

# driving\_behavior\_logistic\_regression\_v1

August 31, 2022

## 1 Logistic Regression

```
[ ]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

```
[ ]: df_training = pd.read_csv("../data_mod/train_motion_data.csv")
df_test = pd.read_csv("../data_mod/test_motion_data.csv")

df_training
```

```
[ ]:
```

	AccX	AccY	Class	DiffAccX	DiffAccY	VelX	VelY
0	0.000000	0.000000	NORMAL	0.000000	0.000000	0.000000	0.000000
1	-1.624864	-1.082492	NORMAL	-1.624864	-1.082492	-0.812432	-0.541246
2	-0.594660	-0.122410	NORMAL	1.030204	0.960082	-0.297330	-0.061205
3	0.738478	-0.228456	NORMAL	1.333138	-0.106046	0.369239	-0.114228
4	0.101741	0.777568	NORMAL	-0.636737	1.006023	0.050871	0.388784
...	...	...	...	...	...	...	...
3639	0.915688	-2.017489	SLOW	2.374675	-1.824629	0.457844	-1.008745
3640	-1.934203	0.914925	SLOW	-2.849891	2.932414	-0.967102	0.457462
3641	-0.222845	0.747304	SLOW	1.711359	-0.167621	-0.111422	0.373652
3642	-0.349423	0.067261	SLOW	-0.126579	-0.680043	-0.174712	0.033630
3643	-0.402428	0.406218	SLOW	-0.053005	0.338957	-0.201214	0.203109

[3644 rows x 7 columns]

```
[ ]: df_training.isna().sum()
```

```
[ ]: AccX      0
AccY      0
Class     0
DiffAccX  0
DiffAccY  0
VelX      0
VelY      0
dtype: int64
```

## 1.1 Change categories to numbers

```
[ ]: df_training = df_training.replace(
      {"Class": {"NORMAL": 0, "AGGRESSIVE": 1, "SLOW": 2}})
df_test = df_test.replace(
      {"Class": {"NORMAL": 0, "AGGRESSIVE": 1, "SLOW": 2}})
df_training
```

```
[ ]:      AccX      AccY  Class  DiffAccX  DiffAccY      VelX      VelY
0      0.000000  0.000000      0  0.000000  0.000000  0.000000  0.000000
1     -1.624864 -1.082492      0 -1.624864 -1.082492 -0.812432 -0.541246
2     -0.594660 -0.122410      0  1.030204  0.960082 -0.297330 -0.061205
3      0.738478 -0.228456      0  1.333138 -0.106046  0.369239 -0.114228
4      0.101741  0.777568      0 -0.636737  1.006023  0.050871  0.388784
...      ...      ...      ...      ...      ...      ...      ...
3639  0.915688 -2.017489      2  2.374675 -1.824629  0.457844 -1.008745
3640 -1.934203  0.914925      2 -2.849891  2.932414 -0.967102  0.457462
3641 -0.222845  0.747304      2  1.711359 -0.167621 -0.111422  0.373652
3642 -0.349423  0.067261      2 -0.126579 -0.680043 -0.174712  0.033630
3643 -0.402428  0.406218      2 -0.053005  0.338957 -0.201214  0.203109
```

[3644 rows x 7 columns]

## 1.2 Normalize the data

```
[ ]: X_training = df_training.drop(columns=["Class"])
X_training = (X_training - X_training.mean()) / X_training.std() * 100

X_training["Class"] = df_training["Class"]
X_training
```

```
[ ]:      AccX      AccY  DiffAccX  DiffAccY      VelX      VelY \
0     -4.105593   8.126800   0.010300  -0.010421  -4.105593   8.126800
1    -168.957027 -111.696347 -151.542377 -101.201825 -168.957027 -111.696347
2     -64.437130  -5.422989   96.098456   89.738101  -64.437130  -5.422989
3      70.817107 -17.161393  124.353421  -9.923577   70.817107 -17.161393
4       6.216602  94.197287  -59.378806   94.032688    6.216602  94.197287
...      ...      ...      ...      ...      ...      ...
3639  88.795978 -215.193071  221.498566 -170.576840  88.795978 -215.193071
3640 -200.341232  109.401604 -265.801873  274.111831 -200.341232  109.401604
3641 -26.714411   90.847295  159.630443  -15.679652 -26.714411   90.847295
3642 -39.556507  15.572024  -11.795809  -63.580862 -39.556507  15.572024
3643 -44.934120  53.091875  -4.933494   31.675331 -44.934120  53.091875

      Class
0         0
1         0
```

```

2      0
3      0
4      0
...
3639   2
3640   2
3641   2
3642   2
3643   2

```

[3644 rows x 7 columns]

```

[ ]: X_testing = df_test.drop(columns="Class")
X_testing = (X_testing - X_testing.mean()) / X_testing.std() * 100

X_testing["Class"] = df_test["Class"]
X_testing

```

```

[ ]:
      AccX      AccY      DiffAccX      DiffAccY      VelX      VelY \
0      67.345100    -9.509000    -0.021340    -0.012385   -10.948927    14.564454
1      57.982946     10.303100    -8.494392     16.758078    58.012497    10.295271
2      270.452050  -824.010358    192.270076   -706.238535   270.496822  -824.016540
3      229.805029  -828.171460   -36.808209    -3.534656   229.846889  -828.177633
4      283.133326  -732.402479    48.242495    81.053740   283.179007  -732.408842
...
3079  -84.712435   -57.627689   -73.609489   -1.097380   -84.693107   -57.635384
3080   145.444037    51.068429   208.277716    91.996249   145.479853    51.060520
3081   121.268079  -177.287100   -21.901364  -193.309813   121.302164  -177.294558
3082    83.265000    79.069807   -34.415357   216.987532    83.296362    79.061842
3083   140.063424    35.612446    51.383072   -36.797989   140.098855    35.604567

```

```

      Class
0         1
1         1
2         1
3         1
4         1
...
3079      2
3080      2
3081      2
3082      2
3083      2

```

[3084 rows x 7 columns]

### 1.3 Train model

```
[ ]: X_train = X_training.drop(columns="Class")
     y_train = X_training.Class
```

```
X_test = X_testing.drop(columns="Class")
y_test = X_testing.Class
```

```
[ ]: from sklearn.linear_model import LogisticRegression
     from sklearn.model_selection import GridSearchCV
     from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay
```

```
[ ]: lr = LogisticRegression(random_state=0)

     param_grid = {'max_iter': np.arange(80, 200)}

     lr_gscv = GridSearchCV(lr, param_grid, cv=5, verbose=10, n_jobs=10)
     lr_gscv.fit(X_train, y_train)
```

Fitting 5 folds for each of 120 candidates, totalling 600 fits

```
[CV 1/5; 1/120] START max_iter=80...
[CV 2/5; 1/120] START max_iter=80...
[CV 3/5; 1/120] START max_iter=80...
[CV 4/5; 1/120] START max_iter=80...
[CV 5/5; 1/120] START max_iter=80...
[CV 1/5; 2/120] START max_iter=81...
[CV 2/5; 2/120] START max_iter=81...
[CV 3/5; 2/120] START max_iter=81...
[CV 4/5; 2/120] START max_iter=81...
[CV 5/5; 2/120] START max_iter=81...
[CV 1/5; 1/120] END ...max_iter=80;; score=0.406 total time= 0.0s
[CV 4/5; 1/120] END ...max_iter=80;; score=0.425 total time= 0.0s
[CV 2/5; 1/120] END ...max_iter=80;; score=0.403 total time= 0.0s
[CV 5/5; 1/120] END ...max_iter=80;; score=0.418 total time= 0.0s
[CV 1/5; 3/120] START max_iter=82...
[CV 3/5; 1/120] END ...max_iter=80;; score=0.410 total time= 0.0s
[CV 1/5; 2/120] END ...max_iter=81;; score=0.406 total time= 0.0s
[CV 3/5; 2/120] END ...max_iter=81;; score=0.410 total time= 0.0s
[CV 4/5; 2/120] END ...max_iter=81;; score=0.425 total time= 0.0s
[CV 2/5; 2/120] END ...max_iter=81;; score=0.403 total time= 0.0s
[CV 2/5; 3/120] START max_iter=82...
[CV 3/5; 3/120] START max_iter=82...
[CV 4/5; 3/120] START max_iter=82...
[CV 5/5; 3/120] START max_iter=82...
[CV 5/5; 2/120] END ...max_iter=81;; score=0.418 total time= 0.0s
[CV 1/5; 4/120] START max_iter=83...
[CV 2/5; 4/120] START max_iter=83...
[CV 3/5; 4/120] START max_iter=83...
```

```

[CV 4/5; 4/120] START max_iter=83...
[CV 5/5; 4/120] START max_iter=83...
[CV 1/5; 3/120] END ...max_iter=82;; score=0.406 total time= 0.0s
[CV 1/5; 5/120] START max_iter=84...
[CV 3/5; 3/120] END ...max_iter=82;; score=0.410 total time= 0.0s
[CV 2/5; 3/120] END ...max_iter=82;; score=0.403 total time= 0.0s
[CV 3/5; 5/120] START
max_iter=84...[CV 5/5; 5/120] START
max_iter=84...

[CV 1/5; 4/120] END ...max_iter=83;; score=0.406 total time= 0.0s
[CV 4/5; 3/120] END ...max_iter=82;; score=0.425 total time= 0.0s
[CV 2/5; 4/120] END ...max_iter=83;; score=0.403 total time= 0.0s
[CV 4/5; 4/120] END ...max_iter=83;; score=0.425 total time= 0.0s
[CV 2/5; 6/120] START max_iter=85...
[CV 5/5; 3/120] END ...max_iter=82;; score=0.418 total time= 0.0s
[CV 5/5; 4/120] END ...max_iter=83;; score=0.418 total time= 0.0s
[CV 3/5; 4/120] END ...max_iter=83;; score=0.410 total time= 0.0s
[CV 4/5; 6/120] START max_iter=85...
[CV 1/5; 7/120] START max_iter=86...
[CV 3/5; 7/120] START max_iter=86...
[CV 5/5; 7/120] START max_iter=86...
[CV 2/5; 8/120] START max_iter=87...
[CV 4/5; 8/120] START max_iter=87...
[CV 1/5; 5/120] END ...max_iter=84;; score=0.406 total time= 0.0s
[CV 3/5; 5/120] END ...max_iter=84;; score=0.410 total time=
0.0s[CV 2/5; 5/120] START
max_iter=84...

[CV 4/5; 5/120] START max_iter=84...
[CV 5/5; 5/120] END ...max_iter=84;; score=0.418 total time= 0.0s
[CV 1/5; 6/120] START max_iter=85...
[CV 4/5; 6/120] END ...max_iter=85;; score=0.425 total time= 0.0s
[CV 5/5; 6/120] START max_iter=85...
[CV 2/5; 6/120] END ...max_iter=85;; score=0.403 total time= 0.0s
[CV 3/5; 6/120] START max_iter=85...
[CV 1/5; 7/120] END ...max_iter=86;; score=0.406 total time= 0.0s
[CV 2/5; 7/120] START max_iter=86...
[CV 5/5; 7/120] END ...max_iter=86;; score=0.418 total time= 0.0s
[CV 1/5; 8/120] START max_iter=87...
[CV 4/5; 8/120] END ...max_iter=87;; score=0.425 total time=
0.0s[CV 4/5; 5/120] END ...max_iter=84;; score=0.425 total time=
0.0s
[CV 1/5; 6/120] END ...max_iter=85;; score=0.406 total time= 0.0s

[CV 5/5; 8/120] START max_iter=87...
[CV 2/5; 5/120] END ...max_iter=84;; score=0.403 total time= 0.0s
[CV 3/5; 7/120] END ...max_iter=86;; score=0.410 total time= 0.0s

```

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[CV 4/5; 7/120] START max_iter=86...
[CV 1/5; 9/120] START max_iter=88...
[CV 3/5; 6/120] END ...max_iter=85;; score=0.410 total time=
0.0s[CV 2/5; 8/120] END ...max_iter=87;; score=0.403 total time=
0.0s

[CV 3/5; 8/120] START max_iter=87...
[CV 5/5; 6/120] END ...max_iter=85;; score=0.418 total time= 0.0s
[CV 3/5; 9/120] START max_iter=88...
[CV 2/5; 7/120] END ...max_iter=86;; score=0.403 total time=
0.0s[CV 5/5; 9/120] START
max_iter=88...

[CV 2/5; 10/120] START max_iter=89...
[CV 4/5; 10/120] START max_iter=89...
[CV 1/5; 11/120] START max_iter=90...
[CV 5/5; 8/120] END ...max_iter=87;; score=0.418 total time= 0.0s
[CV 3/5; 11/120] START
max_iter=90...[CV 1/5; 9/120] END
...max_iter=88;; score=0.406 total time= 0.0s

[CV 2/5; 9/120] START max_iter=88...
[CV 3/5; 8/120] END ...max_iter=87;; score=0.410 total time= 0.0s
[CV 4/5; 7/120] END ...max_iter=86;; score=0.425 total time= 0.0s
[CV 5/5; 11/120] START max_iter=90...
[CV 1/5; 8/120] END ...max_iter=87;; score=0.406 total time= 0.0s
[CV 5/5; 9/120] END ...max_iter=88;; score=0.418 total time= 0.0s
[CV 1/5; 10/120] START max_iter=89...
[CV 3/5; 9/120] END ...max_iter=88;; score=0.410 total time= 0.0s
[CV 2/5; 12/120] START
max_iter=91...[CV 4/5; 9/120] START
max_iter=88...

[CV 4/5; 12/120] START max_iter=91...
[CV 4/5; 10/120] END ...max_iter=89;; score=0.425 total time= 0.0s
[CV 5/5; 10/120] START max_iter=89...
[CV 2/5; 10/120] END ...max_iter=89;; score=0.403 total time= 0.0s
[CV 3/5; 10/120] START max_iter=89...
[CV 3/5; 11/120] END ...max_iter=90;; score=0.410 total time= 0.0s
[CV 4/5; 11/120] START max_iter=90...
[CV 1/5; 11/120] END ...max_iter=90;; score=0.406 total time= 0.0s
[CV 2/5; 11/120] START max_iter=90...
[CV 2/5; 9/120] END ...max_iter=88;; score=0.403 total time= 0.0s
[CV 5/5; 11/120] END ...max_iter=90;; score=0.418 total time= 0.0s
[CV 1/5; 12/120] START max_iter=91...
[CV 1/5; 10/120] END ...max_iter=89;; score=0.406 total time= 0.0s
[CV 4/5; 9/120] END ...max_iter=88;; score=0.425 total time= 0.0s
[CV 1/5; 13/120] START max_iter=92...

