': 0.01, 'svc\_\_gamma': 1}

10 0.01 10 {'svc\_\_C': 0.01, 'svc\_\_gamma': 10}

11 0.01 100 {'svc\_\_C': 0.01, 'svc\_\_gamma': 100}

12 0.1 0.001 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.001}

13 0.1 0.01 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.01}

14 0.1 0.1 {'svc\_\_C': 0.1, 'svc\_\_gamma': 0.1}

15 0.1 1 {'svc\_\_C': 0.1, 'svc\_\_gamma': 1}

16 0.1 10 {'svc\_\_C': 0.1, 'svc\_\_gamma': 10}

17 0.1 100 {'svc\_\_C': 0.1, 'svc\_\_gamma': 100}

18 1 0.001 {'svc\_\_C': 1, 'svc\_\_gamma': 0.001}

19 1 0.01 {'svc\_\_C': 1, 'svc\_\_gamma': 0.01}

20 1 0.1 {'svc\_\_C': 1, 'svc\_\_gamma': 0.1}

21 1 1 {'svc\_\_C': 1, 'svc\_\_gamma': 1}

22 1 10 {'svc\_\_C': 1, 'svc\_\_gamma': 10}

23 1 100 {'svc\_\_C': 1, 'svc\_\_gamma': 100}

24 10 0.001 {'svc\_\_C': 10, 'svc\_\_gamma': 0.001}

25 10 0.01 {'svc\_\_C': 10, 'svc\_\_gamma': 0.01}

26 10 0.1 {'svc\_\_C': 10, 'svc\_\_gamma': 0.1}

27 10 1 {'svc\_\_C': 10, 'svc\_\_gamma': 1}

28 10 10 {'svc\_\_C': 10, 'svc\_\_gamma': 10}

29 10 100 {'svc\_\_C': 10, 'svc\_\_gamma': 100}

30 100 0.001 {'svc\_\_C': 100, 'svc\_\_gamma': 0.001}

31 100 0.01 {'svc\_\_C': 100, 'svc\_\_gamma': 0.01}

32 100 0.1 {'svc\_\_C': 100, 'svc\_\_gamma': 0.1}

33 100 1 {'svc\_\_C': 100, 'svc\_\_gamma': 1}

34 100 10 {'svc\_\_C': 100, 'svc\_\_gamma': 10}

35 100 100 {'svc\_\_C': 100, 'svc\_\_gamma': 100}

rank\_test\_score split0\_test\_score split0\_train\_score ... \

0 3 0.000000 0.000000 ...

1 3 0.000000 0.000000 ...

2 3 0.000000 0.000000 ...

3 3 0.000000 0.000000 ...

4 3 0.000000 0.000000 ...

5 3 0.000000 0.000000 ...

6 3 0.000000 0.000000 ...

7 3 0.000000 0.000000 ...

8 3 0.000000 0.000000 ...

9 3 0.000000 0.000000 ...

10 3 0.000000 0.000000 ...

11 3 0.000000 0.000000 ...

12 3 0.000000 0.000000 ...

13 3 0.000000 0.000000 ...

14 3 0.000000 0.000000 ...

15 3 0.000000 0.000000 ...

16 3 0.000000 0.000000 ...

17 3 0.000000 0.000000 ...

18 3 0.000000 0.000000 ...

19 3 0.000000 0.000000 ...

20 3 0.000000 1.000000 ...

21 3 0.000000 1.000000 ...

22 3 0.000000 1.000000 ...

23 3 0.000000 1.000000 ...

24 3 0.000000 0.000000 ...

25 2 0.035088 0.710204 ...

26 3 0.000000 1.000000 ...

27 3 0.000000 1.000000 ...

28 3 0.000000 1.000000 ...

29 3 0.000000 1.000000 ...

30 3 0.000000 0.000000 ...

31 1 0.091286 1.000000 ...

32 3 0.000000 1.000000 ...

33 3 0.000000 1.000000 ...

34 3 0.000000 1.000000 ...

35 3 0.000000 1.000000 ...

