```
##################################################
MultinomialNB()

Training Accuracy scores
[0.5183551  0.51782563 0.51853159 0.51853159 0.51800212 0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Accuracy
51.82655686892694

Training Precision scores
[0.5183551  0.51782563 0.51853159 0.51853159 0.51800212 0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Precision
0.5182655686892694

Training Recall scores[0.5183551  0.51782563 0.51853159 0.51853159 0.51800212
0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Recall0.5182655686892694

Training F1 scores[0.5183551  0.51782563 0.51853159 0.51853159 0.51800212
0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training F1 Score0.5182655686892694

Validation Accuracy scores[0.51746032 0.52222222 0.51587302 0.51587302
0.52063492 0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation Accuracy51.82658288540642

Validation Precision scores[0.51746032 0.52222222 0.51587302 0.51587302
0.52063492 0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation Precision0.5182658288540641

Validation Recall scores[0.51746032 0.52222222 0.51587302 0.51587302 0.52063492
0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation Recall0.5182658288540641

Validation F1 scores[0.51746032 0.52222222 0.51587302 0.51587302 0.52063492
0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation F1 Score0.5182658288540641


##################################################
GaussianNB()

Training Accuracy scores
[0.30109425 0.29915284 0.30391811 0.30056477 0.29932933 0.30144723
 0.29662961 0.29874713 0.29786483 0.29910005]
Mean Training Accuracy
29.97848157143141
```

Training Precision scores
[0.30109425 0.29915284 0.30391811 0.30056477 0.29932933 0.30144723
 0.29662961 0.29874713 0.29786483 0.29910005]
Mean Training Precision
0.2997848157143141

Training Recall scores[0.30109425 0.29915284 0.30391811 0.30056477 0.29932933 0.30144723
 0.29662961 0.29874713 0.29786483 0.29910005]
Mean Training Recall0.2997848157143141

Training F1 scores[0.30109425 0.29915284 0.30391811 0.30056477 0.29932933 0.30144723
 0.29662961 0.29874713 0.29786483 0.29910005]
Mean Training F1 Score0.2997848157143141

Validation Accuracy scores[0.28412698 0.3031746 0.27301587 0.2984127
 0.27460317 0.26666667
 0.27344992 0.30047695 0.2845787 0.30047695]
Mean Validation Accuracy28.589825119236878

Validation Precision scores[0.28412698 0.3031746 0.27301587 0.2984127
 0.27460317 0.26666667
 0.27344992 0.30047695 0.2845787 0.30047695]
Mean Validation Precision0.2858982511923688

Validation Recall scores[0.28412698 0.3031746 0.27301587 0.2984127 0.27460317
 0.26666667
 0.27344992 0.30047695 0.2845787 0.30047695]
Mean Validation Recall0.2858982511923688

Validation F1 scores[0.28412698 0.3031746 0.27301587 0.2984127 0.27460317
 0.26666667
 0.27344992 0.30047695 0.2845787 0.30047695]
Mean Validation F1 Score0.2858982511923688

##
BernoulliNB()

Training Accuracy scores
[0.51570773 0.51535475 0.51535475 0.51588422 0.51588422 0.51570773
 0.51544027 0.51596965 0.51508735 0.51526381]
Mean Training Accuracy
51.55654472101505

Training Precision scores
[0.51570773 0.51535475 0.51535475 0.51588422 0.51588422 0.51570773
 0.51544027 0.51596965 0.51508735 0.51526381]
Mean Training Precision
0.5155654472101505

Training Recall scores[0.51570773 0.51535475 0.51535475 0.51588422 0.51588422

0.51570773
 0.51544027 0.51596965 0.51508735 0.51526381]
Mean Training Recall0.5155654472101505

Training F1 scores[0.51570773 0.51535475 0.51535475 0.51588422 0.51588422
0.51570773
 0.51544027 0.51596965 0.51508735 0.51526381]
Mean Training F1 Score0.5155654472101505

Validation Accuracy scores[0.51111111 0.51428571 0.51269841 0.51269841
0.50952381 0.50952381
 0.51351351 0.50874404 0.51510334 0.51828299]
Mean Validation Accuracy51.254851490145604

Validation Precision scores[0.51111111 0.51428571 0.51269841 0.51269841
0.50952381 0.50952381
 0.51351351 0.50874404 0.51510334 0.51828299]
Mean Validation Precision0.512548514901456

Validation Recall scores[0.51111111 0.51428571 0.51269841 0.51269841 0.50952381
0.50952381
 0.51351351 0.50874404 0.51510334 0.51828299]
Mean Validation Recall0.512548514901456

Validation F1 scores[0.51111111 0.51428571 0.51269841 0.51269841 0.50952381
0.50952381
 0.51351351 0.50874404 0.51510334 0.51828299]
Mean Validation F1 Score0.512548514901456

##
ComplementNB()

Training Accuracy scores
[0.66907872 0.6694317 0.67119661 0.66960819 0.67119661 0.67207907
 0.67231339 0.67019587 0.67301923 0.67284277]
Mean Training Accuracy
67.10962165324341

Training Precision scores
[0.66907872 0.6694317 0.67119661 0.66960819 0.67119661 0.67207907
 0.67231339 0.67019587 0.67301923 0.67284277]
Mean Training Precision
0.6710962165324341