```

```

[CV 4/5; 12/120] END ...max_iter=91;; score=0.425 total time= 0.0s
[CV 5/5; 12/120] START max_iter=91...
[CV 5/5; 13/120] START max_iter=92...
[CV 5/5; 10/120] END ...max_iter=89;; score=0.418 total time= 0.0s
[CV 3/5; 10/120] END ...max_iter=89;; score=0.410 total time= 0.0s
[CV 3/5; 15/120] START max_iter=94...
[CV 2/5; 12/120] END ...max_iter=91;; score=0.403 total time= 0.0s
[CV 3/5; 12/120] START max_iter=91...
[CV 4/5; 14/120] START max_iter=93...
[CV 4/5; 11/120] END ...max_iter=90;; score=0.425 total time= 0.0s
[CV 1/5; 12/120] END ...max_iter=91;; score=0.406 total time= 0.0s
[CV 2/5; 16/120] START max_iter=95...
[CV 1/5; 17/120] START max_iter=96...
[CV 5/5; 12/120] END ...max_iter=91;; score=0.418 total time= 0.0s
[CV 1/5; 13/120] END ...max_iter=92;; score=0.406 total time= 0.0s
[CV 2/5; 13/120] START max_iter=92...
[CV 5/5; 17/120] START max_iter=96...
[CV 4/5; 18/120] START max_iter=97...
[CV 2/5; 11/120] END ...max_iter=90;; score=0.403 total time= 0.0s
[CV 3/5; 19/120] START max_iter=98...
[CV 3/5; 12/120] END ...max_iter=91;; score=0.410 total time= 0.0s
[CV 3/5; 15/120] END ...max_iter=94;; score=0.410 total time= 0.0s
[CV 4/5; 15/120] START max_iter=94...
[CV 2/5; 20/120] START max_iter=99...
[CV 5/5; 13/120] END ...max_iter=92;; score=0.418 total time= 0.0s
[CV 1/5; 14/120] START max_iter=93...
[CV 4/5; 14/120] END ...max_iter=93;; score=0.425 total time= 0.0s
[CV 5/5; 14/120] START max_iter=93...
[CV 1/5; 17/120] END ...max_iter=96;; score=0.406 total time= 0.0s
[CV 2/5; 17/120] START max_iter=96...
[CV 2/5; 16/120] END ...max_iter=95;; score=0.403 total time= 0.0s
[CV 3/5; 16/120] START max_iter=95...
[CV 4/5; 18/120] END ...max_iter=97;; score=0.425 total time= 0.0s
[CV 5/5; 18/120] START max_iter=97...
[CV 2/5; 13/120] END ...max_iter=92;; score=0.403 total time= 0.0s
[CV 3/5; 13/120] START max_iter=92...
[CV 3/5; 19/120] END ...max_iter=98;; score=0.410 total time= 0.0s
[CV 4/5; 19/120] START max_iter=98...
[CV 5/5; 17/120] END ...max_iter=96;; score=0.418 total time= 0.0s
[CV 1/5; 18/120] START max_iter=97...
[CV 4/5; 15/120] END ...max_iter=94;; score=0.425 total time= 0.0s
[CV 5/5; 15/120] START max_iter=94...
[CV 1/5; 14/120] END ...max_iter=93;; score=0.406 total time= 0.0s
[CV 2/5; 14/120] START max_iter=93...
[CV 2/5; 20/120] END ...max_iter=99;; score=0.403 total time= 0.0s
[CV 3/5; 20/120] START max_iter=99...
[CV 2/5; 17/120] END ...max_iter=96;; score=0.403 total time= 0.0s
[CV 3/5; 17/120] START max_iter=96...

```

```

[CV 5/5; 14/120] END ...max_iter=93;; score=0.418 total time= 0.0s
[CV 1/5; 15/120] START max_iter=94...
[CV 3/5; 16/120] END ...max_iter=95;; score=0.410 total time= 0.0s
[CV 4/5; 16/120] START max_iter=95...
[CV 5/5; 18/120] END ...max_iter=97;; score=0.418 total time= 0.0s
[CV 1/5; 19/120] START max_iter=98...
[CV 3/5; 13/120] END ...max_iter=92;; score=0.410 total time= 0.0s
[CV 4/5; 13/120] START max_iter=92...
[CV 1/5; 18/120] END ...max_iter=97;; score=0.406 total time= 0.0s
[CV 2/5; 18/120] START max_iter=97...
[CV 4/5; 19/120] END ...max_iter=98;; score=0.425 total time= 0.0s
[CV 5/5; 19/120] START max_iter=98...
[CV 5/5; 15/120] END ...max_iter=94;; score=0.418 total time= 0.0s
[CV 1/5; 16/120] START max_iter=95...
[CV 2/5; 14/120] END ...max_iter=93;; score=0.403 total time= 0.0s
[CV 3/5; 14/120] START max_iter=93...
[CV 3/5; 20/120] END ...max_iter=99;; score=0.410 total time= 0.0s
[CV 4/5; 20/120] START max_iter=99...
[CV 3/5; 17/120] END ...max_iter=96;; score=0.410 total time=
0.0s[CV 1/5; 15/120] END ...max_iter=94;; score=0.406 total time=
0.0s
[CV 2/5; 15/120] START max_iter=94...
[CV 4/5; 16/120] END ...max_iter=95;; score=0.425 total time= 0.0s

[CV 5/5; 16/120] START max_iter=95...
[CV 4/5; 17/120] START max_iter=96...
[CV 1/5; 19/120] END ...max_iter=98;; score=0.406 total time= 0.0s
[CV 2/5; 19/120] START max_iter=98...
[CV 4/5; 13/120] END ...max_iter=92;; score=0.425 total time= 0.0s
[CV 1/5; 21/120] START max_iter=100...
[CV 5/5; 19/120] END ...max_iter=98;; score=0.418 total time= 0.0s
[CV 1/5; 20/120] START max_iter=99...
[CV 3/5; 14/120] END ...max_iter=93;; score=0.410 total time= 0.0s
[CV 1/5; 16/120] END ...max_iter=95;; score=0.406 total time= 0.0s
[CV 5/5; 21/120] START max_iter=100...
[CV 4/5; 20/120] END ...max_iter=99;; score=0.425 total time= 0.0s
[CV 5/5; 20/120] START max_iter=99...
[CV 2/5; 18/120] END ...max_iter=97;; score=0.403 total time= 0.0s
[CV 3/5; 18/120] START max_iter=97...
[CV 5/5; 16/120] END ...max_iter=95;; score=0.418 total time= 0.0s
[CV 4/5; 22/120] START max_iter=101...
[CV 2/5; 19/120] END ...max_iter=98;; score=0.403 total time= 0.0s
[CV 2/5; 15/120] END ...max_iter=94;; score=0.403 total time= 0.0s
[CV 3/5; 23/120] START max_iter=102...
[CV 4/5; 17/120] END ...max_iter=96;; score=0.425 total time= 0.0s
[CV 1/5; 21/120] END ...max_iter=100;; score=0.406 total time= 0.0s
[CV 2/5; 21/120] START max_iter=100...
[CV 2/5; 24/120] START max_iter=103...