split2\_test\_score split2\_train\_score split3\_test\_score \

0 0.000000 0.000000 0.000000

1 0.000000 0.000000 0.000000

2 0.000000 0.000000 0.000000

3 0.000000 0.000000 0.000000

4 0.000000 0.000000 0.000000

5 0.000000 0.000000 0.000000

6 0.000000 0.000000 0.000000

7 0.000000 0.000000 0.000000

8 0.000000 0.000000 0.000000

9 0.000000 0.000000 0.000000

10 0.000000 0.000000 0.000000

11 0.000000 0.000000 0.000000

12 0.000000 0.000000 0.000000

13 0.000000 0.000000 0.000000

14 0.000000 0.000000 0.000000

15 0.000000 0.000000 0.000000

16 0.000000 0.000000 0.000000

17 0.000000 0.000000 0.000000

18 0.000000 0.000000 0.000000

19 0.000000 0.000000 0.000000

20 0.000000 1.000000 0.000000

21 0.000000 1.000000 0.000000

22 0.000000 1.000000 0.000000

23 0.000000 1.000000 0.000000

24 0.000000 0.000000 0.000000

25 0.023669 0.737263 0.012270

26 0.000000 1.000000 0.000000

27 0.000000 1.000000 0.000000

28 0.000000 1.000000 0.000000

29 0.000000 1.000000 0.000000

30 0.000000 0.000000 0.000000

31 0.043290 1.000000 0.034483

32 0.000000 1.000000 0.000000

33 0.000000 1.000000 0.000000

34 0.000000 1.000000 0.000000

35 0.000000 1.000000 0.000000

split3\_train\_score split4\_test\_score split4\_train\_score std\_fit\_time \

0 0.000000 0.000000 0.000000 0.002838

1 0.000000 0.000000 0.000000 0.003786

2 0.000000 0.000000 0.000000 0.004034

3 0.000000 0.000000 0.000000 0.006906

4 0.000000 0.000000 0.000000 0.002803

5 0.000000 0.000000 0.000000 0.002652

6 0.000000 0.000000 0.000000 0.005495

7 0.000000 0.000000 0.000000 0.009125

8 0.000000 0.000000 0.000000 0.010007

9 0.000000 0.000000 0.000000 0.006932

10 0.000000 0.000000 0.000000 0.004164

11 0.000000 0.000000 0.000000 0.020379

12 0.000000 0.000000 0.000000 0.007183

13 0.000000 0.000000 0.000000 0.306699

14 0.000000 0.000000 0.000000 0.008942

15 0.000000 0.000000 0.000000 0.045661

16 0.000000 0.000000 0.000000 0.005664

17 0.000000 0.000000 0.000000 0.012857

18 0.000000 0.000000 0.000000 0.034028

19 0.000000 0.000000 0.000000 0.020048

20 1.000000 0.000000 1.000000 0.022642

21 1.000000 0.000000 1.000000 0.055902

22 1.000000 0.000000 1.000000 0.015913

23 1.000000 0.000000 1.000000 0.014074

24 0.000000 0.000000 0.000000 0.079011

25 0.732197 0.011976 0.732197 0.019253

26 1.000000 0.000000 1.000000 0.012569

27 1.000000 0.000000 1.000000 0.005173

28 1.000000 0.000000 1.000000 0.013380

29 1.000000 0.000000 1.000000 0.008260

30 0.000000 0.000000 0.000000 0.140094

31 1.000000 0.025000 1.000000 0.277004

32 1.000000 0.000000 1.000000 0.009788

33 1.000000 0.000000 1.000000 0.005851

34 1.000000 0.000000 1.000000 0.010694

35 1.000000 0.000000 1.000000 0.008965

std\_score\_time std\_test\_score std\_train\_score

0 0.001457 0.000000 0.000000

1 0.001157 0.000000 0.000000

2 0.001015 0.000000 0.000000

3 0.001037 0.000000 0.000000

4 0.000404 0.000000 0.000000

5 0.001652 0.000000 0.000000

6 0.000608 0.000000 0.000000

7 0.001501 0.000000 0.000000

8 0.001723 0.000000 0.000000

9 0.002748 0.000000 0.000000

10 0.000970 0.000000 0.000000

11 0.004086 0.000000 0.000000

12 0.000773 0.000000 0.000000

13 0.003186 0.000000 0.000000

14 0.001725 0.000000 0.000000

15 0.003559 0.000000 0.000000

16 0.003658 0.000000 0.000000

17 0.001026 0.000000 0.000000

18 0.001484 0.000000 0.000000

19 0.001933 0.000000 0.000000

20 0.001716 0.000000 0.000000

21 0.002480 0.000000 0.000000

22 0.002728 0.000000 0.000000

23 0.002238 0.000000 0.000000

24 0.003528 0.000000 0.000000

25 0.002010 0.011895 0.009431

26 0.012875 0.000000 0.000000

27 0.002261 0.000000 0.000000

28 0.000910 0.000000 0.000000

29 0.002810 0.000000 0.000000

30 0.002920 0.000000 0.000000

31 0.003953 0.023238 0.000000

32 0.002632 0.000000 0.000000

33 0.000765 0.000000 0.000000

34 0.001090 0.000000 0.000000

35 0.000975 0.000000 0.000000

[36 rows x 22 columns]>

Test set score: 0.09

Best parameters: {'svc\_\_C': 100, 'svc\_\_gamma': 0.01}

**MLPC Normalized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.088629 0.001611 0.000000 0.000000

1 0.060360 0.001605 0.000000 0.000000

2 0.072170 0.001809 0.000000 0.000000

3 0.389435 0.002206 0.000000 0.000000

4 0.104278 0.002807 0.000000 0.000000

5 0.248862 0.002807 0.000000 0.000000

6 0.128344 0.001410 0.000000 0.000000

7 0.073796 0.001411 0.000000 0.000000

8 0.151595 0.001204 0.000000 0.000000

9 1.077258 0.004011 0.000000 0.000000

10 0.176077 0.004203 0.000000 0.000000

11 0.478059 0.004001 0.000000 0.000000

12 0.134960 0.001812 0.004734 0.021525

13 0.184692 0.001998 0.000000 0.000000

14 0.170854 0.001798 0.000000 0.000000

15 0.621052 0.004419 0.000000 0.000000

16 0.144175 0.004409 0.000000 0.000000

17 0.147785 0.004620 0.000000 0.000000

18 0.022470 0.001997 0.000000 0.000000

19 0.285755 0.002010 0.000000 0.000000

20 0.224989 0.001604 0.000000 0.000000

21 0.374195 0.006825 0.000000 0.000000

22 0.231201 0.007233 0.000000 0.000000

23 0.311010 0.007025 0.000000 0.000000

24 0.532225 0.001396 0.024270 0.173643

25 0.097059 0.001603 0.000000 0.000000

26 0.071984 0.002014 0.000000 0.000000

