```
In [1]:  import numpy as np
         import pandas as pd
         import matplotlib.pyplot as plt
         from matplotlib.mlab import frange

         from sklearn import datasets
         data_brut = pd.read_csv('/Users/thesard/Doctorat/These2018/ISEP/Dev
         eloppements/EspaceIntelliJ/LearningAllInPython/Learning_IHM_Feature
         s/datasets/imported_datasets/shuttle-unsupervised-ad_2019-06-14 17:
         33:02.493755.csv', header=None, index_col=None)
         X = data_brut[[0, 1, 2, 3, 4, 5, 6, 7, 8]]
         y_brut = data_brut[[9]]
```

```
In [2]:  # To encode qualitative data into quantitative data
         from sklearn.preprocessing import LabelEncoder
         encoder = LabelEncoder()
         y = encoder.fit_transform(y_brut)
         y
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/prepr
ocessing/label.py:235: DataConversionWarning: A column-vector y wa
s passed when a 1d array was expected. Please change the shape of
y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
Out[2]:  array([1, 1, 1, ..., 0, 0, 0])
```

```
In [3]:  data = pd.concat([
             X,
             pd.DataFrame(y, dtype=np.int)
         ], axis=1, ignore_index=True)
         #data
```

```
In [4]:  from sklearn.neighbors import LocalOutlierFactor
         from scipy.stats import randint as sp_randint
         import random
         n_neighbors = sp_randint(1, 100)
         contamination = random.uniform(0, 0.5)
         #clf = LocalOutlierFactor(n_neighbors=n_neighbors, contamination=co
         ntamination, novelty=True)
         clf = LocalOutlierFactor(novelty=True)
```

In [5]:
```python
from sklearn.metrics import SCORERS
SCORERS.keys()
```

Out[5]: dict_keys(['explained_variance', 'r2', 'neg_median_absolute_error', 'neg_mean_absolute_error', 'neg_mean_squared_error', 'neg_mean_squared_log_error', 'accuracy', 'roc_auc', 'balanced_accuracy', 'average_precision', 'neg_log_loss', 'brier_score_loss', 'adjusted_rand_score', 'homogeneity_score', 'completeness_score', 'v_measure_score', 'mutual_info_score', 'adjusted_mutual_info_score', 'normalized_mutual_info_score', 'fowlkes_mallows_score', 'precision', 'precision_macro', 'precision_micro', 'precision_samples', 'precision_weighted', 'recall', 'recall_macro', 'recall_micro', 'recall_samples', 'recall_weighted', 'f1', 'f1_macro', 'f1_micro', 'f1_samples', 'f1_weighted'])

In [6]:
```python
from sklearn.model_selection import cross_validate
from sklearn.metrics import recall_score
scoring = ['precision_macro', 'recall_macro']
scores = cross_validate(clf, X, y, scoring=scoring, cv=5)
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/neigh
bors/lof.py:236: FutureWarning: default contamination parameter 0.
1 will change in version 0.22 to "auto". This will change the pred
ict method behavior.
  FutureWarning)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/neigh
bors/lof.py:236: FutureWarning: default contamination parameter 0.
1 will change in version 0.22 to "auto". This will change the pred
ict method behavior.
  FutureWarning)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/neigh
bors/lof.py:236: FutureWarning: default contamination parameter 0.
1 will change in version 0.22 to "auto". This will change the pred
ict method behavior.
  FutureWarning)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/neigh
bors/lof.py:236: FutureWarning: default contamination parameter 0.
1 will change in version 0.22 to "auto". This will change the pred
ict method behavior.
  FutureWarning)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
  'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
```

```
      'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/neigh
bors/lof.py:236: FutureWarning: default contamination parameter 0.
1 will change in version 0.22 to "auto". This will change the pred
ict method behavior.
      FutureWarning)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
      'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1143: UndefinedMetricWarning: Precision is il
l-defined and being set to 0.0 in labels with no predicted samples
.
      'precision', 'predicted', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
```