```



```

[CV 1/5; 25/120] START max_iter=104...
[CV 1/5; 20/120] END ...max_iter=99;; score=0.406 total time= 0.0s
[CV 5/5; 20/120] END ...max_iter=99;; score=0.418 total time= 0.0s
[CV 5/5; 21/120] END ...max_iter=100;; score=0.418 total time= 0.0s
[CV 1/5; 22/120] START max_iter=101...
[CV 5/5; 25/120] START max_iter=104...
[CV 4/5; 26/120] START max_iter=105...
[CV 3/5; 27/120] START max_iter=106...
[CV 4/5; 22/120] END ...max_iter=101;; score=0.425 total time= 0.0s
[CV 5/5; 22/120] START max_iter=101...
[CV 3/5; 23/120] END ...max_iter=102;; score=0.410 total time= 0.0s
[CV 4/5; 23/120] START max_iter=102...
[CV 2/5; 21/120] END ...max_iter=100;; score=0.403 total time= 0.0s
[CV 3/5; 21/120] START max_iter=100...
[CV 2/5; 24/120] END ...max_iter=103;; score=0.403 total time= 0.0s
[CV 1/5; 25/120] END ...max_iter=104;; score=0.406 total time=
0.0s[CV 3/5; 24/120] START
max_iter=103...
[CV 3/5; 18/120] END ...max_iter=97;; score=0.410 total time= 0.0s

[CV 2/5; 25/120] START max_iter=104...
[CV 2/5; 28/120] START max_iter=107...
[CV 1/5; 22/120] END ...max_iter=101;; score=0.406 total time= 0.0s
[CV 2/5; 22/120] START max_iter=101...
[CV 4/5; 26/120] END ...max_iter=105;; score=0.425 total time= 0.0s
[CV 5/5; 26/120] START max_iter=105...
[CV 5/5; 25/120] END ...max_iter=104;; score=0.418 total time= 0.0s
[CV 1/5; 26/120] START max_iter=105...
[CV 3/5; 21/120] END ...max_iter=100;; score=0.410 total time= 0.0s
[CV 4/5; 21/120] START max_iter=100...
[CV 4/5; 23/120] END ...max_iter=102;; score=0.425 total time= 0.0s
[CV 5/5; 23/120] START max_iter=102...
[CV 3/5; 27/120] END ...max_iter=106;; score=0.410 total time= 0.0s
[CV 4/5; 27/120] START max_iter=106...
[CV 5/5; 22/120] END ...max_iter=101;; score=0.418 total time= 0.0s
[CV 1/5; 23/120] START max_iter=102...
[CV 3/5; 24/120] END ...max_iter=103;; score=0.410 total time= 0.0s
[CV 4/5; 24/120] START max_iter=103...
[CV 2/5; 25/120] END ...max_iter=104;; score=0.403 total time= 0.0s
[CV 3/5; 25/120] START max_iter=104...
[CV 2/5; 28/120] END ...max_iter=107;; score=0.403 total time= 0.0s
[CV 3/5; 28/120] START max_iter=107...
[CV 2/5; 22/120] END ...max_iter=101;; score=0.403 total time= 0.0s
[CV 3/5; 22/120] START max_iter=101...
[CV 1/5; 26/120] END ...max_iter=105;; score=0.406 total time= 0.0s
[CV 2/5; 26/120] START max_iter=105...
[CV 5/5; 26/120] END ...max_iter=105;; score=0.418 total time= 0.0s
[CV 1/5; 27/120] START max_iter=106...

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[CV 4/5; 21/120] END ...max_iter=100;; score=0.425 total time= 0.0s
[CV 5/5; 23/120] END ...max_iter=102;; score=0.418 total time= 0.0s
[CV 4/5; 27/120] END ...max_iter=106;; score=0.425 total time= 0.0s
[CV 5/5; 27/120] START max_iter=106...
[CV 1/5; 23/120] END ...max_iter=102;; score=0.406 total time= 0.0s
[CV 2/5; 23/120] START max_iter=102...
[CV 1/5; 24/120] START max_iter=103...
[CV 3/5; 25/120] END ...max_iter=104;; score=0.410 total time= 0.0s
[CV 4/5; 25/120] START max_iter=104...
[CV 1/5; 29/120] START max_iter=108...
[CV 3/5; 28/120] END ...max_iter=107;; score=0.410 total time= 0.0s
[CV 4/5; 28/120] START max_iter=107...
[CV 4/5; 24/120] END ...max_iter=103;; score=0.425 total time= 0.0s
[CV 5/5; 24/120] START max_iter=103...
[CV 3/5; 22/120] END ...max_iter=101;; score=0.410 total time= 0.0s
[CV 1/5; 27/120] END ...max_iter=106;; score=0.406 total time= 0.0s
[CV 2/5; 27/120] START max_iter=106...
[CV 4/5; 30/120] START max_iter=109...
[CV 5/5; 27/120] END ...max_iter=106;; score=0.418 total time= 0.0s
[CV 1/5; 28/120] START max_iter=107...
[CV 2/5; 26/120] END ...max_iter=105;; score=0.403 total time= 0.0s
[CV 3/5; 26/120] START max_iter=105...
[CV 1/5; 24/120] END ...max_iter=103;; score=0.406 total time= 0.0s
[CV 2/5; 23/120] END ...max_iter=102;; score=0.403 total time= 0.0s
[CV 4/5; 25/120] END ...max_iter=104;; score=0.425 total time= 0.0s
[CV 1/5; 29/120] END ...max_iter=108;; score=0.406 total time= 0.0s
[CV 2/5; 29/120] START max_iter=108...
[CV 2/5; 32/120] START max_iter=111...
[CV 5/5; 33/120] START max_iter=112...
[CV 4/5; 28/120] END ...max_iter=107;; score=0.425 total time= 0.0s
[CV 5/5; 28/120] START max_iter=107...
[CV 5/5; 24/120] END ...max_iter=103;; score=0.418 total time= 0.0s
[CV 3/5; 35/120] START max_iter=114...
[CV 2/5; 27/120] END ...max_iter=106;; score=0.403 total time= 0.0s
[CV 4/5; 30/120] END ...max_iter=109;; score=0.425 total time= 0.0s
[CV 5/5; 30/120] START max_iter=109...
[CV 1/5; 37/120] START max_iter=116...
[CV 1/5; 28/120] END ...max_iter=107;; score=0.406 total time= 0.0s
[CV 4/5; 38/120] START max_iter=117...
[CV 3/5; 26/120] END ...max_iter=105;; score=0.410 total time= 0.0s
[CV 2/5; 40/120] START max_iter=119...
[CV 5/5; 41/120] START max_iter=120...
[CV 2/5; 29/120] END ...max_iter=108;; score=0.403 total time= 0.0s
[CV 3/5; 29/120] START max_iter=108...
[CV 5/5; 33/120] END ...max_iter=112;; score=0.418 total time= 0.0s
[CV 1/5; 34/120] START max_iter=113...
[CV 2/5; 32/120] END ...max_iter=111;; score=0.403 total time= 0.0s
[CV 3/5; 32/120] START max_iter=111...

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[CV 5/5; 28/120] END ...max_iter=107;; score=0.418 total time= 0.0s
[CV 3/5; 43/120] START max_iter=122...
[CV 3/5; 35/120] END ...max_iter=114;; score=0.410 total time= 0.0s
[CV 4/5; 35/120] START max_iter=114...
[CV 5/5; 30/120] END ...max_iter=109;; score=0.418 total time= 0.0s
[CV 1/5; 31/120] START max_iter=110...
[CV 4/5; 38/120] END ...max_iter=117;; score=0.425 total time= 0.0s
[CV 5/5; 38/120] START max_iter=117...
[CV 2/5; 40/120] END ...max_iter=119;; score=0.403 total time= 0.0s
[CV 3/5; 40/120] START max_iter=119...
[CV 5/5; 41/120] END ...max_iter=120;; score=0.418 total time= 0.0s
[CV 1/5; 42/120] START max_iter=121...
[CV 1/5; 37/120] END ...max_iter=116;; score=0.406 total time= 0.0s
[CV 2/5; 37/120] START
max_iter=116...[CV 3/5; 29/120] END
...max_iter=108;; score=0.410 total time= 0.0s

[CV 4/5; 29/120] START max_iter=108...
[CV 1/5; 34/120] END ...max_iter=113;; score=0.406 total time= 0.0s
[CV 2/5; 34/120] START max_iter=113...
[CV 3/5; 32/120] END ...max_iter=111;; score=0.410 total time= 0.0s
[CV 4/5; 32/120] START max_iter=111...
[CV 3/5; 43/120] END ...max_iter=122;; score=0.410 total time= 0.0s
[CV 4/5; 43/120] START max_iter=122...
[CV 1/5; 31/120] END ...max_iter=110;; score=0.406 total time= 0.0s
[CV 4/5; 35/120] END ...max_iter=114;; score=0.425 total time= 0.0s
[CV 5/5; 35/120] START
max_iter=114...[CV 2/5; 31/120] START
max_iter=110...

[CV 5/5; 38/120] END ...max_iter=117;; score=0.418 total time= 0.0s
[CV 1/5; 39/120] START max_iter=118...
[CV 3/5; 40/120] END ...max_iter=119;; score=0.410 total time= 0.0s
[CV 4/5; 40/120] START max_iter=119...
[CV 1/5; 42/120] END ...max_iter=121;; score=0.406 total time= 0.0s
[CV 2/5; 42/120] START max_iter=121...
[CV 4/5; 29/120] END ...max_iter=108;; score=0.425 total time= 0.0s
[CV 4/5; 32/120] END ...max_iter=111;; score=0.425 total time= 0.0s
[CV 5/5; 29/120] START max_iter=108...
[CV 5/5; 32/120] START max_iter=111...
[CV 2/5; 37/120] END ...max_iter=116;; score=0.403 total time= 0.0s
[CV 3/5; 37/120] START max_iter=116...
[CV 2/5; 34/120] END ...max_iter=113;; score=0.403 total time= 0.0s
[CV 3/5; 34/120] START max_iter=113...
[CV 4/5; 43/120] END ...max_iter=122;; score=0.425 total time= 0.0s
[CV 5/5; 43/120] START max_iter=122...
[CV 5/5; 35/120] END ...max_iter=114;; score=0.418 total time= 0.0s
[CV 1/5; 36/120] START max_iter=115...

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[CV 1/5; 39/120] END ...max_iter=118;; score=0.406 total time= 0.0s
[CV 2/5; 39/120] START max_iter=118...
[CV 2/5; 31/120] END ...max_iter=110;; score=0.403 total time= 0.0s
[CV 3/5; 31/120] START max_iter=110...
[CV 4/5; 40/120] END ...max_iter=119;; score=0.425 total time= 0.0s
[CV 5/5; 40/120] START max_iter=119...
[CV 5/5; 29/120] END ...max_iter=108;; score=0.418 total time= 0.0s
[CV 1/5; 30/120] START max_iter=109...
[CV 2/5; 42/120] END ...max_iter=121;; score=0.403 total time= 0.0s
[CV 3/5; 42/120] START max_iter=121...
[CV 3/5; 37/120] END ...max_iter=116;; score=0.410 total time= 0.0s
[CV 4/5; 37/120] START max_iter=116...
[CV 3/5; 34/120] END ...max_iter=113;; score=0.410 total time= 0.0s
[CV 4/5; 34/120] START max_iter=113...
[CV 5/5; 32/120] END ...max_iter=111;; score=0.418 total time= 0.0s
[CV 1/5; 33/120] START max_iter=112...
[CV 5/5; 43/120] END ...max_iter=122;; score=0.418 total time= 0.0s
[CV 1/5; 44/120] START max_iter=123...
[CV 1/5; 36/120] END ...max_iter=115;; score=0.406 total time= 0.0s
[CV 2/5; 36/120] START max_iter=115...
[CV 3/5; 31/120] END ...max_iter=110;; score=0.410 total time= 0.0s
[CV 4/5; 31/120] START max_iter=110...
[CV 2/5; 39/120] END ...max_iter=118;; score=0.403 total time= 0.0s
[CV 3/5; 39/120] START max_iter=118...
[CV 5/5; 40/120] END ...max_iter=119;; score=0.418 total time= 0.0s
[CV 1/5; 41/120] START max_iter=120...
[CV 1/5; 30/120] END ...max_iter=109;; score=0.406 total time= 0.0s
[CV 2/5; 30/120] START max_iter=109...
[CV 4/5; 37/120] END ...max_iter=116;; score=0.425 total time= 0.0s
[CV 5/5; 37/120] START max_iter=116...
[CV 4/5; 34/120] END ...max_iter=113;; score=0.425 total time= 0.0s
[CV 5/5; 34/120] START max_iter=113...
[CV 3/5; 42/120] END ...max_iter=121;; score=0.410 total time= 0.0s
[CV 4/5; 42/120] START max_iter=121...
[CV 1/5; 44/120] END ...max_iter=123;; score=0.406 total time= 0.0s
[CV 2/5; 44/120] START max_iter=123...
[CV 1/5; 33/120] END ...max_iter=112;; score=0.406 total time= 0.0s
[CV 2/5; 33/120] START max_iter=112...
[CV 2/5; 36/120] END ...max_iter=115;; score=0.403 total time= 0.0s
[CV 3/5; 36/120] START max_iter=115...
[CV 3/5; 39/120] END ...max_iter=118;; score=0.410 total time= 0.0s
[CV 1/5; 41/120] END ...max_iter=120;; score=0.406 total time= 0.0s
[CV 4/5; 39/120] START max_iter=118...
[CV 2/5; 41/120] START max_iter=120...
[CV 4/5; 31/120] END ...max_iter=110;; score=0.425 total time= 0.0s
[CV 5/5; 31/120] START max_iter=110...
[CV 2/5; 30/120] END ...max_iter=109;; score=0.403 total time= 0.0s
[CV 3/5; 30/120] START max_iter=109...

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[CV 5/5; 37/120] END ...max\_iter=116;; score=0.418 total time= 0.0s  
 [CV 1/5; 38/120] START max\_iter=117...  
 [CV 5/5; 34/120] END ...max\_iter=113;; score=0.418 total time= 0.0s  
 [CV 1/5; 35/120] START max\_iter=114...  
 [CV 4/5; 42/120] END ...max\_iter=121;; score=0.425 total time=  
 0.0s[CV 2/5; 44/120] END ...max\_iter=123;; score=0.403 total time=  
 0.0s

[CV 3/5; 44/120] START max\_iter=123...  
 [CV 5/5; 42/120] START max\_iter=121...  
 [CV 3/5; 36/120] END ...max\_iter=115;; score=0.410 total time= 0.0s  
 [CV 4/5; 36/120] START max\_iter=115...  
 [CV 4/5; 39/120] END ...max\_iter=118;; score=0.425 total time= 0.0s  
 [CV 5/5; 39/120] START max\_iter=118...  
 [CV 2/5; 41/120] END ...max\_iter=120;; score=0.403 total time= 0.0s  
 [CV 3/5; 41/120] START max\_iter=120...  
 [CV 2/5; 33/120] END ...max\_iter=112;; score=0.403 total time= 0.0s  
 [CV 3/5; 33/120] START max\_iter=112...  
 [CV 5/5; 31/120] END ...max\_iter=110;; score=0.418 total time= 0.0s  
 [CV 1/5; 32/120] START max\_iter=111...  
 [CV 3/5; 30/120] END ...max\_iter=109;; score=0.410 total time= 0.0s  
 [CV 1/5; 38/120] END ...max\_iter=117;; score=0.406 total time= 0.0s  
 [CV 2/5; 38/120] START max\_iter=117...  
 [CV 1/5; 35/120] END ...max\_iter=114;; score=0.406 total time= 0.0s  
 [CV 2/5; 35/120] START max\_iter=114...  
 [CV 3/5; 44/120] END ...max\_iter=123;; score=0.410 total time= 0.0s  
 [CV 4/5; 44/120] START max\_iter=123...  
 [CV 1/5; 45/120] START max\_iter=124...  
 [CV 4/5; 36/120] END ...max\_iter=115;; score=0.425 total time= 0.0s  
 [CV 5/5; 36/120] START max\_iter=115...  
 [CV 5/5; 42/120] END ...max\_iter=121;; score=0.418 total time= 0.0s  
 [CV 1/5; 43/120] START max\_iter=122...  
 [CV 5/5; 39/120] END ...max\_iter=118;; score=0.418 total time= 0.0s  
 [CV 1/5; 40/120] START max\_iter=119...  
 [CV 3/5; 41/120] END ...max\_iter=120;; score=0.410 total time= 0.0s  
 [CV 4/5; 41/120] START max\_iter=120...  
 [CV 1/5; 32/120] END ...max\_iter=111;; score=0.406 total time= 0.0s  
 [CV 2/5; 38/120] END ...max\_iter=117;; score=0.403 total time= 0.0s  
 [CV 3/5; 38/120] START max\_iter=117...  
 [CV 4/5; 46/120] START max\_iter=125...  
 [CV 4/5; 44/120] END ...max\_iter=123;; score=0.425 total time= 0.0s  
 [CV 5/5; 44/120] START max\_iter=123...  
 [CV 2/5; 35/120] END ...max\_iter=114;; score=0.403 total time= 0.0s  
 [CV 3/5; 33/120] END ...max\_iter=112;; score=0.410 total time= 0.0s  
 [CV 4/5; 33/120] START max\_iter=112...  
 [CV 1/5; 45/120] END ...max\_iter=124;; score=0.406 total time= 0.0s  
 [CV 2/5; 45/120] START max\_iter=124...  
 [CV 5/5; 36/120] END ...max\_iter=115;; score=0.418 total time= 0.0s

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[CV 1/5; 40/120] END ...max_iter=119;; score=0.406 total time= 0.0s
[CV 2/5; 48/120] START max_iter=127...
[CV 4/5; 41/120] END ...max_iter=120;; score=0.425 total time= 0.0s
[CV 5/5; 49/120] START max_iter=128...
[CV 3/5; 51/120] START max_iter=130...
[CV 3/5; 38/120] END ...max_iter=117;; score=0.410 total time= 0.0s
[CV 1/5; 43/120] END ...max_iter=122;; score=0.406 total time= 0.0s
[CV 2/5; 43/120] START max_iter=122...
[CV 1/5; 53/120] START max_iter=132...
[CV 5/5; 44/120] END ...max_iter=123;; score=0.418 total time= 0.0s
[CV 4/5; 54/120] START max_iter=133...
[CV 4/5; 46/120] END ...max_iter=125;; score=0.425 total time= 0.0s
[CV 5/5; 46/120] START max_iter=125...
[CV 2/5; 56/120] START max_iter=135...
[CV 5/5; 49/120] END ...max_iter=128;; score=0.418 total time= 0.0s
[CV 1/5; 50/120] START max_iter=129...
[CV 4/5; 33/120] END ...max_iter=112;; score=0.425 total time= 0.0s
[CV 2/5; 45/120] END ...max_iter=124;; score=0.403 total time= 0.0s
[CV 3/5; 45/120] START max_iter=124...
[CV 3/5; 51/120] END ...max_iter=130;; score=0.410 total time= 0.0s
[CV 4/5; 51/120] START max_iter=130...
[CV 2/5; 48/120] END ...max_iter=127;; score=0.403 total time= 0.0s
[CV 3/5; 48/120] START max_iter=127...
[CV 1/5; 53/120] END ...max_iter=132;; score=0.406 total time= 0.0s
[CV 2/5; 53/120] START max_iter=132...
[CV 5/5; 46/120] END ...max_iter=125;; score=0.418 total time= 0.0s
[CV 1/5; 47/120] START max_iter=126...
[CV 4/5; 54/120] END ...max_iter=133;; score=0.425 total time= 0.0s
[CV 5/5; 54/120] START max_iter=133...
[CV 5/5; 57/120] START max_iter=136...
[CV 2/5; 56/120] END ...max_iter=135;; score=0.403 total time= 0.0s
[CV 3/5; 56/120] START max_iter=135...
[CV 2/5; 43/120] END ...max_iter=122;; score=0.403 total time= 0.0s
[CV 1/5; 50/120] END ...max_iter=129;; score=0.406 total time= 0.0s
[CV 2/5; 50/120] START max_iter=129...
[CV 3/5; 59/120] START max_iter=138...
[CV 3/5; 45/120] END ...max_iter=124;; score=0.410 total time= 0.0s
[CV 4/5; 45/120] START max_iter=124...
[CV 3/5; 48/120] END ...max_iter=127;; score=0.410 total time= 0.0s
[CV 4/5; 48/120] START max_iter=127...
[CV 4/5; 51/120] END ...max_iter=130;; score=0.425 total time= 0.0s
[CV 5/5; 51/120] START max_iter=130...
[CV 1/5; 47/120] END ...max_iter=126;; score=0.406 total time= 0.0s
[CV 2/5; 47/120] START max_iter=126...
[CV 2/5; 53/120] END ...max_iter=132;; score=0.403 total time= 0.0s
[CV 3/5; 53/120] START max_iter=132...
[CV 5/5; 54/120] END ...max_iter=133;; score=0.418 total time= 0.0s
[CV 1/5; 55/120] START max_iter=134...

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[CV 3/5; 56/120] END ...max_iter=135;; score=0.410 total time= 0.0s
[CV 5/5; 57/120] END ...max_iter=136;; score=0.418 total time=
0.0s[CV 4/5; 56/120] START
max_iter=135...

[CV 1/5; 58/120] START max_iter=137...
[CV 2/5; 50/120] END ...max_iter=129;; score=0.403 total time= 0.0s
[CV 3/5; 50/120] START max_iter=129...
[CV 3/5; 59/120] END ...max_iter=138;; score=0.410 total time= 0.0s
[CV 4/5; 59/120] START max_iter=138...
[CV 4/5; 48/120] END ...max_iter=127;; score=0.425 total time= 0.0s
[CV 5/5; 48/120] START max_iter=127...
[CV 4/5; 45/120] END ...max_iter=124;; score=0.425 total time= 0.0s
[CV 5/5; 45/120] START max_iter=124...
[CV 3/5; 53/120] END ...max_iter=132;; score=0.410 total time=
0.0s[CV 5/5; 51/120] END ...max_iter=130;; score=0.418 total time=
0.0s
[CV 1/5; 52/120] START max_iter=131...
[CV 2/5; 47/120] END ...max_iter=126;; score=0.403 total time= 0.0s
[CV 3/5; 47/120] START max_iter=126...

[CV 1/5; 55/120] END ...max_iter=134;; score=0.406 total time= 0.0s
[CV 2/5; 55/120] START max_iter=134...
[CV 4/5; 53/120] START max_iter=132...
[CV 1/5; 58/120] END ...max_iter=137;; score=0.406 total time= 0.0s
[CV 2/5; 58/120] START max_iter=137...
[CV 4/5; 56/120] END ...max_iter=135;; score=0.425 total time= 0.0s
[CV 5/5; 56/120] START max_iter=135...
[CV 3/5; 50/120] END ...max_iter=129;; score=0.410 total time= 0.0s
[CV 4/5; 50/120] START max_iter=129...
[CV 5/5; 48/120] END ...max_iter=127;; score=0.418 total time= 0.0s
[CV 1/5; 49/120] START max_iter=128...
[CV 5/5; 45/120] END ...max_iter=124;; score=0.418 total time= 0.0s
[CV 1/5; 46/120] START max_iter=125...
[CV 3/5; 47/120] END ...max_iter=126;; score=0.410 total time= 0.0s
[CV 1/5; 52/120] END ...max_iter=131;; score=0.406 total time= 0.0s
[CV 4/5; 47/120] START max_iter=126...
[CV 2/5; 52/120] START max_iter=131...
[CV 4/5; 59/120] END ...max_iter=138;; score=0.425 total time= 0.0s
[CV 5/5; 59/120] START max_iter=138...
[CV 2/5; 55/120] END ...max_iter=134;; score=0.403 total time= 0.0s
[CV 3/5; 55/120] START max_iter=134...
[CV 4/5; 53/120] END ...max_iter=132;; score=0.425 total time= 0.0s
[CV 5/5; 53/120] START max_iter=132...
[CV 4/5; 50/120] END ...max_iter=129;; score=0.425 total time= 0.0s
[CV 5/5; 50/120] START max_iter=129...
[CV 5/5; 56/120] END ...max_iter=135;; score=0.418 total time= 0.0s
[CV 1/5; 57/120] START max_iter=136...

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[CV 2/5; 58/120] END ...max_iter=137;; score=0.403 total time= 0.0s
[CV 3/5; 58/120] START max_iter=137...
[CV 1/5; 49/120] END ...max_iter=128;; score=0.406 total time= 0.0s
[CV 2/5; 49/120] START max_iter=128...
[CV 1/5; 46/120] END ...max_iter=125;; score=0.406 total time= 0.0s
[CV 2/5; 46/120] START max_iter=125...
[CV 4/5; 47/120] END ...max_iter=126;; score=0.425 total time= 0.0s
[CV 5/5; 47/120] START max_iter=126...
[CV 2/5; 52/120] END ...max_iter=131;; score=0.403 total time= 0.0s
[CV 3/5; 52/120] START max_iter=131...
[CV 3/5; 55/120] END ...max_iter=134;; score=0.410 total time= 0.0s
[CV 4/5; 55/120] START max_iter=134...
[CV 5/5; 59/120] END ...max_iter=138;; score=0.418 total time= 0.0s
[CV 1/5; 60/120] START max_iter=139...
[CV 5/5; 50/120] END ...max_iter=129;; score=0.418 total time=
0.0s[CV 1/5; 57/120] END ...max_iter=136;; score=0.406 total time=
0.0s
[CV 2/5; 57/120] START max_iter=136...

[CV 1/5; 51/120] START max_iter=130...
[CV 3/5; 58/120] END ...max_iter=137;; score=0.410 total time= 0.0s
[CV 4/5; 58/120] START max_iter=137...
[CV 5/5; 53/120] END ...max_iter=132;; score=0.418 total time= 0.0s
[CV 1/5; 54/120] START max_iter=133...
[CV 5/5; 47/120] END ...max_iter=126;; score=0.418 total time= 0.0s
[CV 2/5; 49/120] END ...max_iter=128;; score=0.403 total time= 0.0s
[CV 1/5; 48/120] START max_iter=127...
[CV 3/5; 49/120] START max_iter=128...
[CV 2/5; 46/120] END ...max_iter=125;; score=0.403 total time= 0.0s
[CV 3/5; 52/120] END ...max_iter=131;; score=0.410 total time= 0.0s
[CV 3/5; 46/120] START max_iter=125...
[CV 4/5; 52/120] START max_iter=131...
[CV 4/5; 55/120] END ...max_iter=134;; score=0.425 total time= 0.0s
[CV 5/5; 55/120] START max_iter=134...
[CV 1/5; 60/120] END ...max_iter=139;; score=0.406 total time= 0.0s
[CV 2/5; 60/120] START max_iter=139...
[CV 1/5; 51/120] END ...max_iter=130;; score=0.406 total time= 0.0s
[CV 2/5; 51/120] START max_iter=130...
[CV 2/5; 57/120] END ...max_iter=136;; score=0.403 total time= 0.0s
[CV 3/5; 57/120] START max_iter=136...
[CV 1/5; 54/120] END ...max_iter=133;; score=0.406 total time= 0.0s
[CV 2/5; 54/120] START max_iter=133...
[CV 3/5; 49/120] END ...max_iter=128;; score=0.410 total time=
0.0s[CV 4/5; 58/120] END ...max_iter=137;; score=0.425 total time=
0.0s

[CV 5/5; 58/120] START
max_iter=137...[CV 4/5; 49/120] START