27 4.381839 0.006026 0.012770 0.147289

28 0.128943 0.004211 0.000000 0.000000

29 0.397859 0.003810 0.000000 0.000000

30 0.957549 0.002204 0.015784 0.102950

31 0.130547 0.002206 0.000000 0.000000

32 0.149799 0.002406 0.000000 0.000000

33 10.867104 0.011237 0.009376 0.081130

34 0.269517 0.007427 0.000000 0.000000

35 0.583143 0.007622 0.000000 0.000000

36 0.276938 0.001403 0.000000 0.000000

37 0.079010 0.001805 0.000000 0.000000

38 0.075994 0.001210 0.000000 0.000000

39 2.794425 0.002407 0.007087 0.064954

40 0.140552 0.002823 0.000000 0.000000

41 0.311020 0.002815 0.000000 0.000000

42 0.567510 0.001404 0.000000 0.000000

43 0.100656 0.002006 0.000000 0.000000

44 0.141772 0.002005 0.000000 0.000000

45 6.204494 0.004420 0.000000 0.031949

46 0.287765 0.004418 0.000000 0.000000

47 0.536637 0.004403 0.000000 0.000000

param\_mlpclassifier\_\_activation param\_mlpclassifier\_\_hidden\_layer\_sizes \

0 identity 10

1 identity 10

2 identity 10

3 identity 100

4 identity 100

5 identity 100

6 identity (10, 10)

7 identity (10, 10)

8 identity (10, 10)

9 identity (100, 100)

10 identity (100, 100)

11 identity (100, 100)

12 logistic 10

13 logistic 10

14 logistic 10

15 logistic 100

16 logistic 100

17 logistic 100

18 logistic (10, 10)

19 logistic (10, 10)

20 logistic (10, 10)

21 logistic (100, 100)

22 logistic (100, 100)

23 logistic (100, 100)

24 tanh 10

25 tanh 10

26 tanh 10

27 tanh 100

28 tanh 100

29 tanh 100

30 tanh (10, 10)

31 tanh (10, 10)

32 tanh (10, 10)

33 tanh (100, 100)

34 tanh (100, 100)

35 tanh (100, 100)

36 relu 10

37 relu 10

38 relu 10

39 relu 100

40 relu 100

41 relu 100

42 relu (10, 10)

43 relu (10, 10)

44 relu (10, 10)

45 relu (100, 100)

46 relu (100, 100)

47 relu (100, 100)

param\_mlpclassifier\_\_solver \

0 lbfgs

1 sgd

2 adam

3 lbfgs

4 sgd

5 adam

6 lbfgs

7 sgd

8 adam

9 lbfgs

10 sgd

11 adam

12 lbfgs

13 sgd

14 adam

15 lbfgs

16 sgd

17 adam

18 lbfgs

19 sgd

20 adam

21 lbfgs

22 sgd

23 adam

24 lbfgs

25 sgd

26 adam

27 lbfgs

28 sgd

29 adam

30 lbfgs

31 sgd

32 adam

33 lbfgs

34 sgd

35 adam

36 lbfgs

37 sgd

38 adam

39 lbfgs

40 sgd

41 adam

42 lbfgs

43 sgd

44 adam

45 lbfgs

46 sgd

47 adam

params rank\_test\_score \

0 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

1 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

2 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

3 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

4 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

5 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

6 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

7 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

8 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

9 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

10 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

11 {'mlpclassifier\_\_activation': 'identity', 'mlp... 7

12 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 6

13 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

14 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

15 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

16 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

17 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

18 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

19 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

20 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

21 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

22 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

23 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 7

24 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 1

25 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

26 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

27 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 3

28 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

29 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

30 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 2

31 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

32 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

33 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 4

34 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

35 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 7

36 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

37 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

38 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

39 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 5

40 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

41 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

42 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

43 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

44 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

45 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

46 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

47 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.000000 ... 0.000000 0.000000