Training Recall scores[0.66907872 0.6694317 0.67119661 0.66960819 0.67119661
0.67207907
 0.67231339 0.67019587 0.67301923 0.67284277]
Mean Training Recall0.6710962165324341

Training F1 scores[0.66907872 0.6694317 0.67119661 0.66960819 0.67119661
0.67207907
 0.67231339 0.67019587 0.67301923 0.67284277]
Mean Training F1 Score0.6710962165324341

Validation Accuracy scores[0.66666667 0.68571429 0.65714286 0.69047619
0.66349206 0.65396825
 0.65977742 0.65977742 0.64864865 0.65023847]
Mean Validation Accuracy66.35902288843465

Validation Precision scores[0.66666667 0.68571429 0.65714286 0.69047619
0.66349206 0.65396825
 0.65977742 0.65977742 0.64864865 0.65023847]
Mean Validation Precision0.6635902288843465

Validation Recall scores[0.66666667 0.68571429 0.65714286 0.69047619 0.66349206
0.65396825
 0.65977742 0.65977742 0.64864865 0.65023847]
Mean Validation Recall0.6635902288843465

Validation F1 scores[0.66666667 0.68571429 0.65714286 0.69047619 0.66349206
0.65396825
 0.65977742 0.65977742 0.64864865 0.65023847]
Mean Validation F1 Score0.6635902288843465

##
RandomForestClassifier(n_jobs=10, random_state=0)

Training Accuracy scores
[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Accuracy
100.0

Training Precision scores
[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Precision
1.0

Training Recall scores[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Recall1.0

Training F1 scores[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training F1 Score1.0

Validation Accuracy scores[0.84444444 0.86031746 0.86031746 0.88095238
0.86984127 0.85396825
 0.86327504 0.85691574 0.83624801 0.84578696]
Mean Validation Accuracy85.72067025008202

Validation Precision scores[0.84444444 0.86031746 0.86031746 0.88095238
0.86984127 0.85396825
 0.86327504 0.85691574 0.83624801 0.84578696]
Mean Validation Precision0.8572067025008202

Validation Recall scores[0.84444444 0.86031746 0.86031746 0.88095238 0.86984127
0.85396825
 0.86327504 0.85691574 0.83624801 0.84578696]

Mean Validation Recall0.8572067025008202

Validation F1 scores[0.84444444 0.86031746 0.86031746 0.88095238 0.86984127
0.85396825
 0.86327504 0.85691574 0.83624801 0.84578696]
Mean Validation F1 Score0.8572067025008202

##
DecisionTreeClassifier()

Training Accuracy scores
[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Accuracy
100.0

Training Precision scores
[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Precision
1.0

Training Recall scores[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training Recall1.0

Training F1 scores[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]
Mean Training F1 Score1.0

Validation Accuracy scores[0.83174603 0.81111111 0.83174603 0.84126984
0.82857143 0.79047619
 0.79968203 0.79968203 0.79968203 0.78537361]
Mean Validation Accuracy81.19340348752114

Validation Precision scores[0.83174603 0.81111111 0.83174603 0.84126984
0.82857143 0.79047619
 0.79968203 0.79968203 0.79968203 0.78537361]
Mean Validation Precision0.8119340348752113

Validation Recall scores[0.83174603 0.81111111 0.83174603 0.84126984 0.82857143
0.79047619
 0.79968203 0.79968203 0.79968203 0.78537361]
Mean Validation Recall0.8119340348752113

Validation F1 scores[0.83174603 0.81111111 0.83174603 0.84126984 0.82857143
0.79047619
 0.79968203 0.79968203 0.79968203 0.78537361]
Mean Validation F1 Score0.8119340348752113

##
SVC()

Training Accuracy scores
[0.71496647 0.71478998 0.72184963 0.71443699 0.71461348 0.71902577
 0.71925181 0.71731075 0.72154579 0.71660491]

Mean Training Accuracy
71.74395567728176

Training Precision scores
[0.71496647 0.71478998 0.72184963 0.71443699 0.71461348 0.71902577
 0.71925181 0.71731075 0.72154579 0.71660491]
Mean Training Precision
0.7174395567728176

Training Recall scores[0.71496647 0.71478998 0.72184963 0.71443699 0.71461348 0.71902577
 0.71925181 0.71731075 0.72154579 0.71660491]
Mean Training Recall0.7174395567728176

Training F1 scores[0.71496647 0.71478998 0.72184963 0.71443699 0.71461348
0.71902577
 0.71925181 0.71731075 0.72154579 0.71660491]
Mean Training F1 Score0.7174395567728176

Validation Accuracy scores[0.71269841 0.6952381 0.68888889 0.71111111
0.69365079 0.68253968
 0.68203498 0.69316375 0.67567568 0.69157393]
Mean Validation Accuracy69.26575314810609

Validation Precision scores[0.71269841 0.6952381 0.68888889 0.71111111
0.69365079 0.68253968
 0.68203498 0.69316375 0.67567568 0.69157393]
Mean Validation Precision0.6926575314810608

Validation Recall scores[0.71269841 0.6952381 0.68888889 0.71111111 0.69365079
0.68253968
 0.68203498 0.69316375 0.67567568 0.69157393]
Mean Validation Recall0.6926575314810608

Validation F1 scores[0.71269841 0.6952381 0.68888889 0.71111111 0.69365079
0.68253968
 0.68203498 0.69316375 0.67567568 0.69157393]
Mean Validation F1 Score0.6926575314810608