```



max\_iter=128...

```
[CV 1/5; 48/120] END ...max_iter=127;; score=0.406 total time= 0.0s
[CV 3/5; 46/120] END ...max_iter=125;; score=0.410 total time= 0.0s
[CV 4/5; 52/120] END ...max_iter=131;; score=0.425 total time= 0.0s
[CV 5/5; 52/120] START max_iter=131...
[CV 5/5; 55/120] END ...max_iter=134;; score=0.418 total time= 0.0s
[CV 1/5; 56/120] START max_iter=135...
[CV 2/5; 60/120] END ...max_iter=139;; score=0.403 total time= 0.0s
[CV 3/5; 60/120] START max_iter=139...
[CV 3/5; 57/120] END ...max_iter=136;; score=0.410 total time= 0.0s
[CV 4/5; 57/120] START max_iter=136...
[CV 2/5; 51/120] END ...max_iter=130;; score=0.403 total time= 0.0s
[CV 1/5; 61/120] START max_iter=140...
[CV 2/5; 54/120] END ...max_iter=133;; score=0.403 total time= 0.0s
[CV 3/5; 54/120] START max_iter=133...
[CV 4/5; 49/120] END ...max_iter=128;; score=0.425 total time= 0.0s
[CV 1/5; 56/120] END ...max_iter=135;; score=0.406 total time= 0.0s
[CV 5/5; 58/120] END ...max_iter=137;; score=0.418 total time= 0.0s
[CV 1/5; 59/120] START max_iter=138...
[CV 5/5; 52/120] END ...max_iter=131;; score=0.418 total time= 0.0s
[CV 2/5; 64/120] START max_iter=143...
[CV 3/5; 60/120] END ...max_iter=139;; score=0.410 total time= 0.0s
[CV 4/5; 60/120] START max_iter=139...
[CV 3/5; 67/120] START max_iter=146...
[CV 4/5; 57/120] END ...max_iter=136;; score=0.425 total time= 0.0s
[CV 4/5; 70/120] START max_iter=149...
[CV 1/5; 59/120] END ...max_iter=138;; score=0.406 total time= 0.0s
[CV 2/5; 59/120] START max_iter=138...
[CV 3/5; 54/120] END ...max_iter=133;; score=0.410 total time= 0.0s
[CV 5/5; 73/120] START max_iter=152...
[CV 1/5; 77/120] START max_iter=156...
[CV 2/5; 80/120] START max_iter=159...
[CV 2/5; 64/120] END ...max_iter=143;; score=0.403 total time= 0.0s
[CV 3/5; 64/120] START max_iter=143...
[CV 3/5; 83/120] START max_iter=162...
[CV 1/5; 61/120] END ...max_iter=140;; score=0.406 total time= 0.0s
[CV 2/5; 61/120] START max_iter=140...
[CV 4/5; 60/120] END ...max_iter=139;; score=0.425 total time= 0.0s
[CV 5/5; 60/120] START max_iter=139...
[CV 3/5; 67/120] END ...max_iter=146;; score=0.410 total time= 0.0s
[CV 4/5; 67/120] START max_iter=146...
[CV 2/5; 59/120] END ...max_iter=138;; score=0.403 total time=
0.0s[CV 5/5; 73/120] END ...max_iter=152;; score=0.418 total time=
0.0s
[CV 1/5; 74/120] START max_iter=153...

[CV 1/5; 77/120] END ...max_iter=156;; score=0.406 total time= 0.0s
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[CV 2/5; 77/120] START max\_iter=156...  
 [CV 3/5; 64/120] END ...max\_iter=143;; score=0.410 total time= 0.0s  
 [CV 4/5; 64/120] START max\_iter=143...  
 [CV 4/5; 86/120] START max\_iter=165...  
 [CV 4/5; 70/120] END ...max\_iter=149;; score=0.425 total time= 0.0s  
 [CV 5/5; 70/120] START max\_iter=149...  
 [CV 5/5; 60/120] END ...max\_iter=139;; score=0.418 total time= 0.0s  
 [CV 2/5; 61/120] END ...max\_iter=140;; score=0.403 total time= 0.0s  
 [CV 3/5; 61/120] START max\_iter=140...  
 [CV 5/5; 89/120] START max\_iter=168...  
 [CV 4/5; 67/120] END ...max\_iter=146;; score=0.425 total time= 0.0s  
 [CV 5/5; 67/120] START max\_iter=146...  
 [CV 2/5; 80/120] END ...max\_iter=159;; score=0.403 total time= 0.0s  
 [CV 3/5; 80/120] START max\_iter=159...  
 [CV 1/5; 74/120] END ...max\_iter=153;; score=0.406 total time= 0.0s  
 [CV 2/5; 74/120] START max\_iter=153...  
 [CV 3/5; 83/120] END ...max\_iter=162;; score=0.410 total time= 0.0s  
 [CV 4/5; 83/120] START max\_iter=162...  
 [CV 4/5; 64/120] END ...max\_iter=143;; score=0.425 total time= 0.0s  
 [CV 5/5; 64/120] START max\_iter=143...  
 [CV 4/5; 86/120] END ...max\_iter=165;; score=0.425 total time= 0.0s  
 [CV 5/5; 86/120] START max\_iter=165...  
 [CV 2/5; 77/120] END ...max\_iter=156;; score=0.403 total time= 0.0s  
 [CV 3/5; 77/120] START max\_iter=156...  
 [CV 3/5; 61/120] END ...max\_iter=140;; score=0.410 total time=  
 0.0s[CV 5/5; 89/120] END ...max\_iter=168;; score=0.418 total time=  
 0.0s

[CV 1/5; 90/120] START max\_iter=169...  
 [CV 4/5; 61/120] START max\_iter=140...  
 [CV 5/5; 67/120] END ...max\_iter=146;; score=0.418 total time= 0.0s  
 [CV 1/5; 68/120] START max\_iter=147...  
 [CV 5/5; 70/120] END ...max\_iter=149;; score=0.418 total time= 0.0s  
 [CV 1/5; 71/120] START max\_iter=150...  
 [CV 4/5; 83/120] END ...max\_iter=162;; score=0.425 total time= 0.0s  
 [CV 5/5; 83/120] START max\_iter=162...  
 [CV 2/5; 74/120] END ...max\_iter=153;; score=0.403 total time= 0.0s  
 [CV 3/5; 74/120] START max\_iter=153...  
 [CV 5/5; 64/120] END ...max\_iter=143;; score=0.418 total time= 0.0s  
 [CV 1/5; 65/120] START max\_iter=144...  
 [CV 3/5; 77/120] END ...max\_iter=156;; score=0.410 total time= 0.0s  
 [CV 4/5; 77/120] START max\_iter=156...  
 [CV 5/5; 86/120] END ...max\_iter=165;; score=0.418 total time= 0.0s  
 [CV 1/5; 87/120] START max\_iter=166...  
 [CV 3/5; 80/120] END ...max\_iter=159;; score=0.410 total time=  
 0.0s[CV 1/5; 68/120] END ...max\_iter=147;; score=0.406 total time=  
 0.0s  
 [CV 1/5; 90/120] END ...max\_iter=169;; score=0.406 total time= 0.0s