1 0.000000 ... 0.000000 0.000000

2 0.000000 ... 0.000000 0.000000

3 0.000000 ... 0.000000 0.000000

4 0.000000 ... 0.000000 0.000000

5 0.000000 ... 0.000000 0.000000

6 0.000000 ... 0.000000 0.000000

7 0.000000 ... 0.000000 0.000000

8 0.000000 ... 0.000000 0.000000

9 0.000000 ... 0.000000 0.000000

10 0.000000 ... 0.000000 0.000000

11 0.000000 ... 0.000000 0.000000

12 0.000000 ... 0.000000 0.000000

13 0.000000 ... 0.000000 0.000000

14 0.000000 ... 0.000000 0.000000

15 0.000000 ... 0.000000 0.000000

16 0.000000 ... 0.000000 0.000000

17 0.000000 ... 0.000000 0.000000

18 0.000000 ... 0.000000 0.000000

19 0.000000 ... 0.000000 0.000000

20 0.000000 ... 0.000000 0.000000

21 0.000000 ... 0.000000 0.000000

22 0.000000 ... 0.000000 0.000000

23 0.000000 ... 0.000000 0.000000

24 0.032086 ... 0.011834 0.138439

25 0.000000 ... 0.000000 0.000000

26 0.000000 ... 0.000000 0.000000

27 0.000000 ... 0.021622 0.268229

28 0.000000 ... 0.000000 0.000000

29 0.000000 ... 0.000000 0.000000

30 0.023256 ... 0.012121 0.053651

31 0.000000 ... 0.000000 0.000000

32 0.000000 ... 0.000000 0.000000

33 0.011834 ... 0.000000 0.101597

34 0.000000 ... 0.000000 0.000000

35 0.000000 ... 0.000000 0.000000

36 0.000000 ... 0.000000 0.000000

37 0.000000 ... 0.000000 0.000000

38 0.000000 ... 0.000000 0.000000

39 0.011905 ... 0.000000 0.149584

40 0.000000 ... 0.000000 0.000000

41 0.000000 ... 0.000000 0.000000

42 0.000000 ... 0.000000 0.000000

43 0.000000 ... 0.000000 0.000000

44 0.000000 ... 0.000000 0.000000

45 0.000000 ... 0.000000 0.074516

46 0.000000 ... 0.000000 0.000000

47 0.000000 ... 0.000000 0.000000

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.000000 0.000000 0.000000

1 0.000000 0.000000 0.000000

2 0.000000 0.000000 0.000000

3 0.000000 0.000000 0.000000

4 0.000000 0.000000 0.000000

5 0.000000 0.000000 0.000000

6 0.000000 0.000000 0.000000

7 0.000000 0.000000 0.000000

8 0.000000 0.000000 0.000000

9 0.000000 0.000000 0.000000

10 0.000000 0.000000 0.000000

11 0.000000 0.000000 0.000000

12 0.000000 0.000000 0.000000

13 0.000000 0.000000 0.000000

14 0.000000 0.000000 0.000000

15 0.000000 0.000000 0.000000

16 0.000000 0.000000 0.000000

17 0.000000 0.000000 0.000000

18 0.000000 0.000000 0.000000

19 0.000000 0.000000 0.000000

20 0.000000 0.000000 0.000000

21 0.000000 0.000000 0.000000

22 0.000000 0.000000 0.000000

23 0.000000 0.000000 0.000000

24 0.023669 0.119048 0.053763

25 0.000000 0.000000 0.000000

26 0.000000 0.000000 0.000000

27 0.020725 0.193029 0.021505

28 0.000000 0.000000 0.000000

29 0.000000 0.000000 0.000000

30 0.000000 0.098655 0.031915

31 0.000000 0.000000 0.000000

32 0.000000 0.000000 0.000000

33 0.011696 0.087848 0.012048

34 0.000000 0.000000 0.000000

35 0.000000 0.000000 0.000000

36 0.000000 0.000000 0.000000

37 0.000000 0.000000 0.000000

38 0.000000 0.000000 0.000000

39 0.000000 0.021841 0.000000

40 0.000000 0.000000 0.000000

41 0.000000 0.000000 0.000000

42 0.000000 0.000000 0.000000

43 0.000000 0.000000 0.000000

44 0.000000 0.000000 0.000000

45 0.000000 0.003160 0.000000

46 0.000000 0.000000 0.000000

47 0.000000 0.000000 0.000000

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 0.000000 0.018849 4.974491e-04 0.000000