##
KNeighborsClassifier(n_jobs=10)

Training Accuracy scores
[0.64578186 0.64542887 0.65354748 0.64984116 0.65037063 0.65337098
 0.65396153 0.64866773 0.64902065 0.65343215]
Mean Training Accuracy
65.0342303528874

Training Precision scores
[0.64578186 0.64542887 0.65354748 0.64984116 0.65037063 0.65337098
 0.65396153 0.64866773 0.64902065 0.65343215]
Mean Training Precision
0.650342303528874

Training Recall scores[0.64578186 0.64542887 0.65354748 0.64984116 0.65037063 0.65337098
 0.65396153 0.64866773 0.64902065 0.65343215]
Mean Training Recall0.650342303528874

Training F1 scores[0.64578186 0.64542887 0.65354748 0.64984116 0.65037063 0.65337098
 0.65396153 0.64866773 0.64902065 0.65343215]
Mean Training F1 Score0.650342303528874

Validation Accuracy scores[0.57142857 0.55555556 0.56507937 0.58571429 0.58412698 0.55079365
 0.55961844 0.56597774 0.55166932 0.59300477]
Mean Validation Accuracy56.82968682968682

Validation Precision scores[0.57142857 0.55555556 0.56507937 0.58571429 0.58412698 0.55079365
 0.55961844 0.56597774 0.55166932 0.59300477]
Mean Validation Precision0.5682968682968682

Validation Recall scores[0.57142857 0.55555556 0.56507937 0.58571429 0.58412698 0.55079365
 0.55961844 0.56597774 0.55166932 0.59300477]
Mean Validation Recall0.5682968682968682

Validation F1 scores[0.57142857 0.55555556 0.56507937 0.58571429 0.58412698 0.55079365
 0.55961844 0.56597774 0.55166932 0.59300477]
Mean Validation F1 Score0.5682968682968682

##
LogisticRegression(max_iter=5000, n_jobs=10)

Training Accuracy scores
[0.72255559 0.72326156 0.72714437 0.72290858 0.71796682 0.72873279
 0.72383977 0.725075   0.72931004 0.72701606]
Mean Training Accuracy
72.47810582268235

Training Precision scores
[0.72255559 0.72326156 0.72714437 0.72290858 0.71796682 0.72873279
 0.72383977 0.725075   0.72931004 0.72701606]
Mean Training Precision
0.7247810582268235

Training Recall scores[0.72255559 0.72326156 0.72714437 0.72290858 0.71796682 0.72873279
 0.72383977 0.725075   0.72931004 0.72701606]
Mean Training Recall0.7247810582268235

Training F1 scores[0.72255559 0.72326156 0.72714437 0.72290858 0.71796682 0.72873279

```
 0.72383977 0.725075   0.72931004 0.72701606]
Mean Training F1 Score0.7247810582268235


Validation Accuracy scores[0.71587302 0.72063492 0.7015873  0.72222222
0.72698413 0.68253968
 0.71065183 0.7027027  0.67567568 0.7217806 ]
Mean Validation Accuracy70.8065208065208


Validation Precision scores[0.71587302 0.72063492 0.7015873  0.72222222
0.72698413 0.68253968
 0.71065183 0.7027027  0.67567568 0.7217806 ]
Mean Validation Precision0.7080652080652079


Validation Recall scores[0.71587302 0.72063492 0.7015873  0.72222222 0.72698413
0.68253968
 0.71065183 0.7027027  0.67567568 0.7217806 ]
Mean Validation Recall0.7080652080652079


Validation F1 scores[0.71587302 0.72063492 0.7015873  0.72222222 0.72698413
0.68253968
 0.71065183 0.7027027  0.67567568 0.7217806 ]
Mean Validation F1 Score0.7080652080652081



##################################################
LinearDiscriminantAnalysis()

Training Accuracy scores
[0.68425697 0.68390399 0.68231557 0.68055065 0.68743382 0.68549241
 0.68431269 0.68413623 0.68660667 0.68519499]
Mean Training Accuracy
68.44203979778769

Training Precision scores
[0.68425697 0.68390399 0.68231557 0.68055065 0.68743382 0.68549241
 0.68431269 0.68413623 0.68660667 0.68519499]
Mean Training Precision
0.6844203979778769

Training Recall scores[0.68425697 0.68390399 0.68231557 0.68055065 0.68743382
0.68549241
 0.68431269 0.68413623 0.68660667 0.68519499]
Mean Training Recall0.6844203979778769

Training F1 scores[0.68425697 0.68390399 0.68231557 0.68055065 0.68743382
0.68549241
 0.68431269 0.68413623 0.68660667 0.68519499]
Mean Training F1 Score0.6844203979778769

Validation Accuracy scores[0.67460317 0.68412698 0.66507937 0.68253968 0.6952381
 0.64761905
 0.65659777 0.6645469  0.64864865 0.66772655]
Mean Validation Accuracy66.8672622202034
```

```
Validation Precision scores[0.67460317 0.68412698 0.66507937 0.68253968
0.6952381  0.64761905
 0.65659777 0.6645469  0.64864865 0.66772655]
Mean Validation Precision0.668672622202034

Validation Recall scores[0.67460317 0.68412698 0.66507937 0.68253968 0.6952381
0.64761905
 0.65659777 0.6645469  0.64864865 0.66772655]
Mean Validation Recall0.668672622202034

Validation F1 scores[0.67460317 0.68412698 0.66507937 0.68253968 0.6952381
0.64761905
 0.65659777 0.6645469  0.64864865 0.66772655]
Mean Validation F1 Score0.668672622202034


##################################################
BaggingClassifier(estimator=MultinomialNB(), n_jobs=10)

Training Accuracy scores
[0.5183551  0.51729615 0.51853159 0.51853159 0.51800212 0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Accuracy
51.82126212836923

Training Precision scores
[0.5183551  0.51729615 0.51853159 0.51853159 0.51800212 0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Precision
0.5182126212836923

Training Recall scores[0.5183551  0.51729615 0.51853159 0.51853159 0.51800212
0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training Recall0.5182126212836923

Training F1 scores[0.5183551  0.51729615 0.51853159 0.51853159 0.51800212
0.51853159
 0.51826363 0.51826363 0.51808717 0.51826363]
Mean Training F1 Score0.5182126212836923

Validation Accuracy scores[0.51746032 0.52222222 0.51587302 0.51587302
0.52063492 0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation Accuracy51.82658288540642

Validation Precision scores[0.51746032 0.52222222 0.51587302 0.51587302
0.52063492 0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation Precision0.5182658288540641

Validation Recall scores[0.51746032 0.52222222 0.51587302 0.51587302 0.52063492
0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
```