```

[CV 2/5; 68/120] START max_iter=147...
[CV 2/5; 90/120] START max_iter=169...
[CV 4/5; 61/120] END ...max_iter=140;; score=0.425 total time= 0.0s
[CV 5/5; 61/120] START max_iter=140...

[CV 4/5; 80/120] START
max_iter=159...[CV 1/5; 71/120] END
...max_iter=150;; score=0.406 total time= 0.0s
[CV 2/5; 71/120] START max_iter=150...

[CV 1/5; 65/120] END ...max_iter=144;; score=0.406 total time= 0.0s
[CV 2/5; 65/120] START max_iter=144...
[CV 3/5; 74/120] END ...max_iter=153;; score=0.410 total time= 0.0s
[CV 4/5; 74/120] START max_iter=153...
[CV 4/5; 77/120] END ...max_iter=156;; score=0.425 total time= 0.0s
[CV 5/5; 77/120] START max_iter=156...
[CV 1/5; 87/120] END ...max_iter=166;; score=0.406 total time= 0.0s
[CV 2/5; 87/120] START max_iter=166...
[CV 5/5; 83/120] END ...max_iter=162;; score=0.418 total time= 0.0s
[CV 1/5; 84/120] START max_iter=163...
[CV 2/5; 68/120] END ...max_iter=147;; score=0.403 total time= 0.0s
[CV 3/5; 68/120] START max_iter=147...
[CV 5/5; 61/120] END ...max_iter=140;; score=0.418 total time= 0.0s
[CV 1/5; 62/120] START max_iter=141...
[CV 2/5; 71/120] END ...max_iter=150;; score=0.403 total time= 0.0s
[CV 3/5; 71/120] START max_iter=150...
[CV 4/5; 74/120] END ...max_iter=153;; score=0.425 total time= 0.0s
[CV 5/5; 74/120] START max_iter=153...
[CV 2/5; 65/120] END ...max_iter=144;; score=0.403 total time= 0.0s
[CV 3/5; 65/120] START max_iter=144...
[CV 2/5; 87/120] END ...max_iter=166;; score=0.403 total time= 0.0s
[CV 3/5; 87/120] START max_iter=166...
[CV 4/5; 80/120] END ...max_iter=159;; score=0.425 total time= 0.0s
[CV 5/5; 80/120] START max_iter=159...
[CV 1/5; 84/120] END ...max_iter=163;; score=0.406 total time= 0.0s
[CV 2/5; 84/120] START max_iter=163...
[CV 3/5; 68/120] END ...max_iter=147;; score=0.410 total time= 0.0s
[CV 4/5; 68/120] START max_iter=147...
[CV 2/5; 90/120] END ...max_iter=169;; score=0.403 total time= 0.0s
[CV 3/5; 90/120] START max_iter=169...
[CV 1/5; 62/120] END ...max_iter=141;; score=0.406 total time= 0.0s
[CV 2/5; 62/120] START max_iter=141...
[CV 5/5; 77/120] END ...max_iter=156;; score=0.418 total time= 0.0s
[CV 1/5; 78/120] START max_iter=157...
[CV 3/5; 71/120] END ...max_iter=150;; score=0.410 total time= 0.0s
[CV 4/5; 71/120] START max_iter=150...
[CV 5/5; 74/120] END ...max_iter=153;; score=0.418 total time= 0.0s
[CV 1/5; 75/120] START max_iter=154...

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[CV 3/5; 65/120] END ...max\_iter=144;; score=0.410 total time= 0.0s  
 [CV 4/5; 65/120] START max\_iter=144...  
 [CV 3/5; 87/120] END ...max\_iter=166;; score=0.410 total time= 0.0s  
 [CV 4/5; 87/120] START max\_iter=166...  
 [CV 5/5; 80/120] END ...max\_iter=159;; score=0.418 total time= 0.0s  
 [CV 1/5; 81/120] START max\_iter=160...  
 [CV 4/5; 68/120] END ...max\_iter=147;; score=0.425 total time= 0.0s  
 [CV 5/5; 68/120] START max\_iter=147...  
 [CV 2/5; 84/120] END ...max\_iter=163;; score=0.403 total time= 0.0s  
 [CV 3/5; 84/120] START max\_iter=163...  
 [CV 2/5; 62/120] END ...max\_iter=141;; score=0.403 total time= 0.0s  
 [CV 3/5; 62/120] START max\_iter=141...  
 [CV 4/5; 71/120] END ...max\_iter=150;; score=0.425 total time= 0.0s  
 [CV 5/5; 71/120] START max\_iter=150...  
 [CV 3/5; 90/120] END ...max\_iter=169;; score=0.410 total time= 0.0s  
 [CV 4/5; 90/120] START max\_iter=169...  
 [CV 1/5; 75/120] END ...max\_iter=154;; score=0.406 total time= 0.0s  
 [CV 2/5; 75/120] START max\_iter=154...  
 [CV 4/5; 65/120] END ...max\_iter=144;; score=0.425 total time= 0.0s  
 [CV 5/5; 65/120] START max\_iter=144...  
 [CV 4/5; 87/120] END ...max\_iter=166;; score=0.425 total time= 0.0s  
 [CV 5/5; 87/120] START max\_iter=166...  
 [CV 1/5; 81/120] END ...max\_iter=160;; score=0.406 total time= 0.0s  
 [CV 2/5; 81/120] START max\_iter=160...  
 [CV 3/5; 84/120] END ...max\_iter=163;; score=0.410 total time= 0.0s  
 [CV 4/5; 84/120] START max\_iter=163...  
 [CV 5/5; 68/120] END ...max\_iter=147;; score=0.418 total time= 0.0s  
 [CV 1/5; 69/120] START max\_iter=148...  
 [CV 1/5; 78/120] END ...max\_iter=157;; score=0.406 total time= 0.0s  
 [CV 2/5; 78/120] START max\_iter=157...  
 [CV 5/5; 71/120] END ...max\_iter=150;; score=0.418 total time= 0.0s  
 [CV 1/5; 72/120] START max\_iter=151...  
 [CV 3/5; 62/120] END ...max\_iter=141;; score=0.410 total time= 0.0s  
 [CV 4/5; 62/120] START max\_iter=141...  
 [CV 5/5; 65/120] END ...max\_iter=144;; score=0.418 total time= 0.0s  
 [CV 1/5; 66/120] START max\_iter=145...  
 [CV 5/5; 87/120] END ...max\_iter=166;; score=0.418 total time= 0.0s  
 [CV 1/5; 88/120] START max\_iter=167...  
 [CV 2/5; 75/120] END ...max\_iter=154;; score=0.403 total time= 0.0s  
 [CV 3/5; 75/120] START max\_iter=154...  
 [CV 2/5; 81/120] END ...max\_iter=160;; score=0.403 total time= 0.0s  
 [CV 3/5; 81/120] START max\_iter=160...  
 [CV 1/5; 69/120] END ...max\_iter=148;; score=0.406 total time= 0.0s  
 [CV 2/5; 69/120] START max\_iter=148...  
 [CV 4/5; 90/120] END ...max\_iter=169;; score=0.425 total time= 0.0s  
 [CV 5/5; 90/120] START max\_iter=169...  
 [CV 1/5; 66/120] END ...max\_iter=145;; score=0.406 total time= 0.0s  
 [CV 2/5; 66/120] START max\_iter=145...

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[CV 4/5; 62/120] END ...max_iter=141;; score=0.425 total time= 0.0s
[CV 5/5; 62/120] START max_iter=141...
[CV 1/5; 88/120] END ...max_iter=167;; score=0.406 total time= 0.0s
[CV 3/5; 75/120] END ...max_iter=154;; score=0.410 total time=
0.0s[CV 2/5; 88/120] START
max_iter=167...

[CV 4/5; 75/120] START max_iter=154...
[CV 1/5; 72/120] END ...max_iter=151;; score=0.406 total time= 0.0s
[CV 2/5; 72/120] START max_iter=151...
[CV 3/5; 81/120] END ...max_iter=160;; score=0.410 total time= 0.0s
[CV 4/5; 81/120] START max_iter=160...
[CV 4/5; 84/120] END ...max_iter=163;; score=0.425 total time= 0.0s
[CV 5/5; 84/120] START max_iter=163...
[CV 2/5; 69/120] END ...max_iter=148;; score=0.403 total time= 0.0s
[CV 3/5; 69/120] START max_iter=148...
[CV 2/5; 78/120] END ...max_iter=157;; score=0.403 total time= 0.0s
[CV 3/5; 78/120] START max_iter=157...
[CV 5/5; 62/120] END ...max_iter=141;; score=0.418 total time= 0.0s
[CV 1/5; 63/120] START max_iter=142...
[CV 2/5; 66/120] END ...max_iter=145;; score=0.403 total time= 0.0s
[CV 3/5; 66/120] START max_iter=145...
[CV 4/5; 75/120] END ...max_iter=154;; score=0.425 total time= 0.0s
[CV 5/5; 75/120] START max_iter=154...
[CV 2/5; 88/120] END ...max_iter=167;; score=0.403 total time= 0.0s
[CV 3/5; 88/120] START max_iter=167...
[CV 4/5; 81/120] END ...max_iter=160;; score=0.425 total time= 0.0s
[CV 5/5; 81/120] START max_iter=160...
[CV 3/5; 69/120] END ...max_iter=148;; score=0.410 total time= 0.0s
[CV 4/5; 69/120] START max_iter=148...
[CV 5/5; 84/120] END ...max_iter=163;; score=0.418 total time= 0.0s
[CV 1/5; 85/120] START max_iter=164...
[CV 5/5; 90/120] END ...max_iter=169;; score=0.418 total time= 0.0s
[CV 1/5; 91/120] START max_iter=170...
[CV 2/5; 72/120] END ...max_iter=151;; score=0.403 total time= 0.0s
[CV 3/5; 72/120] START max_iter=151...
[CV 1/5; 63/120] END ...max_iter=142;; score=0.406 total time= 0.0s
[CV 2/5; 63/120] START max_iter=142...
[CV 3/5; 66/120] END ...max_iter=145;; score=0.410 total time= 0.0s
[CV 4/5; 66/120] START max_iter=145...
[CV 5/5; 75/120] END ...max_iter=154;; score=0.418 total time= 0.0s
[CV 1/5; 76/120] START max_iter=155...
[CV 3/5; 88/120] END ...max_iter=167;; score=0.410 total time= 0.0s
[CV 4/5; 88/120] START max_iter=167...
[CV 5/5; 81/120] END ...max_iter=160;; score=0.418 total time= 0.0s
[CV 1/5; 82/120] START max_iter=161...
[CV 4/5; 69/120] END ...max_iter=148;; score=0.425 total time= 0.0s
[CV 5/5; 69/120] START max_iter=148...

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[CV 3/5; 78/120] END ...max_iter=157;; score=0.410 total time= 0.0s
[CV 4/5; 78/120] START max_iter=157...
[CV 3/5; 72/120] END ...max_iter=151;; score=0.410 total time= 0.0s
[CV 4/5; 72/120] START max_iter=151...
[CV 1/5; 85/120] END ...max_iter=164;; score=0.406 total time=
0.0s[CV 4/5; 66/120] END ...max_iter=145;; score=0.425 total time=
0.0s
[CV 5/5; 66/120] START max_iter=145...

[CV 1/5; 76/120] END ...max_iter=155;; score=0.406 total time= 0.0s
[CV 2/5; 85/120] START max_iter=164...
[CV 2/5; 63/120] END ...max_iter=142;; score=0.403 total time= 0.0s
[CV 2/5; 76/120] START max_iter=155...
[CV 3/5; 63/120] START max_iter=142...
[CV 4/5; 88/120] END ...max_iter=167;; score=0.425 total time= 0.0s
[CV 5/5; 88/120] START max_iter=167...
[CV 1/5; 82/120] END ...max_iter=161;; score=0.406 total time= 0.0s
[CV 2/5; 82/120] START max_iter=161...
[CV 5/5; 69/120] END ...max_iter=148;; score=0.418 total time= 0.0s
[CV 1/5; 70/120] START max_iter=149...
[CV 1/5; 91/120] END ...max_iter=170;; score=0.406 total time= 0.0s
[CV 2/5; 91/120] START max_iter=170...
[CV 4/5; 78/120] END ...max_iter=157;; score=0.425 total time=
0.0s[CV 4/5; 72/120] END ...max_iter=151;; score=0.425 total time=
0.0s
[CV 5/5; 72/120] START max_iter=151...

[CV 5/5; 78/120] START max_iter=157...
[CV 5/5; 66/120] END ...max_iter=145;; score=0.418 total time= 0.0s
[CV 3/5; 63/120] END ...max_iter=142;; score=0.410 total time= 0.0s
[CV 1/5; 67/120] START max_iter=146...
[CV 4/5; 63/120] START max_iter=142...
[CV 2/5; 76/120] END ...max_iter=155;; score=0.403 total time= 0.0s
[CV 3/5; 76/120] START max_iter=155...
[CV 2/5; 82/120] END ...max_iter=161;; score=0.403 total time= 0.0s
[CV 3/5; 82/120] START max_iter=161...
[CV 5/5; 88/120] END ...max_iter=167;; score=0.418 total time= 0.0s
[CV 1/5; 89/120] START max_iter=168...
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[CV 2/5; 70/120] START max_iter=149...
[CV 2/5; 85/120] END ...max_iter=164;; score=0.403 total time= 0.0s
[CV 3/5; 85/120] START max_iter=164...
[CV 1/5; 67/120] END ...max_iter=146;; score=0.406 total time= 0.0s
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[CV 4/5; 63/120] END ...max_iter=142;; score=0.425 total time= 0.0s
[CV 5/5; 63/120] START max_iter=142...
[CV 5/5; 78/120] END ...max_iter=157;; score=0.418 total time= 0.0s
[CV 1/5; 79/120] START max_iter=158...

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[CV 3/5; 76/120] END ...max_iter=155;; score=0.410 total time= 0.0s
[CV 4/5; 76/120] START max_iter=155...
[CV 3/5; 82/120] END ...max_iter=161;; score=0.410 total time= 0.0s
[CV 4/5; 82/120] START max_iter=161...
[CV 5/5; 72/120] END ...max_iter=151;; score=0.418 total time= 0.0s
[CV 1/5; 73/120] START max_iter=152...
[CV 2/5; 70/120] END ...max_iter=149;; score=0.403 total time=
0.0s[CV 1/5; 89/120] END ...max_iter=168;; score=0.406 total time=
0.0s
[CV 2/5; 89/120] START max_iter=168...
[CV 2/5; 91/120] END ...max_iter=170;; score=0.403 total time= 0.0s
[CV 3/5; 91/120] START max_iter=170...

[CV 5/5; 63/120] END ...max_iter=142;; score=0.418 total time= 0.0s
[CV 1/5; 64/120] START max_iter=143...
[CV 2/5; 67/120] END ...max_iter=146;; score=0.403 total time=
0.0s[CV 3/5; 85/120] END ...max_iter=164;; score=0.410 total time=
0.0s

[CV 4/5; 85/120] START max_iter=164...
[CV 4/5; 76/120] END ...max_iter=155;; score=0.425 total time=
0.0s[CV 4/5; 82/120] END ...max_iter=161;; score=0.425 total time=
0.0s

[CV 5/5; 82/120] START max_iter=161...
[CV 5/5; 76/120] START max_iter=155...
[CV 1/5; 93/120] START max_iter=172...
[CV 3/5; 70/120] START max_iter=149...
[CV 1/5; 79/120] END ...max_iter=158;; score=0.406 total time= 0.0s
[CV 2/5; 79/120] START max_iter=158...
[CV 1/5; 73/120] END ...max_iter=152;; score=0.406 total time= 0.0s
[CV 2/5; 73/120] START max_iter=152...
[CV 3/5; 91/120] END ...max_iter=170;; score=0.410 total time= 0.0s
[CV 4/5; 91/120] START max_iter=170...
[CV 1/5; 64/120] END ...max_iter=143;; score=0.406 total time= 0.0s
[CV 2/5; 93/120] START max_iter=172...
[CV 5/5; 82/120] END ...max_iter=161;; score=0.418 total time= 0.0s
[CV 2/5; 89/120] END ...max_iter=168;; score=0.403 total time=
0.0s[CV 1/5; 83/120] START
max_iter=162...

[CV 3/5; 89/120] START max_iter=168...
[CV 4/5; 85/120] END ...max_iter=164;; score=0.425 total time= 0.0s
[CV 5/5; 85/120] START max_iter=164...
[CV 1/5; 93/120] END ...max_iter=172;; score=0.406 total time=
0.0s[CV 5/5; 76/120] END ...max_iter=155;; score=0.418 total time=
0.0s

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[CV 3/5; 93/120] START max_iter=172...
[CV 2/5; 79/120] END ...max_iter=158;; score=0.403 total time= 0.0s
[CV 3/5; 79/120] START max_iter=158...
[CV 4/5; 93/120] START max_iter=172...
[CV 4/5; 91/120] END ...max_iter=170;; score=0.425 total time= 0.0s
[CV 5/5; 91/120] START max_iter=170...
[CV 3/5; 70/120] END ...max_iter=149;; score=0.410 total time= 0.0s
[CV 2/5; 73/120] END ...max_iter=152;; score=0.403 total time= 0.0s
[CV 3/5; 73/120] START max_iter=152...
[CV 5/5; 93/120] START
max_iter=172...[CV 2/5; 93/120] END
...max_iter=172;; score=0.403 total time= 0.0s

[CV 3/5; 93/120] END ...max_iter=172;; score=0.410 total time= 0.0s
[CV 2/5; 94/120] START max_iter=173...
[CV 1/5; 83/120] END ...max_iter=162;; score=0.406 total time= 0.0s
[CV 2/5; 83/120] START max_iter=162...
[CV 5/5; 85/120] END ...max_iter=164;; score=0.418 total time= 0.0s
[CV 1/5; 86/120] START max_iter=165...
[CV 3/5; 79/120] END ...max_iter=158;; score=0.410 total time= 0.0s
[CV 4/5; 79/120] START max_iter=158...
[CV 5/5; 91/120] END ...max_iter=170;; score=0.418 total time= 0.0s
[CV 1/5; 92/120] START max_iter=171...
[CV 1/5; 94/120] START max_iter=173...
[CV 4/5; 93/120] END ...max_iter=172;; score=0.425 total time= 0.0s
[CV 3/5; 94/120] START max_iter=173...
[CV 3/5; 73/120] END ...max_iter=152;; score=0.410 total time= 0.0s
[CV 1/5; 86/120] END ...max_iter=165;; score=0.406 total time= 0.0s
[CV 2/5; 86/120] START max_iter=165...
[CV 4/5; 73/120] START max_iter=152...
[CV 3/5; 89/120] END ...max_iter=168;; score=0.410 total time= 0.0s
[CV 4/5; 89/120] START max_iter=168...
[CV 2/5; 83/120] END ...max_iter=162;; score=0.403 total time= 0.0s
[CV 5/5; 93/120] END ...max_iter=172;; score=0.418 total time= 0.0s
[CV 4/5; 94/120] START max_iter=173...
[CV 4/5; 79/120] END ...max_iter=158;; score=0.425 total time= 0.0s
[CV 5/5; 79/120] START max_iter=158...
[CV 5/5; 94/120] START max_iter=173...
[CV 1/5; 92/120] END ...max_iter=171;; score=0.406 total time= 0.0s
[CV 2/5; 92/120] START max_iter=171...
[CV 1/5; 94/120] END ...max_iter=173;; score=0.406 total time= 0.0s
[CV 1/5; 95/120] START max_iter=174...
[CV 2/5; 94/120] END ...max_iter=173;; score=0.403 total time= 0.0s
[CV 2/5; 95/120] START max_iter=174...
[CV 3/5; 94/120] END ...max_iter=173;; score=0.410 total time= 0.0s
[CV 3/5; 95/120] START max_iter=174...
[CV 2/5; 86/120] END ...max_iter=165;; score=0.403 total time= 0.0s
[CV 3/5; 86/120] START max_iter=165...

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[CV 4/5; 89/120] END ...max_iter=168;; score=0.425 total time= 0.0s
[CV 4/5; 73/120] END ...max_iter=152;; score=0.425 total time= 0.0s
[CV 4/5; 94/120] END ...max_iter=173;; score=0.425 total time= 0.0s
[CV 4/5; 95/120] START max_iter=174...
[CV 5/5; 95/120] START max_iter=174...
[CV 1/5; 96/120] START max_iter=175...
[CV 2/5; 92/120] END ...max_iter=171;; score=0.403 total time= 0.0s
[CV 3/5; 92/120] START
max_iter=171...[CV 5/5; 79/120] END
...max_iter=158;; score=0.418 total time= 0.0s

[CV 1/5; 80/120] START max_iter=159...
[CV 1/5; 95/120] END ...max_iter=174;; score=0.406 total time= 0.0s
[CV 5/5; 94/120] END ...max_iter=173;; score=0.418 total time= 0.0s
[CV 2/5; 96/120] START max_iter=175...
[CV 3/5; 96/120] START max_iter=175...
[CV 2/5; 95/120] END ...max_iter=174;; score=0.403 total time= 0.0s
[CV 3/5; 86/120] END ...max_iter=165;; score=0.410 total time= 0.0s
[CV 4/5; 96/120] START max_iter=175...
[CV 5/5; 96/120] START max_iter=175...
[CV 3/5; 95/120] END ...max_iter=174;; score=0.410 total time= 0.0s
[CV 4/5; 95/120] END ...max_iter=174;; score=0.425 total time= 0.0s
[CV 1/5; 97/120] START max_iter=176...
[CV 5/5; 95/120] END ...max_iter=174;; score=0.418 total time= 0.0s
[CV 1/5; 96/120] END ...max_iter=175;; score=0.406 total time= 0.0s
[CV 2/5; 97/120] START max_iter=176...
[CV 3/5; 97/120] START max_iter=176...
[CV 4/5; 97/120] START max_iter=176...
[CV 3/5; 92/120] END ...max_iter=171;; score=0.410 total time= 0.0s
[CV 4/5; 92/120] START max_iter=171...
[CV 2/5; 96/120] END ...max_iter=175;; score=0.403 total time= 0.0s
[CV 1/5; 80/120] END ...max_iter=159;; score=0.406 total time= 0.0s
[CV 1/5; 98/120] START max_iter=177...
[CV 4/5; 96/120] END ...max_iter=175;; score=0.425 total time= 0.0s
[CV 5/5; 97/120] START max_iter=176...
[CV 5/5; 96/120] END ...max_iter=175;; score=0.418 total time= 0.0s
[CV 2/5; 98/120] START max_iter=177...
[CV 3/5; 98/120] START max_iter=177...
[CV 3/5; 97/120] END ...max_iter=176;; score=0.410 total time=
0.0s[CV 2/5; 97/120] END ...max_iter=176;; score=0.403 total time=
0.0s
[CV 4/5; 97/120] END ...max_iter=176;; score=0.425 total time= 0.0s

[CV 4/5; 92/120] END ...max_iter=171;; score=0.425 total time= 0.0s
[CV 5/5; 92/120] START
max_iter=171...[CV 4/5; 98/120] START
max_iter=177...
[CV 3/5; 96/120] END ...max_iter=175;; score=0.410 total time= 0.0s

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[CV 1/5; 97/120] END ...max_iter=176;; score=0.406 total time= 0.0s
[CV 1/5; 99/120] START max_iter=178...
[CV 2/5; 99/120] START max_iter=178...
[CV 1/5; 98/120] END ...max_iter=177;; score=0.406 total time= 0.0s
[CV 3/5; 99/120] START
max_iter=178...[CV 4/5; 99/120] START
max_iter=178...
[CV 5/5; 97/120] END ...max_iter=176;; score=0.418 total time= 0.0s
[CV 3/5; 98/120] END ...max_iter=177;; score=0.410 total time=
0.0s[CV 5/5; 98/120] START
max_iter=177...

[CV 5/5; 99/120] START max_iter=178...
[CV 2/5; 98/120] END ...max_iter=177;; score=0.403 total time= 0.0s
[CV 1/5; 100/120] START max_iter=179...
[CV 2/5; 100/120] START max_iter=179...
[CV 4/5; 98/120] END ...max_iter=177;; score=0.425 total time= 0.0s
[CV 3/5; 100/120] START max_iter=179...
[CV 5/5; 92/120] END ...max_iter=171;; score=0.418 total time= 0.0s
[CV 1/5; 99/120] END ...max_iter=178;; score=0.406 total time= 0.0s
[CV 4/5; 100/120] START max_iter=179...
[CV 5/5; 100/120] START max_iter=179...
[CV 3/5; 99/120] END ...max_iter=178;; score=0.410 total time= 0.0s
[CV 2/5; 99/120] END ...max_iter=178;; score=0.403 total time= 0.0s
[CV 2/5; 101/120] START max_iter=180...
[CV 4/5; 99/120] END ...max_iter=178;; score=0.425 total time= 0.0s
[CV 1/5; 101/120] START max_iter=180...
[CV 5/5; 99/120] END ...max_iter=178;; score=0.418 total time= 0.0s
[CV 1/5; 100/120] END ...max_iter=179;; score=0.406 total time= 0.0s
[CV 5/5; 98/120] END ...max_iter=177;; score=0.418 total time= 0.0s
[CV 3/5; 101/120] START max_iter=180...
[CV 2/5; 100/120] END ...max_iter=179;; score=0.403 total time= 0.0s
[CV 4/5; 101/120] START max_iter=180...
[CV 5/5; 101/120] START max_iter=180...
[CV 1/5; 102/120] START max_iter=181...
[CV 2/5; 102/120] START max_iter=181...
[CV 3/5; 100/120] END ...max_iter=179;; score=0.410 total time= 0.0s
[CV 3/5; 102/120] START max_iter=181...
[CV 5/5; 100/120] END ...max_iter=179;; score=0.418 total time= 0.0s
[CV 4/5; 102/120] START max_iter=181...
[CV 1/5; 101/120] END ...max_iter=180;; score=0.406 total time= 0.0s
[CV 2/5; 101/120] END ...max_iter=180;; score=0.403 total time= 0.0s
[CV 4/5; 100/120] END ...max_iter=179;; score=0.425 total time= 0.0s
[CV 5/5; 102/120] START max_iter=181...
[CV 3/5; 101/120] END ...max_iter=180;; score=0.410 total time= 0.0s
[CV 1/5; 103/120] START max_iter=182...

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[CV 2/5; 103/120] START max_iter=182...
[CV 5/5; 101/120] END ...max_iter=180;; score=0.418 total time= 0.0s
[CV 3/5; 103/120] START max_iter=182...
[CV 1/5; 102/120] END ...max_iter=181;; score=0.406 total time= 0.0s
[CV 4/5; 103/120] START max_iter=182...
[CV 5/5; 103/120] START max_iter=182...
[CV 4/5; 101/120] END ...max_iter=180;; score=0.425 total time= 0.0s
[CV 1/5; 104/120] START max_iter=183...
[CV 2/5; 102/120] END ...max_iter=181;; score=0.403 total time= 0.0s
[CV 3/5; 102/120] END ...max_iter=181;; score=0.410 total time= 0.0s
[CV 2/5; 104/120] START max_iter=183...
[CV 4/5; 102/120] END ...max_iter=181;; score=0.425 total time= 0.0s
[CV 3/5; 104/120] START max_iter=183...
[CV 4/5; 104/120] START max_iter=183...
[CV 1/5; 103/120] END ...max_iter=182;; score=0.406 total time= 0.0s
[CV 5/5; 102/120] END ...max_iter=181;; score=0.418 total time= 0.0s
[CV 5/5; 104/120] START max_iter=183...
[CV 1/5; 105/120] START max_iter=184...
[CV 4/5; 103/120] END ...max_iter=182;; score=0.425 total time= 0.0s
[CV 5/5; 103/120] END ...max_iter=182;; score=0.418 total time= 0.0s
[CV 3/5; 103/120] END ...max_iter=182;; score=0.410 total time= 0.0s
[CV 2/5; 105/120] START max_iter=184...
[CV 2/5; 103/120] END ...max_iter=182;; score=0.403 total time= 0.0s
[CV 3/5; 105/120] START max_iter=184...
[CV 4/5; 105/120] START max_iter=184...
[CV 5/5; 105/120] START max_iter=184...
[CV 1/5; 104/120] END ...max_iter=183;; score=0.406 total time= 0.0s
[CV 4/5; 104/120] END ...max_iter=183;; score=0.425 total time= 0.0s
[CV 1/5; 106/120] START max_iter=185...
[CV 5/5; 104/120] END ...max_iter=183;; score=0.418 total time= 0.0s
[CV 2/5; 106/120] START max_iter=185...
[CV 1/5; 105/120] END ...max_iter=184;; score=0.406 total time= 0.0s
[CV 3/5; 106/120] START max_iter=185...
[CV 3/5; 104/120] END ...max_iter=183;; score=0.410 total time= 0.0s
[CV 4/5; 106/120] START max_iter=185...
[CV 5/5; 106/120] START max_iter=185...
[CV 2/5; 105/120] END ...max_iter=184;; score=0.403 total time= 0.0s
[CV 1/5; 107/120] START max_iter=186...
[CV 2/5; 104/120] END ...max_iter=183;; score=0.403 total time= 0.0s
[CV 2/5; 107/120] START max_iter=186...
[CV 4/5; 105/120] END ...max_iter=184;; score=0.425 total time= 0.0s
[CV 3/5; 107/120] START max_iter=186...
[CV 3/5; 105/120] END ...max_iter=184;; score=0.410 total time= 0.0s
[CV 3/5; 106/120] END ...max_iter=185;; score=0.410 total time= 0.0s
[CV 4/5; 107/120] START max_iter=186...
[CV 5/5; 107/120] START max_iter=186...
[CV 4/5; 106/120] END ...max_iter=185;; score=0.425 total time= 0.0s
[CV 5/5; 105/120] END ...max_iter=184;; score=0.418 total time= 0.0s

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[CV 1/5; 106/120] END ...max_iter=185;; score=0.406 total time= 0.0s
[CV 1/5; 108/120] START max_iter=187...
[CV 2/5; 106/120] END ...max_iter=185;; score=0.403 total time=
0.0s[CV 2/5; 108/120] START
max_iter=187...

[CV 5/5; 106/120] END ...max_iter=185;; score=0.418 total time= 0.0s
[CV 1/5; 107/120] END ...max_iter=186;; score=0.406 total time= 0.0s
[CV 3/5; 108/120] START max_iter=187...
[CV 4/5; 108/120] START max_iter=187...
[CV 5/5; 108/120] START max_iter=187...
[CV 2/5; 107/120] END ...max_iter=186;; score=0.403 total time= 0.0s
[CV 1/5; 109/120] START max_iter=188...
[CV 2/5; 109/120] START max_iter=188...
[CV 5/5; 107/120] END ...max_iter=186;; score=0.418 total time= 0.0s
[CV 3/5; 109/120] START max_iter=188...
[CV 1/5; 108/120] END ...max_iter=187;; score=0.406 total time= 0.0s
[CV 4/5; 109/120] START
max_iter=188...[CV 3/5; 107/120] END
...max_iter=186;; score=0.410 total time= 0.0s

[CV 5/5; 109/120] START max_iter=188...
[CV 2/5; 108/120] END ...max_iter=187;; score=0.403 total time= 0.0s
[CV 1/5; 110/120] START max_iter=189...
[CV 4/5; 108/120] END ...max_iter=187;; score=0.425 total time= 0.0s
[CV 5/5; 108/120] END ...max_iter=187;; score=0.418 total time= 0.0s
[CV 1/5; 109/120] END ...max_iter=188;; score=0.406 total time= 0.0s
[CV 2/5; 110/120] START max_iter=189...
[CV 3/5; 110/120] START max_iter=189...
[CV 4/5; 107/120] END ...max_iter=186;; score=0.425 total time= 0.0s
[CV 4/5; 110/120] START max_iter=189...
[CV 3/5; 109/120] END ...max_iter=188;; score=0.410 total time= 0.0s
[CV 5/5; 110/120] START max_iter=189...
[CV 2/5; 109/120] END ...max_iter=188;; score=0.403 total time= 0.0s
[CV 1/5; 111/120] START max_iter=190...
[CV 2/5; 111/120] START max_iter=190...
[CV 3/5; 108/120] END ...max_iter=187;; score=0.410 total time= 0.0s
[CV 4/5; 109/120] END ...max_iter=188;; score=0.425 total time= 0.0s
[CV 3/5; 111/120] START max_iter=190...
[CV 5/5; 109/120] END ...max_iter=188;; score=0.418 total time= 0.0s
[CV 4/5; 111/120] START max_iter=190...
[CV 5/5; 111/120] START max_iter=190...
[CV 1/5; 110/120] END ...max_iter=189;; score=0.406 total time= 0.0s
[CV 1/5; 112/120] START max_iter=191...
[CV 3/5; 110/120] END ...max_iter=189;; score=0.410 total time= 0.0s
[CV 2/5; 112/120] START max_iter=191...
[CV 4/5; 110/120] END ...max_iter=189;; score=0.425 total time= 0.0s
[CV 1/5; 111/120] END ...max_iter=190;; score=0.406 total time= 0.0s

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[CV 5/5; 110/120] END ...max_iter=189;; score=0.418 total time= 0.0s
[CV 3/5; 112/120] START max_iter=191...
[CV 4/5; 112/120] START max_iter=191...
[CV 5/5; 112/120] START max_iter=191...
[CV 2/5; 111/120] END ...max_iter=190;; score=0.403 total time= 0.0s
[CV 3/5; 111/120] END ...max_iter=190;; score=0.410 total time= 0.0s
[CV 1/5; 113/120] START
max_iter=192...[CV 2/5; 113/120] START
max_iter=192...

[CV 5/5; 111/120] END ...max_iter=190;; score=0.418 total time= 0.0s
[CV 4/5; 111/120] END ...max_iter=190;; score=0.425 total time= 0.0s
[CV 3/5; 113/120] START max_iter=192...
[CV 4/5; 113/120] START max_iter=192...
[CV 1/5; 112/120] END ...max_iter=191;; score=0.406 total time= 0.0s
[CV 2/5; 110/120] END ...max_iter=189;; score=0.403 total time= 0.0s
[CV 5/5; 113/120] START max_iter=192...
[CV 4/5; 112/120] END ...max_iter=191;; score=0.425 total time= 0.0s
[CV 2/5; 112/120] END ...max_iter=191;; score=0.403 total time= 0.0s
[CV 3/5; 112/120] END ...max_iter=191;; score=0.410 total time= 0.0s
[CV 5/5; 112/120] END ...max_iter=191;; score=0.418 total time= 0.0s
[CV 1/5; 114/120] START max_iter=193...
[CV 3/5; 113/120] END ...max_iter=192;; score=0.410 total time= 0.0s
[CV 1/5; 113/120] END ...max_iter=192;; score=0.406 total time= 0.0s
[CV 2/5; 113/120] END ...max_iter=192;; score=0.403 total time= 0.0s
[CV 2/5; 114/120] START max_iter=193...
[CV 3/5; 114/120] START max_iter=193...
[CV 4/5; 114/120] START max_iter=193...
[CV 5/5; 113/120] END ...max_iter=192;; score=0.418 total time= 0.0s
[CV 5/5; 114/120] START max_iter=193...
[CV 1/5; 115/120] START max_iter=194...
[CV 4/5; 113/120] END ...max_iter=192;; score=0.425 total time= 0.0s
[CV 3/5; 115/120] START max_iter=194...
[CV 2/5; 115/120] START max_iter=194...
[CV 3/5; 114/120] END ...max_iter=193;; score=0.410 total time= 0.0s
[CV 4/5; 115/120] START max_iter=194...
[CV 1/5; 114/120] END ...max_iter=193;; score=0.406 total time= 0.0s
[CV 2/5; 114/120] END ...max_iter=193;; score=0.403 total time= 0.0s
[CV 5/5; 115/120] START max_iter=194...
[CV 4/5; 114/120] END ...max_iter=193;; score=0.425 total time= 0.0s
[CV 1/5; 116/120] START max_iter=195...
[CV 5/5; 114/120] END ...max_iter=193;; score=0.418 total time= 0.0s
[CV 2/5; 116/120] START max_iter=195...
[CV 3/5; 116/120] START max_iter=195...
[CV 3/5; 115/120] END ...max_iter=194;; score=0.410 total time= 0.0s
[CV 4/5; 116/120] START max_iter=195...
[CV 2/5; 115/120] END ...max_iter=194;; score=0.403 total time= 0.0s
[CV 5/5; 116/120] START max_iter=195...

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[CV 1/5; 117/120] START max_iter=196...
[CV 1/5; 115/120] END ...max_iter=194;; score=0.406 total time= 0.0s
[CV 2/5; 117/120] START max_iter=196...
[CV 3/5; 117/120] START max_iter=196...
[CV 4/5; 115/120] END ...max_iter=194;; score=0.425 total time= 0.0s
[CV 1/5; 116/120] END ...max_iter=195;; score=0.406 total time= 0.0s
[CV 5/5; 117/120] START
max_iter=196...[CV 4/5; 117/120] START
max_iter=196...
[CV 3/5; 116/120] END ...max_iter=195;; score=0.410 total time= 0.0s

[CV 1/5; 118/120] START max_iter=197...
[CV 1/5; 117/120] END ...max_iter=196;; score=0.406 total time= 0.0s
[CV 4/5; 116/120] END ...max_iter=195;; score=0.425 total time= 0.0s
[CV 5/5; 115/120] END ...max_iter=194;; score=0.418 total time= 0.0s
[CV 2/5; 118/120] START max_iter=197...
[CV 2/5; 116/120] END ...max_iter=195;; score=0.403 total time= 0.0s
[CV 3/5; 118/120] START max_iter=197...
[CV 3/5; 117/120] END ...max_iter=196;; score=0.410 total time= 0.0s
[CV 4/5; 118/120] START max_iter=197...
[CV 5/5; 118/120] START max_iter=197...
[CV 5/5; 116/120] END ...max_iter=195;; score=0.418 total time= 0.0s
[CV 4/5; 117/120] END ...max_iter=196;; score=0.425 total time=
0.0s[CV 1/5; 119/120] START
max_iter=198...