1 0.000000 0.002793 4.910309e-04 0.000000

2 0.000000 0.011815 4.032283e-04 0.000000

3 0.000000 0.034235 4.008056e-04 0.000000

4 0.000000 0.008741 4.011871e-04 0.000000

5 0.000000 0.074908 4.007110e-04 0.000000

6 0.000000 0.009885 4.848940e-04 0.000000

7 0.000000 0.009115 4.852258e-04 0.000000

8 0.000000 0.037628 4.009726e-04 0.000000

9 0.000000 0.192133 2.336015e-07 0.000000

10 0.000000 0.018213 4.059729e-04 0.000000

11 0.000000 0.099714 6.188747e-04 0.000000

12 0.000000 0.152139 4.048419e-04 0.009467

13 0.000000 0.004000 6.221511e-04 0.000000

14 0.000000 0.005410 3.976504e-04 0.000000

15 0.000000 0.051894 8.077917e-04 0.000000

16 0.000000 0.007826 4.888036e-04 0.000000

17 0.000000 0.020600 1.025626e-03 0.000000

18 0.000000 0.001755 6.214810e-04 0.000000

19 0.000000 0.007738 8.873016e-06 0.000000

20 0.000000 0.007938 4.911667e-04 0.000000

21 0.000000 0.008032 9.918394e-04 0.000000

22 0.000000 0.006665 1.184879e-03 0.000000

23 0.000000 0.021077 6.458236e-04 0.000000

24 0.219444 0.086567 4.816690e-04 0.018303

25 0.000000 0.001739 4.898911e-04 0.000000

26 0.000000 0.003666 1.604867e-05 0.000000

27 0.184941 1.789073 1.284713e-03 0.010432

28 0.000000 0.003731 7.506860e-04 0.000000

29 0.000000 0.088283 4.011877e-04 0.000000

30 0.151473 0.028254 3.996378e-04 0.010917

31 0.000000 0.005358 4.007817e-04 0.000000

32 0.000000 0.044001 4.910114e-04 0.000000

33 0.054135 0.111297 1.174682e-03 0.004694

34 0.000000 0.011474 5.002268e-04 0.000000

35 0.000000 0.205082 1.025073e-03 0.000000

36 0.000000 0.137573 4.909138e-04 0.000000

37 0.000000 0.005506 4.011870e-04 0.000000

38 0.000000 0.012393 3.978507e-04 0.000000

39 0.042618 0.031791 4.911865e-04 0.009426

40 0.000000 0.006024 4.092848e-04 0.000000

41 0.000000 0.073240 4.053891e-04 0.000000

42 0.000000 0.015675 4.913032e-04 0.000000

43 0.000000 0.002321 3.015783e-07 0.000000

44 0.000000 0.025689 2.736730e-06 0.000000

45 0.048048 0.068744 5.007184e-04 0.000000

46 0.000000 0.029410 4.999077e-04 0.000000

47 0.000000 0.103961 4.803511e-04 0.000000

std\_train\_score

0 0.000000

1 0.000000

2 0.000000

3 0.000000

4 0.000000

5 0.000000

6 0.000000

7 0.000000

8 0.000000

9 0.000000

10 0.000000

11 0.000000

12 0.043049

13 0.000000

14 0.000000

15 0.000000

16 0.000000

17 0.000000

18 0.000000

19 0.000000

20 0.000000

21 0.000000

22 0.000000

23 0.000000

24 0.043461

25 0.000000

26 0.000000

27 0.092827

28 0.000000

29 0.000000

30 0.031599

31 0.000000

32 0.000000

33 0.016079

34 0.000000

35 0.000000

36 0.000000

37 0.000000

38 0.000000

39 0.044516

40 0.000000

41 0.000000

42 0.000000

43 0.000000

44 0.000000

45 0.026313

46 0.000000

47 0.000000

[48 rows x 23 columns]>

Test set score: 0.02

Best parameters: {'mlpclassifier\_\_activation': 'tanh', 'mlpclassifier\_\_hidden\_layer\_sizes': 10, 'mlpclassifier\_\_solver': 'lbfgs'}

**MLPC Standardized Data Frame:**

<bound method NDFrame.head of mean\_fit\_time mean\_score\_time mean\_test\_score mean\_train\_score \