In [7]:
```python
sorted(scores.keys())
```

Out[7]:
```
['fit_time',
 'score_time',
 'test_precision_macro',
 'test_recall_macro',
 'train_precision_macro',
 'train_recall_macro']
```

In [8]:
```
scores
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/utils
/deprecation.py:125: FutureWarning: You are accessing a training s
core ('train_precision_macro'), which will not be available by def
ault any more in 0.21. If you need training scores, please set ret
urn_train_score=True
  warnings.warn(*warn_args, **warn_kwargs)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/utils
/deprecation.py:125: FutureWarning: You are accessing a training s
core ('train_recall_macro'), which will not be available by defaul
t any more in 0.21. If you need training scores, please set return
_train_score=True
  warnings.warn(*warn_args, **warn_kwargs)
```

Out[8]:
```
{'fit_time': array([2.69830608, 4.16939092, 4.05665207, 4.26525998
, 4.11782885]),
 'score_time': array([1.38051009, 1.66500115, 2.56111217, 1.751930
95, 1.99030304]),
 'test_precision_macro': array([8.88060033e-05, 0.00000000e+00, 0.
00000000e+00, 0.00000000e+00,
        0.00000000e+00]),
 'train_precision_macro': array([0.        , 0.00683427, 0.0068131
7, 0.00676389, 0.0067812 ]),
 'test_recall_macro': array([0.0007593, 0.        , 0.        , 0.
, 0.        ]),
 'train_recall_macro': array([0.        , 0.2634776 , 0.2627183 ,
0.26044039, 0.2611997 ])}
```

In [9]:
```
scores['test_recall_macro']
```

Out[9]:
```
array([0.0007593, 0.        , 0.        , 0.        , 0.        ])
```

In [10]:
```
#scores.get_params()
```

In [11]:
```
# RandomizedSearchCV
clf = LocalOutlierFactor()
```

In [12]:
```
clf.get_params()
```

Out[12]:
```
{'algorithm': 'auto',
 'contamination': 'legacy',
 'leaf_size': 30,
 'metric': 'minkowski',
 'metric_params': None,
 'n_jobs': None,
 'n_neighbors': 20,
 'novelty': False,
 'p': 2}
```

```python
In [13]:  # Utility function to report best scores
          def report(results, n_top=3):
              for i in range(1, n_top + 1):
                  candidates = np.flatnonzero(results['rank_test_score'] == i
          )
                  for candidate in candidates:
                      print("Model with rank: {0}".format(i))
                      print("Mean validation score: {0:.3f} (std: {1:.3f})".f
          ormat(
                          results['mean_test_score'][candidate],
                          results['std_test_score'][candidate]))
                      print("Parameters: {0}".format(results['params'][candid
          ate]))
                      print("")
```

```python
In [14]:  #from scipy.stats import randint as sp_randint
          #import random
          # specify parameters and distributions to sample from
          #param_dist = {"algorithm": ['auto', 'ball_tree', 'kd_tree', 'brute
          '],
          #              "contamination": [random.uniform(0, 0.5)],
          #              "leaf_size": sp_randint(1, 100),
          #              "metric": ['braycurtis', 'canberra', 'chebyshev',
          #          'correlation', 'dice', 'hamming', 'jaccard', 'kulsinski'
          ',
          #          'mahalanobis', 'minkowski', 'rogerstanimoto', 'russellra
          o',
          #          'seuclidean', 'sokalmichener', 'sokalsneath', 'sqeuclide
          an',
          #          'yule'],
          #              "n_jobs": [None],
          #              "n_neighbors": sp_randint(1, 100),
          #              "novelty": [True, False],
          #              "p": sp_randint(1, 10)}

          #[frange(0, 1, 0.1)],
          #              "degree": [np.arange(0, 10)]
```

```python
In [15]:  frange(0.1, 0.5, 0.000001)
```

```
          /Users/thesard/anaconda3/lib/python3.7/site-packages/ipykernel_lau
          ncher.py:1: MatplotlibDeprecationWarning: numpy.arange
            """Entry point for launching an IPython kernel.
```

```python
Out[15]:  array([0.1     , 0.100001, 0.100002, ..., 0.499998, 0.499999, 0.5
          ])
```

```python
In [22]:  np.arange(1, 10)
```

```python
Out[22]:  array([1, 2, 3, 4, 5, 6, 7, 8, 9])
```

```python
In [16]:  # specify parameters and distributions to sample from
          param_dist = {"algorithm": ['auto'],
                        #"contamination": [frange(0, 0.5, 0.1)],
                        "contamination": [frange(0, 0.5, 0.1)],
                        "leaf_size": [np.arange(1, 100)],
                        "metric": ['minkowski'],
                        "n_jobs": [None],
                        "n_neighbors": [np.arange(1, 100)],
                        "novelty": [True],
                        "p": [np.arange(1, 10)]}
```