[CV 2/5; 119/120] START max_iter=198...
[CV 1/5; 118/120] END ...max_iter=197;; score=0.406 total time= 0.0s
[CV 3/5; 119/120] START max_iter=198...
[CV 2/5; 117/120] END ...max_iter=196;; score=0.403 total time= 0.0s
[CV 4/5; 119/120] START max_iter=198...
[CV 5/5; 119/120] START max_iter=198...
[CV 2/5; 118/120] END ...max_iter=197;; score=0.403 total time= 0.0s
[CV 3/5; 118/120] END ...max_iter=197;; score=0.410 total time= 0.0s
[CV 1/5; 120/120] START max_iter=199...
[CV 2/5; 120/120] START max_iter=199...
[CV 5/5; 117/120] END ...max_iter=196;; score=0.418 total time=
0.0s[CV 2/5; 119/120] END ...max_iter=198;; score=0.403 total time=
0.0s
[CV 5/5; 118/120] END ...max_iter=197;; score=0.418 total time= 0.0s
[CV 1/5; 119/120] END ...max_iter=198;; score=0.406 total time= 0.0s
[CV 3/5; 120/120] START max_iter=199...

[CV 4/5; 120/120] START max_iter=199...
[CV 5/5; 119/120] END ...max_iter=198;; score=0.418 total time= 0.0s
[CV 4/5; 118/120] END ...max_iter=197;; score=0.425 total time= 0.0s
[CV 5/5; 120/120] START max_iter=199...
[CV 4/5; 119/120] END ...max_iter=198;; score=0.425 total time= 0.0s

```

```
[CV 3/5; 119/120] END ...max_iter=198;; score=0.410 total time= 0.0s
[CV 1/5; 120/120] END ...max_iter=199;; score=0.406 total time= 0.0s
[CV 2/5; 120/120] END ...max_iter=199;; score=0.403 total time= 0.0s
[CV 3/5; 120/120] END ...max_iter=199;; score=0.410 total time= 0.0s
[CV 5/5; 120/120] END ...max_iter=199;; score=0.418 total time= 0.0s
[CV 4/5; 120/120] END ...max_iter=199;; score=0.425 total time= 0.0s
```

```
[ ]: GridSearchCV(cv=5, estimator=LogisticRegression(random_state=0), n_jobs=10,
    param_grid={'max_iter': array([ 80,  81,  82,  83,  84,  85,  86,
    87,  88,  89,  90,  91,  92,
    93,  94,  95,  96,  97,  98,  99, 100, 101, 102, 103, 104, 105,
    106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118,
    119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131,
    132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144,
    145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157,
    158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170,
    171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183,
    184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196,
    197, 198, 199])},
    verbose=10)
```

```
[ ]: best_params = lr_gscv.best_params_
    best_params
```

```
[ ]: {'max_iter': 80}
```

```
[ ]: lr_gscv.best_score_
```

```
[ ]: 0.4124602420898717
```

```
[ ]: lr_gscv.score(X_train, y_train)
```

```
[ ]: 0.41794731064763996
```

```
[ ]: lr_gscv.score(X_test, y_test)
```

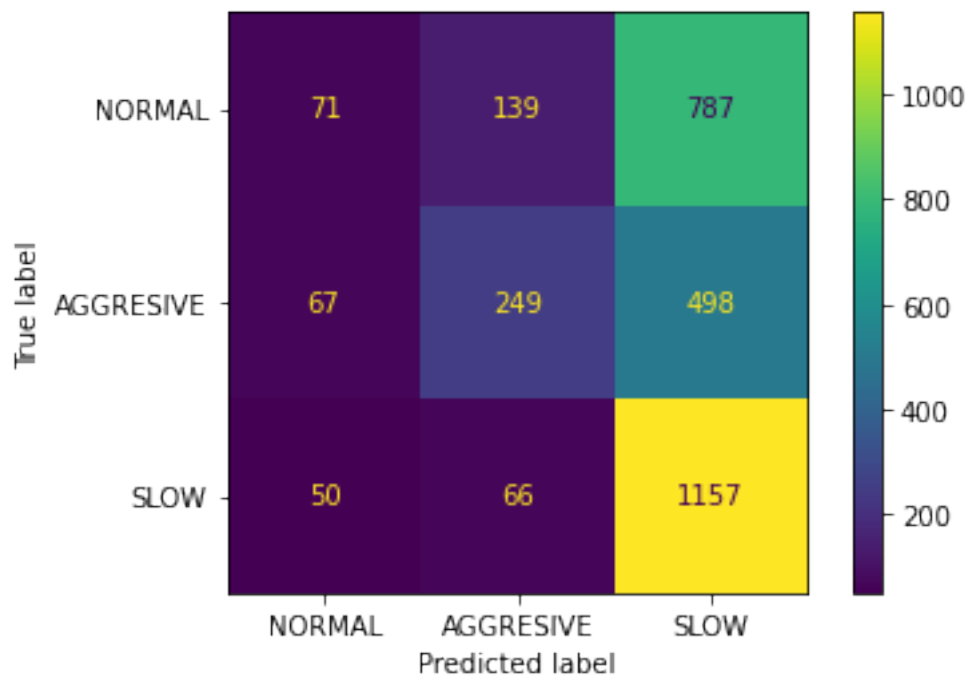
```
[ ]: 0.4789234760051881
```

```
[ ]: classes = ["NORMAL", "AGGRESIVE", "SLOW"]
```

```
[ ]: y_pred = lr_gscv.predict(X_test)

CM = confusion_matrix(y_test, y_pred)
display = ConfusionMatrixDisplay(confusion_matrix=CM,
    display_labels=classes)
display.plot()
```

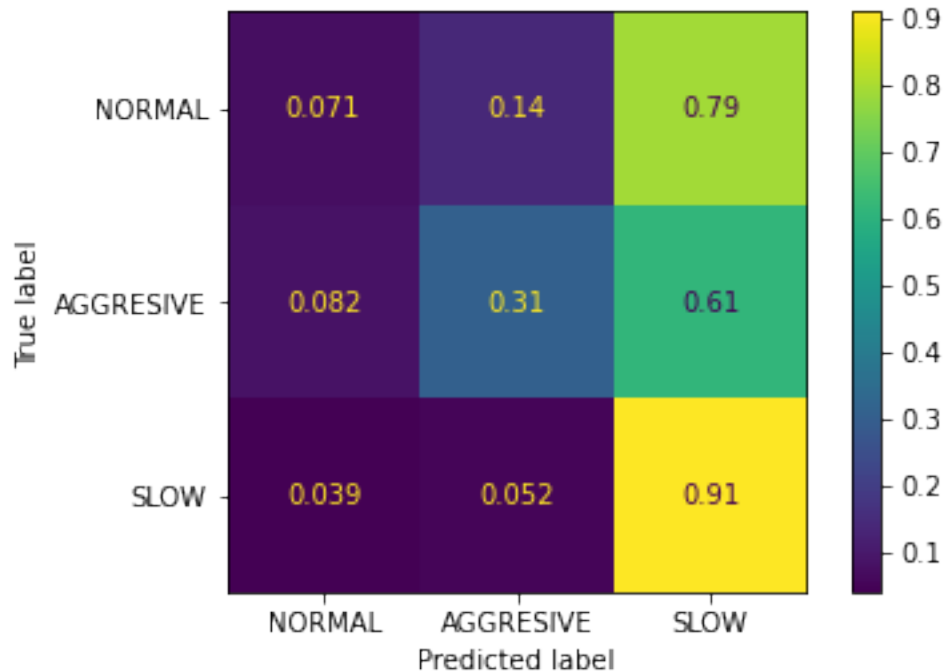
```
[ ]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x7fc43cd8f8e0>
```



```
[ ]: CM_norm = confusion_matrix(y_test, y_pred, normalize="true")
display = ConfusionMatrixDisplay(confusion_matrix=CM_norm,
                                  display_labels=classes)
display.plot()
```

```
[ ]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x7fc43ccf47f0>
```





### 1.3.1 Train model with bagging

```
[ ]: from sklearn.ensemble import BaggingClassifier

lr_bagging = BaggingClassifier(lr_gscv.best_estimator_, max_samples=0.5,
    ↪max_features=0.7, random_state=0)
lr_bagging.fit(X_train, y_train)
```

```
[ ]: BaggingClassifier(base_estimator=LogisticRegression(max_iter=80,
    random_state=0),
    max_features=0.7, max_samples=0.5, random_state=0)
```

```
[ ]: lr_bagging.score(X_train, y_train)
```

```
[ ]: 0.4080680570801317
```

```
[ ]: lr_bagging.score(X_test, y_test)
```

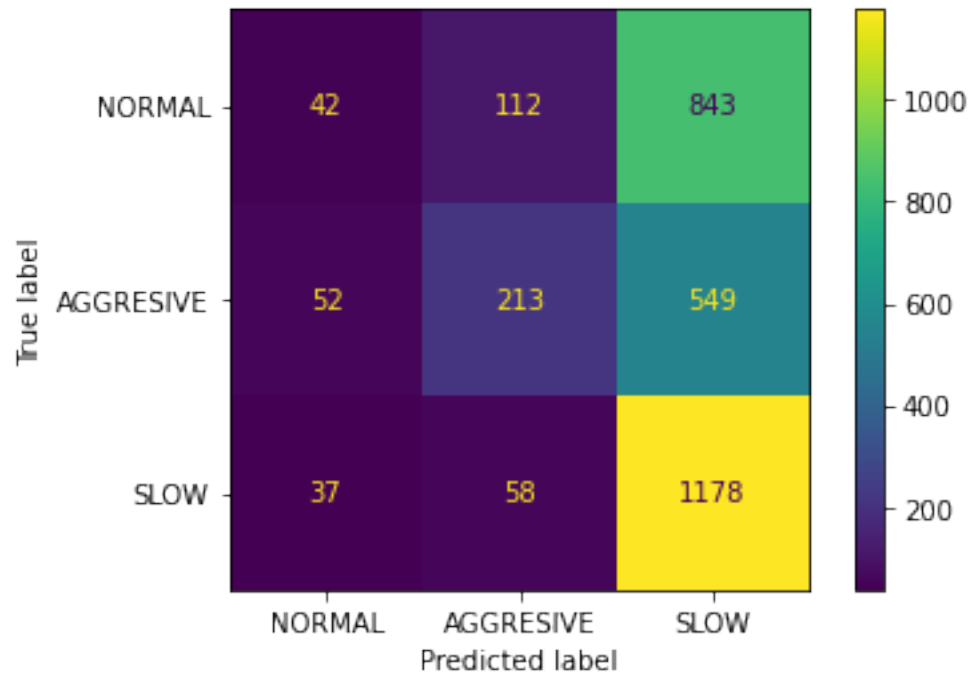
```
[ ]: 0.4646562905317769
```

```
[ ]: y_pred = lr_bagging.predict(X_test)

CM = confusion_matrix(y_test, y_pred)
display = ConfusionMatrixDisplay(confusion_matrix=CM,
```

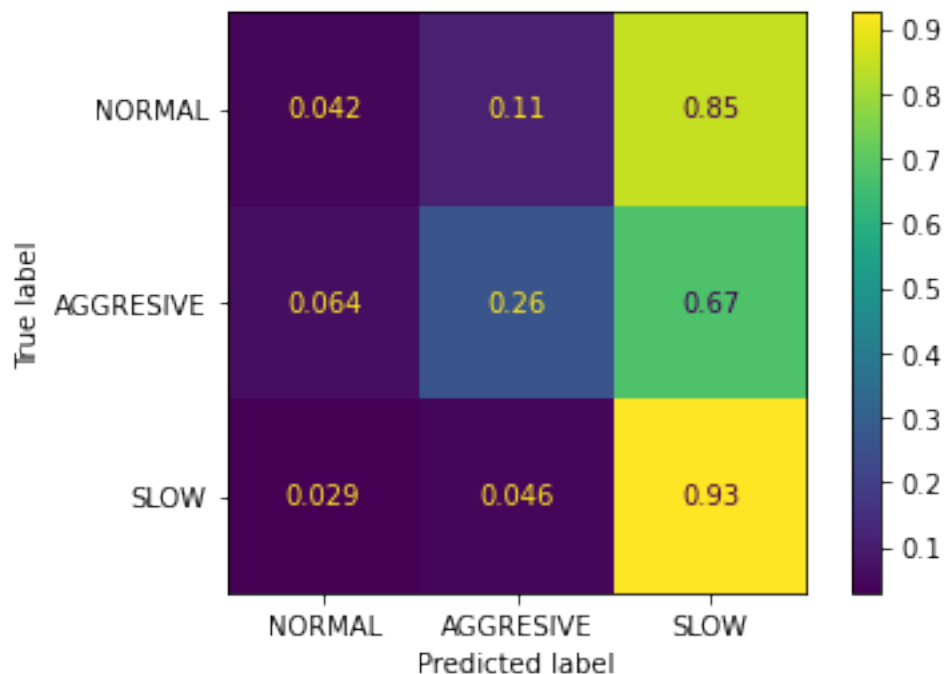
```
display_labels=classes)
display.plot()
```

```
[ ]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7fc43cb98370>
```



```
[ ]: CM_norm = confusion_matrix(y_test, y_pred, normalize="true")
display = ConfusionMatrixDisplay(confusion_matrix=CM_norm,
display_labels=classes)
display.plot()
```

```
[ ]: <sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at
0x7fc43ccb00a0>
```



```
[ ]: def evaluate(model, test_features, test_labels):
    accuracy = model.score(test_features, test_labels)
    print('Model Performance')
    print('Accuracy = {:.3f}%'.format(accuracy))

    return accuracy

bagging_accuracy = evaluate(lr_bagging, X_test, y_test)

best_random = lr_gscv.best_estimator_
random_accuracy = evaluate(best_random, X_test, y_test)

print(f'Improvement of {100 * (bagging_accuracy - random_accuracy) /
    ↳random_accuracy:.3f}%')
```

```
Model Performance
Accuracy = 0.465%.
Model Performance
Accuracy = 0.479%.
Improvement of -2.979%.
```

```
[ ]:
```