0 0.021466 0.001796 0.000000 0.000000

1 0.368481 0.001810 0.000000 0.000000

2 0.231169 0.001003 0.000000 0.000000

3 0.083822 0.002608 0.000000 0.000000

4 0.362158 0.002606 0.000000 0.000000

5 0.168039 0.002808 0.000000 0.000000

6 0.058958 0.001403 0.000000 0.000000

7 0.296180 0.001605 0.000000 0.000000

8 0.158414 0.001204 0.000000 0.000000

9 0.227196 0.004011 0.000000 0.000000

10 0.596988 0.003610 0.000000 0.000000

11 0.258688 0.003610 0.000000 0.000000

12 0.362363 0.001607 0.064991 0.539453

13 0.243641 0.001805 0.000000 0.000000

14 0.288167 0.002005 0.000000 0.000000

15 1.464488 0.004011 0.081088 1.000000

16 0.138160 0.004018 0.000000 0.000000

17 0.270920 0.003810 0.000000 0.000000

18 0.667170 0.001602 0.053474 0.609322

19 0.302395 0.002006 0.000000 0.000000

20 0.320253 0.002005 0.000000 0.000000

21 2.247771 0.006818 0.024918 0.200000

22 0.239447 0.007829 0.000000 0.000000

23 0.786091 0.007220 0.000000 0.000000

24 0.428325 0.001418 0.102227 0.673243

25 0.789894 0.002012 0.000000 0.000000

26 2.071101 0.002006 0.044206 0.224548

27 1.141035 0.006633 0.094114 1.000000

28 1.197778 0.005615 0.000000 0.000000

29 5.423217 0.006023 0.050828 1.000000

30 1.039180 0.002417 0.106078 0.741824

31 0.600390 0.002406 0.000000 0.000000

32 2.866023 0.002206 0.061777 0.348570

33 2.565062 0.011130 0.087716 1.000000

34 2.449917 0.008021 0.000000 0.000000

35 4.243881 0.010427 0.077755 1.000000

36 0.447191 0.001604 0.052916 0.187022

37 1.036757 0.001806 0.000000 0.000000

38 1.602255 0.001409 0.012094 0.047048

39 1.211415 0.003209 0.092857 1.000000

40 2.904526 0.003412 0.000000 0.000000

41 4.523424 0.003824 0.085635 1.000000

42 0.705074 0.001811 0.067886 0.472162

43 0.897989 0.001604 0.000000 0.000000

44 2.529922 0.001813 0.032108 0.208430

45 1.878188 0.005221 0.083860 1.000000

46 8.180157 0.005014 0.000000 0.000000

47 3.802122 0.005405 0.075006 1.000000

param\_mlpclassifier\_\_activation param\_mlpclassifier\_\_hidden\_layer\_sizes \

0 identity 10

1 identity 10

2 identity 10

3 identity 100

4 identity 100

5 identity 100

6 identity (10, 10)

7 identity (10, 10)

8 identity (10, 10)

9 identity (100, 100)

10 identity (100, 100)

11 identity (100, 100)

12 logistic 10

13 logistic 10

14 logistic 10

15 logistic 100

16 logistic 100

17 logistic 100

18 logistic (10, 10)

19 logistic (10, 10)

20 logistic (10, 10)

21 logistic (100, 100)

22 logistic (100, 100)

23 logistic (100, 100)

24 tanh 10

25 tanh 10

26 tanh 10

27 tanh 100

28 tanh 100

29 tanh 100

30 tanh (10, 10)

31 tanh (10, 10)

32 tanh (10, 10)

33 tanh (100, 100)

34 tanh (100, 100)

35 tanh (100, 100)

36 relu 10

37 relu 10

38 relu 10

39 relu 100

40 relu 100

41 relu 100

42 relu (10, 10)

43 relu (10, 10)

44 relu (10, 10)

45 relu (100, 100)

46 relu (100, 100)

47 relu (100, 100)

param\_mlpclassifier\_\_solver \

0 lbfgs

1 sgd

2 adam

3 lbfgs

4 sgd

5 adam

6 lbfgs

7 sgd

8 adam

9 lbfgs

10 sgd

11 adam

12 lbfgs

13 sgd

14 adam

15 lbfgs

16 sgd

17 adam

18 lbfgs

19 sgd

20 adam

21 lbfgs

22 sgd

23 adam

24 lbfgs

25 sgd

26 adam

27 lbfgs

28 sgd

29 adam

30 lbfgs

31 sgd

32 adam

33 lbfgs

34 sgd

35 adam

36 lbfgs

37 sgd

38 adam

39 lbfgs

40 sgd

41 adam

42 lbfgs

43 sgd

44 adam

45 lbfgs

46 sgd

47 adam

params rank\_test\_score \

0 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

1 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

2 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

3 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

4 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

5 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

6 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

7 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

8 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

9 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

10 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

11 {'mlpclassifier\_\_activation': 'identity', 'mlp... 21

12 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 12

13 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

14 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

15 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 8

16 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

17 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

18 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 14

19 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

20 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

21 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 19

22 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

23 {'mlpclassifier\_\_activation': 'logistic', 'mlp... 21

24 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 2

25 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 21

26 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 17

27 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 3

28 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 21

29 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 16

30 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 1

31 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 21

32 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 13

33 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 5

34 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 21

35 {'mlpclassifier\_\_activation': 'tanh', 'mlpclas... 9

36 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 15

37 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 21

38 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 20

39 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 4

40 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 21

41 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 6

42 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 11

43 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 21

44 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 18

45 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 7

46 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 21

47 {'mlpclassifier\_\_activation': 'relu', 'mlpclas... 10

split0\_test\_score ... split2\_test\_score split2\_train\_score \

0 0.000000 ... 0.000000 0.000000

1 0.000000 ... 0.000000 0.000000

2 0.000000 ... 0.000000 0.000000

3 0.000000 ... 0.000000 0.000000

4 0.000000 ... 0.000000 0.000000

5 0.000000 ... 0.000000 0.000000

6 0.000000 ... 0.000000 0.000000

7 0.000000 ... 0.000000 0.000000

8 0.000000 ... 0.000000 0.000000

9 0.000000 ... 0.000000 0.000000

10 0.000000 ... 0.000000 0.000000

11 0.000000 ... 0.000000 0.000000

12 0.057613 ... 0.057613 0.541226

13 0.000000 ... 0.000000 0.000000

14 0.000000 ... 0.000000 0.000000

15 0.081633 ... 0.056140 1.000000

16 0.000000 ... 0.000000 0.000000

17 0.000000 ... 0.000000 0.000000

18 0.062500 ... 0.067164 0.685769

19 0.000000 ... 0.000000 0.000000

20 0.000000 ... 0.000000 0.000000

21 0.000000 ... 0.000000 0.000000

22 0.000000 ... 0.000000 0.000000

23 0.000000 ... 0.000000 0.000000

24 0.090592 ... 0.128571 0.693015

25 0.000000 ... 0.000000 0.000000

26 0.052356 ... 0.041451 0.218035

27 0.114094 ... 0.093863 1.000000

28 0.000000 ... 0.000000 0.000000

29 0.057692 ... 0.028571 1.000000

30 0.094937 ... 0.095808 0.727763

31 0.000000 ... 0.000000 0.000000

32 0.066986 ... 0.053333 0.365362

33 0.095890 ... 0.088889 1.000000

34 0.000000 ... 0.000000 0.000000

35 0.058824 ... 0.096386 1.000000

36 0.011173 ... 0.081218 0.221925

37 0.000000 ... 0.000000 0.000000

38 0.012270 ... 0.023810 0.072508

39 0.106583 ... 0.092308 1.000000

40 0.000000 ... 0.000000 0.000000

41 0.109489 ... 0.105660 1.000000

42 0.052863 ... 0.103175 0.488398

43 0.000000 ... 0.000000 0.000000

44 0.022599 ... 0.048077 0.273325

45 0.100671 ... 0.092715 1.000000

46 0.000000 ... 0.000000 0.000000

47 0.098361 ... 0.098765 1.000000

split3\_test\_score split3\_train\_score split4\_test\_score \

0 0.000000 0.000000 0.000000

1 0.000000 0.000000 0.000000

2 0.000000 0.000000 0.000000

3 0.000000 0.000000 0.000000

4 0.000000 0.000000 0.000000

5 0.000000 0.000000 0.000000

6 0.000000 0.000000 0.000000

7 0.000000 0.000000 0.000000

8 0.000000 0.000000 0.000000

9 0.000000 0.000000 0.000000

10 0.000000 0.000000 0.000000

11 0.000000 0.000000 0.000000

12 0.078292 0.597209 0.084746

13 0.000000 0.000000 0.000000

14 0.000000 0.000000 0.000000

15 0.089552 1.000000 0.114286

16 0.000000 0.000000 0.000000

17 0.000000 0.000000 0.000000

18 0.039216 0.494983 0.045627

19 0.000000 0.000000 0.000000

20 0.000000 0.000000 0.000000

21 0.000000 0.000000 0.124590

22 0.000000 0.000000 0.000000

23 0.000000 0.000000 0.000000

24 0.086379 0.720613 0.100000

25 0.000000 0.000000 0.000000

26 0.079602 0.218329 0.000000

27 0.083624 1.000000 0.090278

28 0.000000 0.000000 0.000000

29 0.055814 1.000000 0.046948

30 0.101351 0.739496 0.146789

31 0.000000 0.000000 0.000000

32 0.051064 0.340686 0.067633

33 0.072131 1.000000 0.097378

34 0.000000 0.000000 0.000000

35 0.069231 1.000000 0.073770

36 0.050761 0.169209 0.049261

37 0.000000 0.000000 0.000000

38 0.000000 0.021875 0.012195

39 0.067227 1.000000 0.074713

40 0.000000 0.000000 0.000000

41 0.064982 1.000000 0.085106

42 0.065574 0.486188 0.034483

43 0.000000 0.000000 0.000000

44 0.011364 0.137143 0.040404

45 0.080997 1.000000 0.068259

46 0.000000 0.000000 0.000000

47 0.047431 1.000000 0.065693

split4\_train\_score std\_fit\_time std\_score\_time std\_test\_score \

0 0.000000 0.001512 3.980941e-04 0.000000

1 0.000000 0.015056 3.863007e-04 0.000000

2 0.000000 0.008471 1.784161e-07 0.000000

3 0.000000 0.003940 4.913229e-04 0.000000

4 0.000000 0.019719 4.903320e-04 0.000000

5 0.000000 0.027136 4.012112e-04 0.000000

6 0.000000 0.003720 4.914004e-04 0.000000

7 0.000000 0.010852 4.911472e-04 0.000000

8 0.000000 0.010047 4.007816e-04 0.000000

9 0.000000 0.016481 2.431402e-07 0.000000

10 0.000000 0.031154 4.908359e-04 0.000000

11 0.000000 0.081983 8.029584e-04 0.000000

12 0.498403 0.043207 4.931435e-04 0.014219

13 0.000000 0.012968 4.009009e-04 0.000000

14 0.000000 0.014358 1.168008e-07 0.000000

15 1.000000 0.082314 6.339177e-04 0.020466

16 0.000000 0.006200 1.641775e-05 0.000000

17 0.000000 0.035138 7.506859e-04 0.000000

18 0.640163 0.024296 4.905093e-04 0.010336

19 0.000000 0.010125 1.033758e-06 0.000000

20 0.000000 0.009442 1.715289e-06 0.000000

21 1.000000 1.786726 7.506098e-04 0.049836

22 0.000000 0.011349 1.178509e-03 0.000000

23 0.000000 0.067130 1.169769e-03 0.000000

24 0.646409 0.056408 4.781460e-04 0.014811

25 0.000000 0.017730 1.418701e-05 0.000000

26 0.221629 0.028001 5.519789e-07 0.025662

27 1.000000 0.036993 1.220638e-03 0.010519

28 0.000000 0.062468 4.914394e-04 0.000000

29 1.000000 0.061174 9.048303e-04 0.012542

30 0.755232 0.014211 4.893018e-04 0.020600

31 0.000000 0.020081 4.906411e-04 0.000000

32 0.355502 0.140979 4.008055e-04 0.007912

33 1.000000 0.106319 1.022914e-03 0.009123

34 0.000000 0.127684 1.154301e-06 0.000000

35 1.000000 0.120915 1.360137e-03 0.013843

36 0.205333 0.009012 4.914396e-04 0.024216

37 0.000000 0.031336 4.009738e-04 0.000000

38 0.051829 0.207962 4.842355e-04 0.007531

39 1.000000 0.031382 4.000721e-04 0.020548

40 0.000000 0.679796 4.949146e-04 0.000000

41 1.000000 0.012796 4.087168e-04 0.019555

42 0.479821 0.007254 4.035601e-04 0.023794

43 0.000000 0.060575 4.912252e-04 0.000000

44 0.219215 0.311273 4.052999e-04 0.013270

45 1.000000 0.104452 7.583332e-04 0.011528

46 0.000000 0.043681 4.862804e-07 0.000000

47 1.000000 0.052192 4.803600e-04 0.020306

std\_train\_score

0 0.000000

1 0.000000

2 0.000000

3 0.000000

4 0.000000

5 0.000000

6 0.000000

7 0.000000

8 0.000000

9 0.000000

10 0.000000

11 0.000000

12 0.034831

13 0.000000

14 0.000000

15 0.000000

16 0.000000

17 0.000000

18 0.064635

19 0.000000

20 0.000000

21 0.400000

22 0.000000

23 0.000000

24 0.033191

25 0.000000

26 0.009686

27 0.000000

28 0.000000

29 0.000000

30 0.015526

31 0.000000

32 0.011524

33 0.000000

34 0.000000

35 0.000000

36 0.022402

37 0.000000

38 0.016263

39 0.000000

40 0.000000

41 0.000000

42 0.015783

43 0.000000

44 0.043525

45 0.000000

46 0.000000

47 0.000000

[48 rows x 23 columns]>

Test set score: 0.10

Best parameters: {'mlpclassifier\_\_activation': 'relu', 'mlpclassifier\_\_hidden\_layer\_sizes': 100, 'mlpclassifier\_\_solver': 'lbfgs'}