Mean Validation Recall0.5182658288540641

Validation F1 scores[0.51746032 0.52222222 0.51587302 0.51587302 0.52063492
0.51587302
 0.51828299 0.51828299 0.51987281 0.51828299]
Mean Validation F1 Score0.5182658288540641

##
BaggingClassifier(estimator=GaussianNB(), n_jobs=10)

Training Accuracy scores
[0.30444758 0.29756442 0.30674197 0.30162372 0.30462407 0.30180021
 0.29521793 0.29962943 0.29768837 0.29998235]
Mean Training Accuracy
30.093200638744843

Training Precision scores
[0.30444758 0.29756442 0.30674197 0.30162372 0.30462407 0.30180021
 0.29521793 0.29962943 0.29768837 0.29998235]
Mean Training Precision
0.30093200638744844

Training Recall scores[0.30444758 0.29756442 0.30674197 0.30162372 0.30462407
0.30180021
 0.29521793 0.29962943 0.29768837 0.29998235]
Mean Training Recall0.30093200638744844

Training F1 scores[0.30444758 0.29756442 0.30674197 0.30162372 0.30462407
0.30180021
 0.29521793 0.29962943 0.29768837 0.29998235]
Mean Training F1 Score0.30093200638744844

Validation Accuracy scores[0.28412698 0.3   0.27777778 0.3
0.27301587 0.26984127
 0.2718601 0.29888712 0.28934817 0.30047695]
Mean Validation Accuracy28.6533424180483

Validation Precision scores[0.28412698 0.3   0.27777778 0.3
0.27301587 0.26984127
 0.2718601 0.29888712 0.28934817 0.30047695]
Mean Validation Precision0.286533424180483

Validation Recall scores[0.28412698 0.3   0.27777778 0.3   0.27301587
0.26984127
 0.2718601 0.29888712 0.28934817 0.30047695]
Mean Validation Recall0.286533424180483

Validation F1 scores[0.28412698 0.3   0.27777778 0.3   0.27301587
0.26984127
 0.2718601 0.29888712 0.28934817 0.30047695]
Mean Validation F1 Score0.286533424180483

```
###################################################
BaggingClassifier(estimator=BernoulliNB(), n_jobs=10)

Training Accuracy scores
[0.51517826 0.51553124 0.51535475 0.51588422 0.51553124 0.51570773
 0.51508735 0.51596965 0.51508735 0.51508735]
Mean Training Accuracy
51.5441912606914

Training Precision scores
[0.51517826 0.51553124 0.51535475 0.51588422 0.51553124 0.51570773
 0.51508735 0.51596965 0.51508735 0.51508735]
Mean Training Precision
0.515441912606914

Training Recall scores[0.51517826 0.51553124 0.51535475 0.51588422 0.51553124
0.51570773
 0.51508735 0.51596965 0.51508735 0.51508735]
Mean Training Recall0.515441912606914

Training F1 scores[0.51517826 0.51553124 0.51535475 0.51588422 0.51553124
0.51570773
 0.51508735 0.51596965 0.51508735 0.51508735]
Mean Training F1 Score0.515441912606914

Validation Accuracy scores[0.51111111 0.51269841 0.51269841 0.51269841
0.50952381 0.50952381
 0.51351351 0.51033386 0.51669316 0.51987281]
Mean Validation Accuracy51.2866732278497

Validation Precision scores[0.51111111 0.51269841 0.51269841 0.51269841
0.50952381 0.50952381
 0.51351351 0.51033386 0.51669316 0.51987281]
Mean Validation Precision0.512866732278497

Validation Recall scores[0.51111111 0.51269841 0.51269841 0.51269841 0.50952381
0.50952381
 0.51351351 0.51033386 0.51669316 0.51987281]
Mean Validation Recall0.512866732278497

Validation F1 scores[0.51111111 0.51269841 0.51269841 0.51269841 0.50952381
0.50952381
 0.51351351 0.51033386 0.51669316 0.51987281]
Mean Validation F1 Score0.512866732278497


###################################################
BaggingClassifier(estimator=ComplementNB(), n_jobs=10)

Training Accuracy scores
[0.66996117 0.67013766 0.66996117 0.66854924 0.6713731  0.67084363
 0.67107817 0.67054879 0.67478384 0.67301923]
Mean Training Accuracy
67.10256013054442
```

Training Precision scores
[0.66996117 0.67013766 0.66996117 0.66854924 0.6713731 0.67084363
 0.67107817 0.67054879 0.67478384 0.67301923]
Mean Training Precision
0.6710256013054442

Training Recall scores[0.66996117 0.67013766 0.66996117 0.66854924 0.6713731
0.67084363
 0.67107817 0.67054879 0.67478384 0.67301923]
Mean Training Recall0.6710256013054442

Training F1 scores[0.66996117 0.67013766 0.66996117 0.66854924 0.6713731
0.67084363
 0.67107817 0.67054879 0.67478384 0.67301923]
Mean Training F1 Score0.6710256013054442

Validation Accuracy scores[0.66666667 0.68095238 0.65396825 0.69206349
0.66666667 0.65238095
 0.65977742 0.65977742 0.65023847 0.64864865]
Mean Validation Accuracy66.3114038408156

Validation Precision scores[0.66666667 0.68095238 0.65396825 0.69206349
0.66666667 0.65238095
 0.65977742 0.65977742 0.65023847 0.64864865]
Mean Validation Precision0.663114038408156

Validation Recall scores[0.66666667 0.68095238 0.65396825 0.69206349 0.66666667
0.65238095
 0.65977742 0.65977742 0.65023847 0.64864865]
Mean Validation Recall0.663114038408156

Validation F1 scores[0.66666667 0.68095238 0.65396825 0.69206349 0.66666667
0.65238095
 0.65977742 0.65977742 0.65023847 0.64864865]
Mean Validation F1 Score0.663114038408156

###
BaggingClassifier(estimator=RandomForestClassifier(), n_jobs=10)

Training Accuracy scores
[0.99223438 0.99294035 0.99311684 0.99294035 0.99241087 0.99205789
 0.99170637 0.99011823 0.99188283 0.99400035]
Mean Training Accuracy
99.2340845256232

Training Precision scores
[0.99223438 0.99294035 0.99311684 0.99294035 0.99241087 0.99205789
 0.99170637 0.99011823 0.99188283 0.99400035]
Mean Training Precision
0.992340845256232

Training Recall scores[0.99223438 0.99294035 0.99311684 0.99294035 0.99241087

```
0.99205789
 0.99170637 0.99011823 0.99188283 0.99400035]
Mean Training Recall0.992340845256232

Training F1 scores[0.99223438 0.99294035 0.99311684 0.99294035 0.99241087
0.99205789
 0.99170637 0.99011823 0.99188283 0.99400035]
Mean Training F1 Score0.992340845256232

Validation Accuracy scores[0.84285714 0.84126984 0.84444444 0.85714286
0.85555556 0.82539683
 0.84737679 0.84101749 0.83624801 0.82988871]
Mean Validation Accuracy84.21197668256491

Validation Precision scores[0.84285714 0.84126984 0.84444444 0.85714286
0.85555556 0.82539683
 0.84737679 0.84101749 0.83624801 0.82988871]
Mean Validation Precision0.8421197668256492

Validation Recall scores[0.84285714 0.84126984 0.84444444 0.85714286 0.85555556
0.82539683
 0.84737679 0.84101749 0.83624801 0.82988871]
Mean Validation Recall0.8421197668256492

Validation F1 scores[0.84285714 0.84126984 0.84444444 0.85714286 0.85555556
0.82539683
 0.84737679 0.84101749 0.83624801 0.82988871]
Mean Validation F1 Score0.8421197668256492


##################################################
BaggingClassifier(estimator=DecisionTreeClassifier(), n_jobs=10)

Training Accuracy scores
[0.99346982 0.99329333 0.99417579 0.99170491 0.99435228 0.99223438
 0.99170637 0.99223575 0.99170637 0.99029469]
Mean Training Accuracy
99.25173677518565

Training Precision scores
[0.99346982 0.99329333 0.99417579 0.99170491 0.99435228 0.99223438
 0.99170637 0.99223575 0.99170637 0.99029469]
Mean Training Precision
0.9925173677518565

Training Recall scores[0.99346982 0.99329333 0.99417579 0.99170491 0.99435228
0.99223438
 0.99170637 0.99223575 0.99170637 0.99029469]
Mean Training Recall0.9925173677518565

Training F1 scores[0.99346982 0.99329333 0.99417579 0.99170491 0.99435228
0.99223438
 0.99170637 0.99223575 0.99170637 0.99029469]
Mean Training F1 Score0.9925173677518565
```

Validation Accuracy scores[0.85555556 0.83333333 0.86666667 0.88412698
0.85396825 0.83650794
 0.83942766 0.84578696 0.84737679 0.86327504]
Mean Validation Accuracy85.26025184848714

Validation Precision scores[0.85555556 0.83333333 0.86666667 0.88412698
0.85396825 0.83650794
 0.83942766 0.84578696 0.84737679 0.86327504]
Mean Validation Precision0.8526025184848715

Validation Recall scores[0.85555556 0.83333333 0.86666667 0.88412698 0.85396825
0.83650794
 0.83942766 0.84578696 0.84737679 0.86327504]
Mean Validation Recall0.8526025184848715

Validation F1 scores[0.85555556 0.83333333 0.86666667 0.88412698 0.85396825
0.83650794
 0.83942766 0.84578696 0.84737679 0.86327504]
Mean Validation F1 Score0.8526025184848715

##
BaggingClassifier(estimator=SVC(), n_jobs=10)

Training Accuracy scores
[0.72308507 0.71920226 0.72820332 0.71531945 0.72008472 0.7204377
 0.72154579 0.72278101 0.7259573 0.71872243]
Mean Training Accuracy
72.15339038734729

Training Precision scores
[0.72308507 0.71920226 0.72820332 0.71531945 0.72008472 0.7204377
 0.72154579 0.72278101 0.7259573 0.71872243]
Mean Training Precision
0.7215339038734728

Training Recall scores[0.72308507 0.71920226 0.72820332 0.71531945 0.72008472
0.7204377
 0.72154579 0.72278101 0.7259573 0.71872243]
Mean Training Recall0.7215339038734728

Training F1 scores[0.72308507 0.71920226 0.72820332 0.71531945 0.72008472
0.7204377
 0.72154579 0.72278101 0.7259573 0.71872243]
Mean Training F1 Score0.7215339038734728

Validation Accuracy scores[0.72063492 0.7015873 0.69206349 0.70793651 0.6968254
 0.68571429
 0.68680445 0.70111288 0.68203498 0.6963434]
Mean Validation Accuracy69.71057612234083

Validation Precision scores[0.72063492 0.7015873 0.69206349 0.70793651
0.6968254 0.68571429

```
 0.68680445 0.70111288 0.68203498 0.6963434 ]
Mean Validation Precision0.6971057612234083

Validation Recall scores[0.72063492 0.7015873  0.69206349 0.70793651 0.6968254
0.68571429
 0.68680445 0.70111288 0.68203498 0.6963434 ]
Mean Validation Recall0.6971057612234083

Validation F1 scores[0.72063492 0.7015873  0.69206349 0.70793651 0.6968254
0.68571429
 0.68680445 0.70111288 0.68203498 0.6963434 ]
Mean Validation F1 Score0.6971057612234083


##################################################
BaggingClassifier(estimator=KNeighborsClassifier(), n_jobs=10)

Training Accuracy scores
[0.66590187 0.66784328 0.66801977 0.6673138  0.66890222 0.67049065
 0.67054879 0.66454914 0.66790189 0.67178401]
Mean Training Accuracy
66.83255421137268

Training Precision scores
[0.66590187 0.66784328 0.66801977 0.6673138  0.66890222 0.67049065
 0.67054879 0.66454914 0.66790189 0.67178401]
Mean Training Precision
0.6683255421137267

Training Recall scores[0.66590187 0.66784328 0.66801977 0.6673138  0.66890222
0.67049065
 0.67054879 0.66454914 0.66790189 0.67178401]
Mean Training Recall0.6683255421137267

Training F1 scores[0.66590187 0.66784328 0.66801977 0.6673138  0.66890222
0.67049065
 0.67054879 0.66454914 0.66790189 0.67178401]
Mean Training F1 Score0.6683255421137267

Validation Accuracy scores[0.58412698 0.53333333 0.54761905 0.58412698
0.56666667 0.54603175
 0.53736089 0.56438792 0.55643879 0.57551669]
Mean Validation Accuracy55.95609054432583

Validation Precision scores[0.58412698 0.53333333 0.54761905 0.58412698
0.56666667 0.54603175
 0.53736089 0.56438792 0.55643879 0.57551669]
Mean Validation Precision0.5595609054432583

Validation Recall scores[0.58412698 0.53333333 0.54761905 0.58412698 0.56666667
0.54603175
 0.53736089 0.56438792 0.55643879 0.57551669]
Mean Validation Recall0.5595609054432583
```

Validation F1 scores[0.58412698 0.53333333 0.54761905 0.58412698 0.56666667 0.54603175
 0.53736089 0.56438792 0.55643879 0.57551669]
Mean Validation F1 Score0.5595609054432583

##
BaggingClassifier(estimator=LogisticRegression(max_iter=5000), n_jobs=10)

Training Accuracy scores
[0.72167314 0.7223791 0.72432051 0.72290858 0.71690787 0.72432051
 0.72083995 0.72048703 0.725075   0.72313393]
Mean Training Accuracy
72.22045616676729

Training Precision scores
[0.72167314 0.7223791 0.72432051 0.72290858 0.71690787 0.72432051
 0.72083995 0.72048703 0.725075   0.72313393]
Mean Training Precision
0.7222045616676729

Training Recall scores[0.72167314 0.7223791 0.72432051 0.72290858 0.71690787 0.72432051
 0.72083995 0.72048703 0.725075   0.72313393]
Mean Training Recall0.7222045616676729

Training F1 scores[0.72167314 0.7223791 0.72432051 0.72290858 0.71690787 0.72432051
 0.72083995 0.72048703 0.725075   0.72313393]
Mean Training F1 Score0.7222045616676729

Validation Accuracy scores[0.71428571 0.71269841 0.6952381 0.71111111 0.73015873 0.67936508
 0.70747218 0.709062   0.67249603 0.70588235]
Mean Validation Accuracy70.37769702475585

Validation Precision scores[0.71428571 0.71269841 0.6952381 0.71111111 0.73015873 0.67936508
 0.70747218 0.709062   0.67249603 0.70588235]
Mean Validation Precision0.7037769702475585

Validation Recall scores[0.71428571 0.71269841 0.6952381 0.71111111 0.73015873 0.67936508
 0.70747218 0.709062   0.67249603 0.70588235]
Mean Validation Recall0.7037769702475585

Validation F1 scores[0.71428571 0.71269841 0.6952381 0.71111111 0.73015873 0.67936508
 0.70747218 0.709062   0.67249603 0.70588235]
Mean Validation F1 Score0.7037769702475585

##
BaggingClassifier(estimator=LinearDiscriminantAnalysis(), n_jobs=10)

```
Training Accuracy scores
[0.68990469 0.68937522 0.68884575 0.69219908 0.69096364 0.69343452
 0.68943003 0.69190048 0.69084172 0.69048879]
Mean Training Accuracy
69.07383928517483


Training Precision scores
[0.68990469 0.68937522 0.68884575 0.69219908 0.69096364 0.69343452
 0.68943003 0.69190048 0.69084172 0.69048879]
Mean Training Precision
0.6907383928517483


Training Recall scores[0.68990469 0.68937522 0.68884575 0.69219908 0.69096364
0.69343452
 0.68943003 0.69190048 0.69084172 0.69048879]
Mean Training Recall0.6907383928517483


Training F1 scores[0.68990469 0.68937522 0.68884575 0.69219908 0.69096364
0.69343452
 0.68943003 0.69190048 0.69084172 0.69048879]
Mean Training F1 Score0.6907383928517483


Validation Accuracy scores[0.68253968 0.67619048 0.66825397 0.68571429 0.7015873
 0.65238095
 0.66613672 0.6645469  0.65500795 0.66772655]
Mean Validation Accuracy67.20084790673026


Validation Precision scores[0.68253968 0.67619048 0.66825397 0.68571429
0.7015873  0.65238095
 0.66613672 0.6645469  0.65500795 0.66772655]
Mean Validation Precision0.6720084790673027


Validation Recall scores[0.68253968 0.67619048 0.66825397 0.68571429 0.7015873
0.65238095
 0.66613672 0.6645469  0.65500795 0.66772655]
Mean Validation Recall0.6720084790673027


Validation F1 scores[0.68253968 0.67619048 0.66825397 0.68571429 0.7015873
0.65238095
 0.66613672 0.6645469  0.65500795 0.66772655]
Mean Validation F1 Score0.6720084790673027



##################################################
GradientBoostingClassifier()

Training Accuracy scores
[0.97811507 0.97740911 0.97529121 0.97670314 0.97917402 0.97705612
 0.97953062 0.97811893 0.97653079 0.97723663]
Mean Training Accuracy
97.75165651786892


Training Precision scores
```

```
[0.97811507 0.97740911 0.97529121 0.97670314 0.97917402 0.97705612
 0.97953062 0.97811893 0.97653079 0.97723663]
Mean Training Precision
0.9775165651786892

Training Recall scores[0.97811507 0.97740911 0.97529121 0.97670314 0.97917402
0.97705612
 0.97953062 0.97811893 0.97653079 0.97723663]
Mean Training Recall0.9775165651786892

Training F1 scores[0.97811507 0.97740911 0.97529121 0.97670314 0.97917402
0.97705612
 0.97953062 0.97811893 0.97653079 0.97723663]
Mean Training F1 Score0.9775165651786892

Validation Accuracy scores[0.87619048 0.87460317 0.8968254  0.8984127
0.87301587 0.89206349
 0.86168521 0.87440382 0.88394277 0.87758347]
Mean Validation Accuracy88.08726373432253

Validation Precision scores[0.87619048 0.87460317 0.8968254  0.8984127
0.87301587 0.89206349
 0.86168521 0.87440382 0.88394277 0.87758347]
Mean Validation Precision0.8808726373432254

Validation Recall scores[0.87619048 0.87460317 0.8968254   0.8984127   0.87301587
0.89206349
 0.86168521 0.87440382 0.88394277 0.87758347]
Mean Validation Recall0.8808726373432254

Validation F1 scores[0.87619048 0.87460317 0.8968254   0.8984127   0.87301587
0.89206349
 0.86168521 0.87440382 0.88394277 0.87758347]
Mean Validation F1 Score0.8808726373432256


##################################################
AdaBoostClassifier()

Training Accuracy scores
[0.53018002 0.41404871 0.39781151 0.40504765 0.49135192 0.41246029
 0.36580201 0.45067937 0.41344627 0.42050468]
Mean Training Accuracy
43.01332433404957

Training Precision scores
[0.53018002 0.41404871 0.39781151 0.40504765 0.49135192 0.41246029
 0.36580201 0.45067937 0.41344627 0.42050468]
Mean Training Precision
0.43013324334049574

Training Recall scores[0.53018002 0.41404871 0.39781151 0.40504765 0.49135192
0.41246029
 0.36580201 0.45067937 0.41344627 0.42050468]
```

Mean Training Recall0.43013324334049574

Training F1 scores[0.53018002 0.41404871 0.39781151 0.40504765 0.49135192
0.41246029
 0.36580201 0.45067937 0.41344627 0.42050468]
Mean Training F1 Score0.43013324334049574

Validation Accuracy scores[0.56349206 0.41746032 0.38888889 0.41428571
0.45238095 0.40793651
 0.3608903 0.43084261 0.41971383 0.41335453]
Mean Validation Accuracy42.692457163045404

Validation Precision scores[0.56349206 0.41746032 0.38888889 0.41428571
0.45238095 0.40793651
 0.3608903 0.43084261 0.41971383 0.41335453]
Mean Validation Precision0.42692457163045405

Validation Recall scores[0.56349206 0.41746032 0.38888889 0.41428571 0.45238095
0.40793651
 0.3608903 0.43084261 0.41971383 0.41335453]
Mean Validation Recall0.42692457163045405

Validation F1 scores[0.56349206 0.41746032 0.38888889 0.41428571 0.45238095
0.40793651
 0.3608903 0.43084261 0.41971383 0.41335453]
Mean Validation F1 Score0.42692457163045405

###
StackingClassifier(estimators=[('mnb', MultinomialNB()), ('gnb', GaussianNB()),
                               ('bnb', BernoulliNB()), ('cnb', ComplementNB()),
                               ('rf', RandomForestClassifier()),
                               ('dt', DecisionTreeClassifier()), ('svc', SVC()),
                               ('lr', LogisticRegression(max_iter=100000000)),
                               ('knn', KNeighborsClassifier()),
                               ('lda', LinearDiscriminantAnalysis()))],
                   n_jobs=10)

Training Accuracy scores
[0.99947053 0.99964702 0.99947053 0.99964702 0.99982351 0.99982351
 0.99947062 0.99982354 0.9991177 0.99964708]
Mean Training Accuracy
99.9594104148646

Training Precision scores
[0.99947053 0.99964702 0.99947053 0.99964702 0.99982351 0.99982351
 0.99947062 0.99982354 0.9991177 0.99964708]
Mean Training Precision
0.999594104148646

Training Recall scores[0.99947053 0.99964702 0.99947053 0.99964702 0.99982351
0.99982351
 0.99947062 0.99982354 0.9991177 0.99964708]
Mean Training Recall0.999594104148646

Training F1 scores[0.99947053 0.99964702 0.99947053 0.99964702 0.99982351
0.99982351
 0.99947062 0.99982354 0.9991177 0.99964708]
Mean Training F1 Score0.999594104148646

Validation Accuracy scores[0.87460317 0.87777778 0.87777778 0.88412698 0.8968254
 0.86031746
 0.86486486 0.86327504 0.85532591 0.87440382]
Mean Validation Accuracy87.29298205768794

Validation Precision scores[0.87460317 0.87777778 0.87777778 0.88412698
0.8968254 0.86031746
 0.86486486 0.86327504 0.85532591 0.87440382]
Mean Validation Precision0.8729298205768794

Validation Recall scores[0.87460317 0.87777778 0.87777778 0.88412698 0.8968254
0.86031746
 0.86486486 0.86327504 0.85532591 0.87440382]
Mean Validation Recall0.8729298205768794

Validation F1 scores[0.87460317 0.87777778 0.87777778 0.88412698 0.8968254
0.86031746
 0.86486486 0.86327504 0.85532591 0.87440382]
Mean Validation F1 Score0.8729298205768794

###
VotingClassifier(estimators=[('mnb', MultinomialNB()), ('gnb', GaussianNB()),
                             ('bnb', BernoulliNB()), ('cnb', ComplementNB()),
                             ('rf', RandomForestClassifier()),
                             ('dt', DecisionTreeClassifier()),
                             ('svc', SVC(probability=True)),
                             ('lr', LogisticRegression(max_iter=10000)),
                             ('knn', KNeighborsClassifier()),
                             ('lda', LinearDiscriminantAnalysis()))],
                 n_jobs=10)

Training Accuracy scores
[0.72167314 0.7204377 0.724497   0.72132016 0.7223791 0.72502647
 0.72666314 0.72295747 0.72666314 0.72295747]
Mean Training Accuracy
72.34574789759776

Training Precision scores
[0.72167314 0.7204377 0.724497   0.72132016 0.7223791 0.72502647
 0.72666314 0.72295747 0.72666314 0.72295747]
Mean Training Precision
0.7234574789759777

Training Recall scores[0.72167314 0.7204377 0.724497   0.72132016 0.7223791
0.72502647
 0.72666314 0.72295747 0.72666314 0.72295747]
Mean Training Recall0.7234574789759777

```
Training F1 scores[0.72167314 0.7204377  0.724497   0.72132016 0.7223791
0.72502647
 0.72666314 0.72295747 0.72666314 0.72295747]
Mean Training F1 Score0.7234574789759777

Validation Accuracy scores[0.70952381 0.68730159 0.68888889 0.71111111 0.6968254
 0.67619048
 0.67885533 0.68839428 0.66931638 0.71065183]
Mean Validation Accuracy69.17059075882605

Validation Precision scores[0.70952381 0.68730159 0.68888889 0.71111111
0.6968254  0.67619048
 0.67885533 0.68839428 0.66931638 0.71065183]
Mean Validation Precision0.6917059075882606

Validation Recall scores[0.70952381 0.68730159 0.68888889 0.71111111 0.6968254
0.67619048
 0.67885533 0.68839428 0.66931638 0.71065183]
Mean Validation Recall0.6917059075882606

Validation F1 scores[0.70952381 0.68730159 0.68888889 0.71111111 0.6968254
0.67619048
 0.67885533 0.68839428 0.66931638 0.71065183]
Mean Validation F1 Score0.6917059075882606
```