/Users/thesard/anaconda3/lib/python3.7/site-packages/ipykernel_lau
ncher.py:4: MatplotlibDeprecationWarning: numpy.arange
  after removing the cwd from sys.path.

```python
In [34]:  # specify parameters and distributions to sample from
          param_dist = {"algorithm": ['auto'],
                        "contamination": frange(0.1, 0.5, 0.000001),
                        "leaf_size": np.arange(1, 100),
                        "metric": ['minkowski'],
                        "n_jobs": [None],
                        "n_neighbors": np.arange(1, 100),
                        "novelty": [True],
                        "p": np.arange(2, 10)
                        }

          from time import time
          from sklearn.model_selection import RandomizedSearchCV
          # run randomized search
          n_iter_search = 20
          random_search = RandomizedSearchCV(clf, param_distributions=param_d
          ist, n_iter=n_iter_search, cv=5,
                                             iid=False, scoring="recall_macro
          ")
          start = time()
          random_search.fit(X, y)
          print("RandomizedSearchCV took %.2f seconds for %d candidates"
                " parameter settings." % ((time() - start), n_iter_search))
          report(random_search.cv_results_)
```

/Users/thesard/anaconda3/lib/python3.7/site-packages/ipykernel_lau
ncher.py:3: MatplotlibDeprecationWarning: numpy.arange
  This is separate from the ipykernel package so we can avoid doin
g imports until
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri

```
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
```

```
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
```

```
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
      'recall', 'true', average, warn_for)
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
```

```
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
```

```
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
```

```
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
```

```
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
```

```
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
```

```
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
```

```
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
```

```
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
```

```
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
  'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
```

```
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
/Users/thesard/anaconda3/lib/python3.7/site-packages/sklearn/metri
cs/classification.py:1145: UndefinedMetricWarning: Recall is ill-d
efined and being set to 0.0 in labels with no true samples.
   'recall', 'true', average, warn_for)
```

```
RandomizedSearchCV took 5910.42 seconds for 20 candidates paramete
r settings.
Model with rank: 1
Mean validation score: 0.001 (std: 0.002)
Parameters: {'p': 9, 'novelty': True, 'n_neighbors': 4, 'n_jobs':
None, 'metric': 'minkowski', 'leaf_size': 21, 'contamination': 0.1
4847100000000002, 'algorithm': 'auto'}

Model with rank: 2
Mean validation score: 0.001 (std: 0.002)
Parameters: {'p': 5, 'novelty': True, 'n_neighbors': 3, 'n_jobs':
None, 'metric': 'minkowski', 'leaf_size': 41, 'contamination': 0.1
3542500000000002, 'algorithm': 'auto'}

Model with rank: 3
Mean validation score: 0.000 (std: 0.000)
Parameters: {'p': 2, 'novelty': True, 'n_neighbors': 15, 'n_jobs':
None, 'metric': 'minkowski', 'leaf_size': 7, 'contamination': 0.21
387499999999998, 'algorithm': 'auto'}
```

In [ ]: