

```
In [1]: import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
%matplotlib inline
from scipy import stats
import warnings
warnings.filterwarnings('ignore')
import matplotlib.gridspec as gridspec
import itertools
import phik
from phik import resources
from phik.binning import bin_data
from phik.report import plot_correlation_matrix
%matplotlib inline
from sklearn.impute import SimpleImputer
from sklearn.manifold import TSNE
import scikitplot as skplt
from xgboost import XGBClassifier
from sklearn.model_selection import RandomizedSearchCV
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score, confusion_matrix, recall_score
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from tqdm import tqdm
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
from xgboost import XGBClassifier
```

```
In [2]: data = df = pd.read_csv("aps_failure_training_set.csv", na_values='na')
data.head()
```

```
Out[2]:
```

	class	aa_000	ab_000	ac_000	ad_000	ae_000	af_000	ag_000	ag_001	ag_002	...	ee_000
0	neg	76698	NaN	2.130706e+09	280.0	0.0	0.0	0.0	0.0	0.0	...	1240520.
1	neg	33058	NaN	0.000000e+00	NaN	0.0	0.0	0.0	0.0	0.0	...	421400.
2	neg	41040	NaN	2.280000e+02	100.0	0.0	0.0	0.0	0.0	0.0	...	277378.
3	neg	12	0.0	7.000000e+01	66.0	0.0	10.0	0.0	0.0	0.0	...	240.
4	neg	60874	NaN	1.368000e+03	458.0	0.0	0.0	0.0	0.0	0.0	...	622012.

5 rows × 171 columns



```
In [3]: test = pd.read_csv("aps_failure_test_set.csv", na_values='na')
test.head()
```

```
Out[3]:
```

	class	aa_000	ab_000	ac_000	ad_000	ae_000	af_000	ag_000	ag_001	ag_002	...	ee_002	ee_000
0	neg	60	0.0	20.0	12.0	0.0	0.0	0.0	0.0	0.0	...	1098.0	1240520.
1	neg	82	0.0	68.0	40.0	0.0	0.0	0.0	0.0	0.0	...	1068.0	421400.

	class	aa_000	ab_000	ac_000	ad_000	ae_000	af_000	ag_000	ag_001	ag_002	...	ee_002	ee_003
2	neg	66002	2.0	212.0	112.0	0.0	0.0	0.0	0.0	0.0	...	495076.0	38031.0
3	neg	59816	NaN	1010.0	936.0	0.0	0.0	0.0	0.0	0.0	...	540820.0	24321.0
4	neg	1814	NaN	156.0	140.0	0.0	0.0	0.0	0.0	0.0	...	7646.0	41.0

5 rows × 171 columns



In [4]: `data.shape`

Out[4]: (60000, 171)

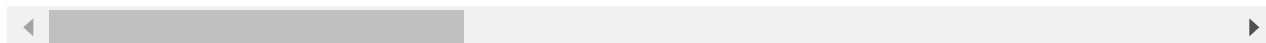
In [5]: `test.shape`

Out[5]: (16000, 171)

In [6]: `data.describe()`

	aa_000	ab_000	ac_000	ad_000	ae_000	af_000	ag_000
count	6.000000e+04	13671.000000	5.666500e+04	4.513900e+04	57500.000000	57500.000000	5.932900e+04
mean	5.933650e+04	0.713189	3.560143e+08	1.906206e+05	6.819130	11.006817	2.216364e+04
std	1.454301e+05	3.478962	7.948749e+08	4.040441e+07	161.543373	209.792592	2.047846e+04
min	0.000000e+00	0.000000	0.000000e+00	0.000000e+00	0.000000	0.000000	0.000000e+00
25%	8.340000e+02	0.000000	1.600000e+01	2.400000e+01	0.000000	0.000000	0.000000e+00
50%	3.077600e+04	0.000000	1.520000e+02	1.260000e+02	0.000000	0.000000	0.000000e+00
75%	4.866800e+04	0.000000	9.640000e+02	4.300000e+02	0.000000	0.000000	0.000000e+00
max	2.746564e+06	204.000000	2.130707e+09	8.584298e+09	21050.000000	20070.000000	3.376892e+04

8 rows × 170 columns



In [7]: `print("Columns name :\n",list(data.columns))`

```
Columns name :
['class', 'aa_000', 'ab_000', 'ac_000', 'ad_000', 'ae_000', 'af_000', 'ag_000', 'ag_001', 'ag_002', 'ag_003', 'ag_004', 'ag_005', 'ag_006', 'ag_007', 'ag_008', 'ag_009', 'ah_000', 'ai_000', 'aj_000', 'ak_000', 'al_000', 'am_000', 'an_000', 'ao_000', 'ap_000', 'aq_000', 'ar_000', 'as_000', 'at_000', 'au_000', 'av_000', 'ax_000', 'ay_000', 'ay_001', 'ay_002', 'ay_003', 'ay_004', 'ay_005', 'ay_006', 'ay_007', 'ay_008', 'ay_009', 'az_000', 'az_001', 'az_002', 'az_003', 'az_004', 'az_005', 'az_006', 'az_007', 'az_008', 'az_009', 'ba_000', 'ba_001', 'ba_002', 'ba_003', 'ba_004', 'ba_005', 'ba_006', 'ba_007', 'ba_008', 'ba_009', 'bb_000', 'bc_000', 'bd_000', 'be_000', 'bf_000', 'bg_000', 'bh_000', 'bi_000', 'bj_000', 'bk_000', 'bl_000', 'bm_000', 'bn_000', 'bo_000', 'bp_000', 'bq_000', 'br_000', 'bs_000', 'bt_000', 'bu_000', 'bv_000', 'bx_000', 'by_000', 'bz_000', 'ca_000', 'cb_000', 'cc_000', 'cd_000', 'ce_000', 'cf_000', 'cg_000', 'ch_000', 'ci_000', 'cj_000']
```

```
000', 'ck_000', 'cl_000', 'cm_000', 'cn_000', 'cn_001', 'cn_002', 'cn_003', 'cn_004', 'cn_005', 'cn_006', 'cn_007', 'cn_008', 'cn_009', 'co_000', 'cp_000', 'cq_000', 'cr_000', 'cs_000', 'cs_001', 'cs_002', 'cs_003', 'cs_004', 'cs_005', 'cs_006', 'cs_007', 'cs_008', 'cs_009', 'ct_000', 'cu_000', 'cv_000', 'cx_000', 'cy_000', 'cz_000', 'da_000', 'db_000', 'dc_000', 'dd_000', 'de_000', 'df_000', 'dg_000', 'dh_000', 'di_000', 'dj_000', 'dk_000', 'dl_000', 'dm_000', 'dn_000', 'do_000', 'dp_000', 'dq_000', 'dr_000', 'ds_000', 'dt_000', 'du_000', 'dv_000', 'dx_000', 'dy_000', 'dz_000', 'ea_000', 'eb_000', 'ec_000', 'ed_000', 'ee_000', 'ee_001', 'ee_002', 'ee_003', 'ee_004', 'ee_005', 'ee_006', 'ee_007', 'ee_008', 'ee_009', 'ef_000', 'eg_000']
```

```
In [8]: def missing_values_table(df):
        # Total missing values
        mis_val = df.isna().sum()

        # Percentage of missing values
        mis_val_percent = 100 * df.isnull().sum() / len(df)

        # Make a table with the results
        mis_val_table = pd.concat([mis_val, mis_val_percent], axis=1)

        # Rename the columns
        mis_val_table_ren_columns = mis_val_table.rename(
            columns = {0 : 'Missing Values', 1 : '% of Total Values'})

        # Sort the table by percentage of missing descending
        mis_val_table_ren_columns = mis_val_table_ren_columns[
            mis_val_table_ren_columns.iloc[:,1] != 0].sort_values(
            '% of Total Values', ascending=False).round(1)

        # Print some summary information
        print ("Your selected dataframe has " + str(df.shape[1]) + " columns.\n"
              "There are " + str(mis_val_table_ren_columns.shape[0]) +
              " columns that have missing values.")

        # Return the dataframe with missing information
        return mis_val_table_ren_columns
```

```
In [9]: data_missing = missing_values_table(data)
        data_missing.head(20)
```

Your selected dataframe has 171 columns.
There are 169 columns that have missing values.

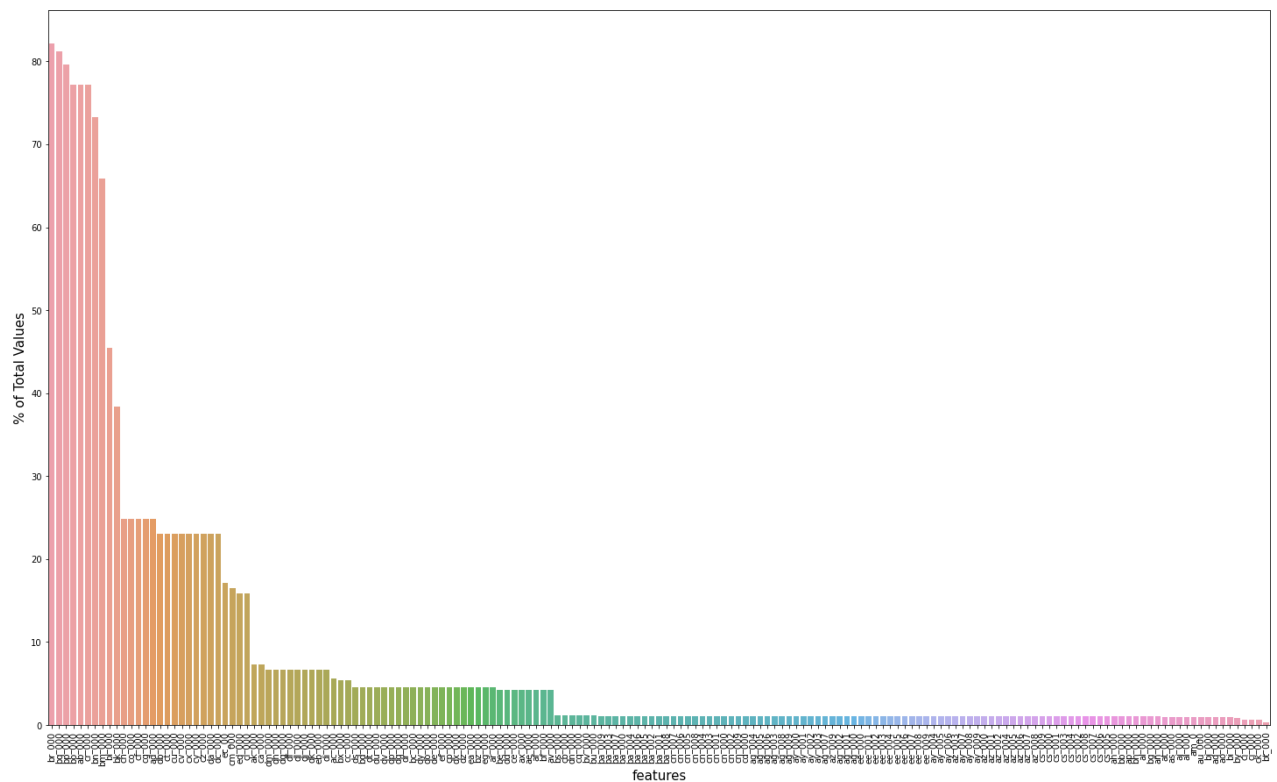
```
Out[9]:
```

	Missing Values	% of Total Values
br_000	49264	82.1
bq_000	48722	81.2
bp_000	47740	79.6
bo_000	46333	77.2
ab_000	46329	77.2
cr_000	46329	77.2
bn_000	44009	73.3
bm_000	39549	65.9
bl_000	27277	45.5

	Missing Values	% of Total Values
bk_000	23034	38.4
ch_000	14861	24.8
co_000	14861	24.8
cf_000	14861	24.8
cg_000	14861	24.8
ad_000	14861	24.8
db_000	13808	23.0
ct_000	13808	23.0
cu_000	13808	23.0
cv_000	13808	23.0
cx_000	13808	23.0

In [10]:

```
plt.figure(figsize = (25,15))
sns.barplot(data_missing.index, data_missing['% of Total Values'], alpha = 0.9, order=data_missing.index)
plt.xticks(rotation = 'vertical')
plt.xlabel('features', fontsize = 15)
plt.ylabel('% of Total Values', fontsize = 15)
plt.show()
plt.draw()
```



<Figure size 432x288 with 0 Axes>

In [11]:

```
data = data.drop(['br_000', 'bq_000', 'bp_000', 'bo_000', 'ab_000', 'cr_000', 'bn_000', 'bm_000'])
```

```
In [12]: data.shape
```

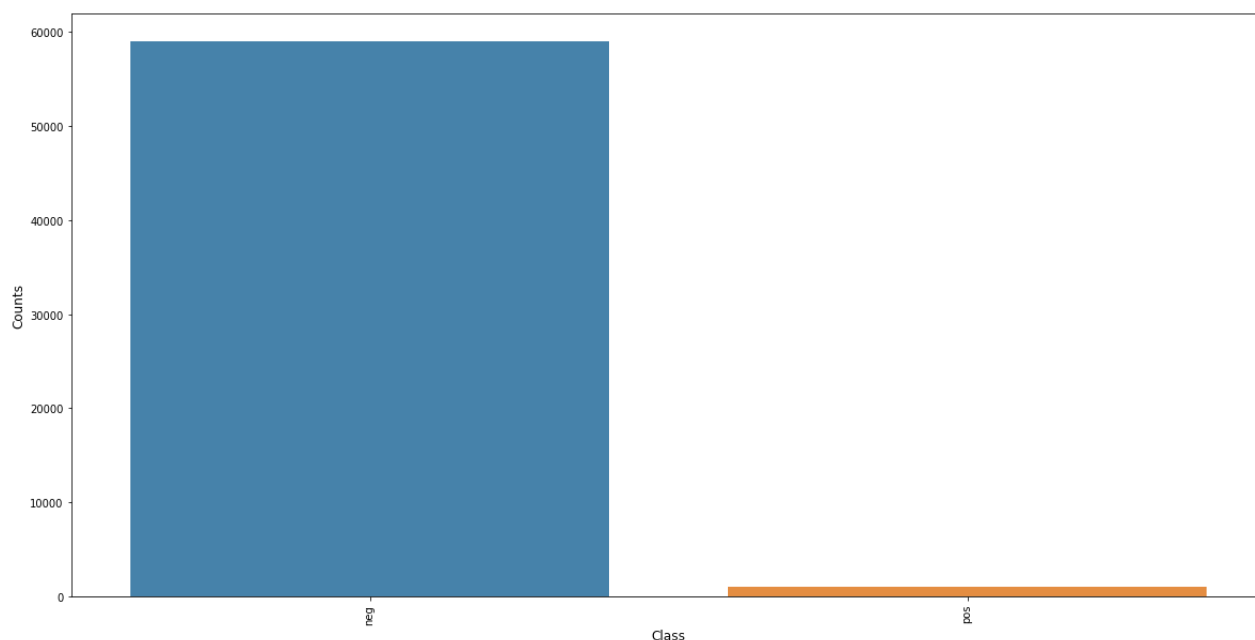
```
Out[12]: (60000, 163)
```

```
In [13]: col = list(data.columns)
```

```
In [14]: print ('The train data has {} unique labels'.format(df['class'].nunique()))
```

The train data has 2 unique labels

```
In [15]: label_counts = df['class'].value_counts()
plt.figure(figsize = (20,10))
sns.barplot(label_counts.index, label_counts.values, alpha = 0.9)
plt.xticks(rotation = 'vertical')
plt.xlabel('Class', fontsize =12)
plt.ylabel('Counts', fontsize = 12)
plt.show()
```



```
In [16]: print("Number of positive classes = ", sum(df['class'] == 'pos'))
print("Number of negative classes = ", sum(df['class'] == 'neg'))
```

Number of positive classes = 1000
Number of negative classes = 59000

```
In [17]: data['class'] = data['class'].apply(lambda x: 0 if x == 'neg' else 1)
test['class'] = test['class'].apply(lambda x: 0 if x == 'neg' else 1)
data.head()
```

```
Out[17]:
```

	class	aa_000	ac_000	ad_000	ae_000	af_000	ag_000	ag_001	ag_002	ag_003	...	ee_000
0	0	76698	2.130706e+09	280.0	0.0	0.0	0.0	0.0	0.0	0.0	...	1240520.
1	0	33058	0.000000e+00	NaN	0.0	0.0	0.0	0.0	0.0	0.0	...	421400.

	class	aa_000	ac_000	ad_000	ae_000	af_000	ag_000	ag_001	ag_002	ag_003	...	ee_000
2	0	41040	2.280000e+02	100.0	0.0	0.0	0.0	0.0	0.0	0.0	...	277378.
3	0	12	7.000000e+01	66.0	0.0	10.0	0.0	0.0	0.0	318.0	...	240.
4	0	60874	1.368000e+03	458.0	0.0	0.0	0.0	0.0	0.0	0.0	...	622012.

5 rows × 163 columns



correlated columns

```
In [18]: correlation_train = data.corr()
corr_dict = correlation_train['class'].sort_values(ascending=False).to_dict()
important_columns=[]
for key,value in corr_dict.items():
    if ((value>0.2) & (value<0.9)) | (value<=-0.2):
        important_columns.append(key)
```

```
In [19]: len(important_columns)
```

Out[19]: 91

```
In [20]: print("correlated columns ",important_columns)

correlated columns ['ci_000', 'bb_000', 'bv_000', 'bu_000', 'cq_000', 'bt_000', 'aa_000', 'aq_000', 'bj_000', 'ah_000', 'an_000', 'bg_000', 'ao_000', 'cc_000', 'ap_000', 'bx_000', 'by_000', 'bh_000', 'dn_000', 'ee_005', 'ba_004', 'cn_004', 'ck_000', 'ba_003', 'ba_005', 'ag_005', 'ee_002', 'cs_005', 'ba_001', 'cs_004', 'ag_003', 'az_005', 'ba_000', 'ee_003', 'bi_000', 'ba_002', 'dt_000', 'ds_000', 'ee_004', 'ee_006', 'ee_000', 'ay_008', 'cn_003', 'ed_000', 'ba_006', 'cs_003', 'cn_001', 'am_000', 'al_000', 'cm_000', 'cs_002', 'ec_000', 'ag_004', 'cn_005', 'ag_006', 'cn_002', 'ee_001', 'az_004', 'do_000', 'cs_000', 'dc_000', 'dd_000', 'cv_000', 'ag_002', 'ba_007', 'dp_000', 'cx_000', 'cj_000', 'cs_001', 'ay_007', 'az_001', 'dv_000', 'de_000', 'ce_000', 'ba_008', 'di_000', 'ag_007', 'bc_000', 'ee_008', 'eb_000', 'ay_006', 'cn_000', 'bd_000', 'cs_006', 'ba_009', 'bf_000', 'ay_005', 'du_000', 'az_007', 'az_000', 'bz_000']
```

```
In [21]: df[important_columns].head()
```

	ci_000	bb_000	bv_000	bu_000	cq_000	bt_000	aa_000	aq_000	bj_000	ah_000
0	5245752.00	6700214.0	6700214.0	6700214.0	6700214.0	76698.08	76698	1132040.0	799478.0	25516
1	2291079.36	3646660.0	3646660.0	3646660.0	3646660.0	33057.51	33058	338544.0	392208.0	13933
2	2322692.16	2673338.0	2673338.0	2673338.0	2673338.0	41040.08	41040	153698.0	139730.0	12341
3	2135.04	21614.0	21614.0	21614.0	21614.0	12.69	12	1014.0	3090.0	26
4	3565684.80	4289260.0	4289260.0	4289260.0	4289260.0	60874.03	60874	551022.0	399410.0	19740

5 rows × 91 columns



Impute Missing Value using SimpleImputer

```
In [22]: from sklearn.impute import SimpleImputer
imp = SimpleImputer(missing_values=np.nan, strategy='mean')
imp.fit(df[important_columns])
X_mean = imp.transform(df[important_columns])
```

```
In [23]: X_mean = pd.DataFrame(X_mean, columns=[important_columns])
X_mean.head()
```

```
Out[23]:
```

	ci_000	bb_000	bv_000	bu_000	cq_000	bt_000	aa_000	aq_000	bj_000	ah
0	5245752.00	6700214.0	6700214.0	6700214.0	6700214.0	76698.08	76698.0	1132040.0	799478.0	2551
1	2291079.36	3646660.0	3646660.0	3646660.0	3646660.0	33057.51	33058.0	338544.0	392208.0	1393
2	2322692.16	2673338.0	2673338.0	2673338.0	2673338.0	41040.08	41040.0	153698.0	139730.0	1234
3	2135.04	21614.0	21614.0	21614.0	21614.0	12.69	12.0	1014.0	3090.0	2
4	3565684.80	4289260.0	4289260.0	4289260.0	4289260.0	60874.03	60874.0	551022.0	399410.0	1974

5 rows × 91 columns



```
In [24]: X_test = imp.transform(test[important_columns])
```

```
In [25]: X_test = pd.DataFrame(X_test, columns=[important_columns])
X_test.head()
```

```
Out[25]:
```

	ci_000	bb_000	bv_000	bu_000	cq_000	bt_000	aa_000	aq_000	bj_000	ah_
0	5913.60	124340.0	124340.0	124340.0	124340.0	59.53	60.0	470.0	3458.0	39
1	7224.96	46894.0	46894.0	46894.0	46894.0	81.89	82.0	1270.0	3134.0	52
2	3594885.12	4644422.0	4644422.0	4644422.0	4644422.0	66002.89	66002.0	286536.0	265492.0	18916
3	3387773.76	4201350.0	4201350.0	4201350.0	4201350.0	59816.46	59816.0	423374.0	316130.0	17728
4	94319.04	110094.0	110094.0	110094.0	110094.0	1813.74	1814.0	5092.0	4966.0	489

5 rows × 91 columns



```
In [26]: X = X_mean
y = data['class']
```

```
In [27]: from sklearn.preprocessing import MinMaxScaler
mx = MinMaxScaler()
```

```
mx.fit(X)
X_std = mx.transform(X)
type(X_std)
```

Out[27]: numpy.ndarray

```
In [28]: X_std = pd.DataFrame(X_std, columns = [important_columns])
X_std.head()
```

```
Out[28]:
```

	ci_000	bb_000	bv_000	bu_000	cq_000	bt_000	aa_000	aq_000	bj_000	ah_000	...
0	0.037208	0.034739	0.034739	0.034739	0.034739	0.027925	0.027925	0.044285	0.017480	0.034368	...
1	0.016250	0.018907	0.018907	0.018907	0.018907	0.012036	0.012036	0.013244	0.008575	0.018766	...
2	0.016475	0.013861	0.013861	0.013861	0.013861	0.014942	0.014942	0.006013	0.003055	0.016622	...
3	0.000015	0.000112	0.000112	0.000112	0.000112	0.000005	0.000004	0.000040	0.000068	0.000036	...
4	0.025291	0.022239	0.022239	0.022239	0.022239	0.022164	0.022164	0.021556	0.008733	0.026587	...

5 rows × 91 columns



```
In [29]: X_test_std = mx.transform(X_test)
X_test_std = pd.DataFrame(X_test_std, columns = [important_columns])
X_test_std.head()
```

```
Out[29]:
```

	ci_000	bb_000	bv_000	bu_000	cq_000	bt_000	aa_000	aq_000	bj_000	ah_000	...
0	0.000042	0.000645	0.000645	0.000645	0.000645	0.000022	0.000022	0.000018	0.000076	0.000054	...
1	0.000051	0.000243	0.000243	0.000243	0.000243	0.000030	0.000030	0.000050	0.000069	0.000071	...
2	0.025498	0.024080	0.024080	0.024080	0.024080	0.024031	0.024031	0.011209	0.005805	0.025478	...
3	0.024029	0.021783	0.021783	0.021783	0.021783	0.021779	0.021778	0.016562	0.006912	0.023877	...
4	0.000669	0.000571	0.000571	0.000571	0.000571	0.000660	0.000660	0.000199	0.000109	0.000660	...

5 rows × 91 columns



```
In [30]: X.shape ,y.shape
```

Out[30]: ((60000, 91), (60000,))

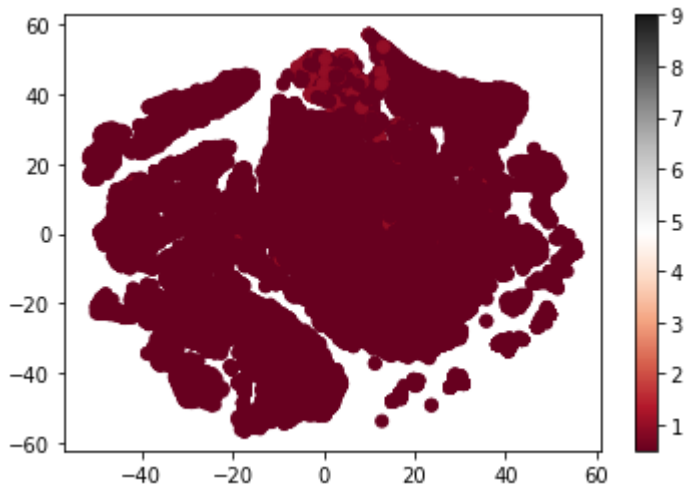
```
In [31]: data['class'].value_counts()
```

```
Out[31]: 0    59000
1     1000
Name: class, dtype: int64
```

In []:

TSNE

```
In [32]: xtsne = TSNE(perplexity=100)
results=xtsne.fit_transform(X_mean)
vis_x = results[:, 0]
vis_y = results[:, 1]
plt.scatter(vis_x, vis_y, c=y, cmap = "RdGy")
plt.colorbar(ticks=range(10))
plt.clim(0.5, 9)
plt.show()
```



Logistic Regression

```
In [33]: from sklearn.linear_model import LogisticRegression
clf = LogisticRegression()
%time clf.fit(X_std,y)
```

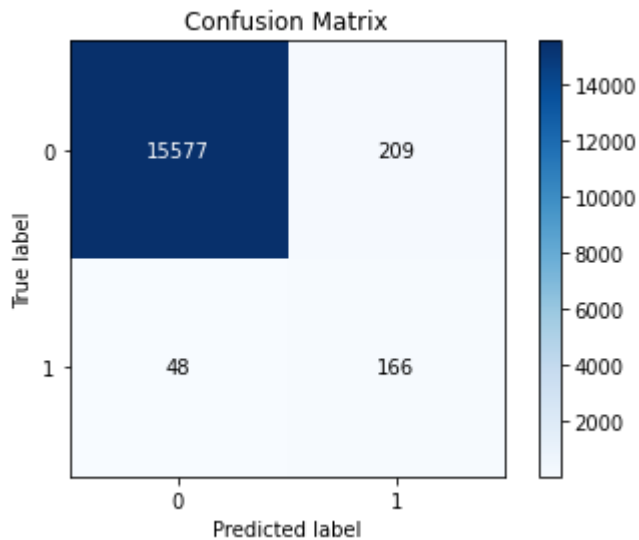
Wall time: 974 ms

Out[33]: LogisticRegression()

```
In [34]: pred = clf.predict(X_test_std)
```

```
In [35]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9839375
Recall Score 0.7757009345794392
[[15577 209]
[48 166]]



Cost

```
In [36]: tn, fp, fn, tp = confusion_matrix(pred, test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[36]: 26090

```
In [37]: np.logspace(-3,3,7)
```

Out[37]: array([1.e-03, 1.e-02, 1.e-01, 1.e+00, 1.e+01, 1.e+02, 1.e+03])

RandomizedSearchCV

```
In [38]: random_grid = {'C': np.logspace(-3,3,7), 'penalty': ['l1', 'l2']}

clf = LogisticRegression()

rf_random = RandomizedSearchCV(estimator = clf,
                               param_distributions = random_grid,
                               cv = 10,
                               verbose=2,
                               random_state=42,
                               n_jobs = -1)

%time rf_random.fit(X_std,y)
```

Fitting 10 folds for each of 10 candidates, totalling 100 fits
Wall time: 34.3 s

```
Out[38]: RandomizedSearchCV(cv=10, estimator=LogisticRegression(), n_jobs=-1,
                             param_distributions={'C': array([1.e-03, 1.e-02, 1.e-01, 1.e+00, 1.e+
01, 1.e+02, 1.e+03]),
                             'penalty': ['l1', 'l2']},
                             random_state=42, verbose=2)
```

```
In [39]: rf_random.best_params_
```

```
Out[39]: {'penalty': 'l2', 'C': 1000.0}
```

On Best Parameter

```
In [40]: clf = LogisticRegression(penalty = 'l2' ,C = 1000.0 )
%time clf.fit(X_std,y)
```

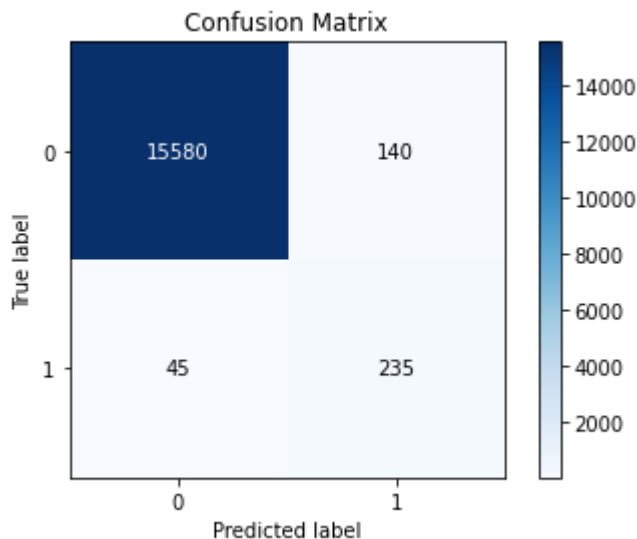
Wall time: 1.36 s

```
Out[40]: LogisticRegression(C=1000.0)
```

```
In [41]: pred = clf.predict(X_test_std)
```

```
In [42]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

```
Accuracy Score  0.9884375
Recall Score  0.8392857142857143
[[15580  140]
 [   45  235]]
```



```
In [43]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

```
Out[43]: 23900
```

Support vector Machine

```
In [44]: from sklearn.svm import SVC
```

```
svm = SVC()
%time svm.fit(X_std,y)
```

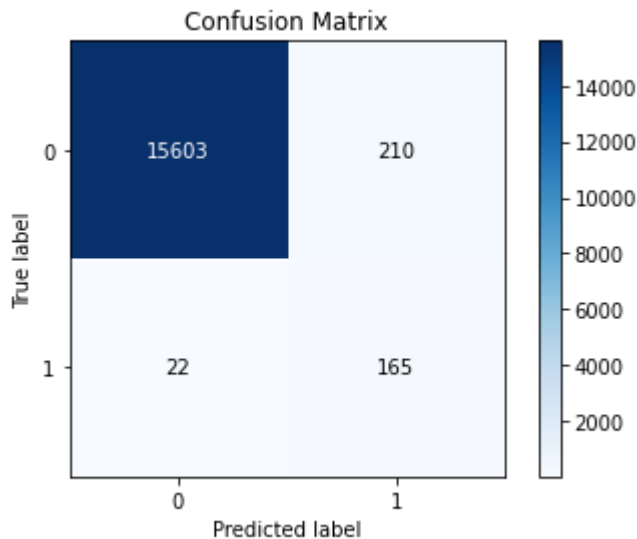
Wall time: 39.6 s

Out[44]: SVC()

```
In [45]: pred = svm.predict(X_test_std)
```

```
In [46]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9855
Recall Score 0.8823529411764706
[[15603 210]
[22 165]]



Cost

```
In [47]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[47]: 13100

Random Search

```
In [48]: parameters = [ {'kernel' : ['rbf'], 'C' : [0.1, 1, 10, 100, 1000]}]

rf_random = RandomizedSearchCV(estimator = svm,
                               param_distributions = parameters,
                               cv = 10,
                               verbose=2,
```

```
random_state=42,
n_jobs = -1)
```

```
%time rf_random.fit(X_std,y)
```

Fitting 10 folds for each of 5 candidates, totalling 50 fits
Wall time: 17min 54s

```
Out[48]: RandomizedSearchCV(cv=10, estimator=SVC(), n_jobs=-1,
                          param_distributions=[{'C': [0.1, 1, 10, 100, 1000],
                                                'kernel': ['rbf']}],
                          random_state=42, verbose=2)
```

```
In [49]: rf_random.best_params_
```

```
Out[49]: {'kernel': 'rbf', 'C': 10}
```

On Best Parameter

```
In [50]: svm = SVC(kernel='rbf',C=10)
         %time svm.fit(X_std,y)
```

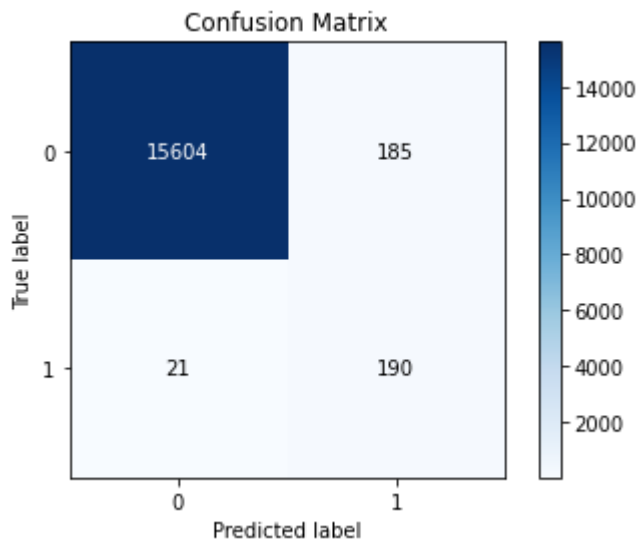
Wall time: 59.8 s

```
Out[50]: SVC(C=10)
```

```
In [51]: pred = svm.predict(X_test_std)
```

```
In [52]: print("Accuracy Score ",accuracy_score(pred,test['class']))
         print("Recall Score ",recall_score(pred,test['class']))
         print(confusion_matrix(pred, test['class']))
         skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
         plt.show()
```

```
Accuracy Score  0.987125
Recall Score  0.9004739336492891
[[15604  185]
 [   21  190]]
```



Cost

```
In [53]: tn, fp, fn, tp = confusion_matrix(pred, test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[53]: 12350

In []:

K Neighbors Classifier

```
In [54]: knn = KNeighborsClassifier()
%time knn.fit(X_std,y)
```

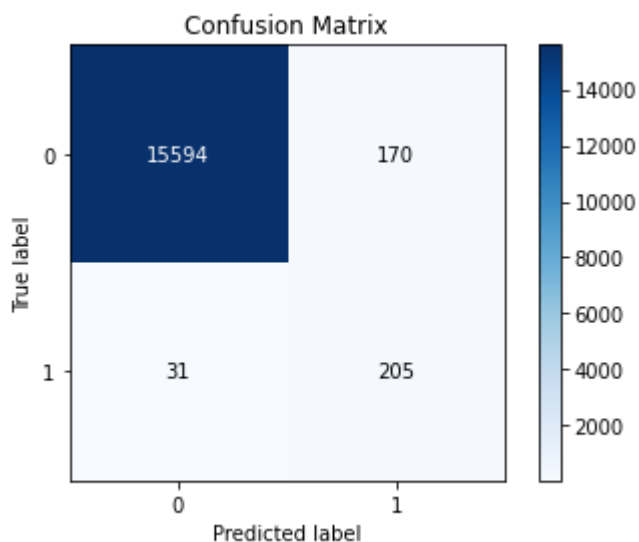
Wall time: 15.9 ms

Out[54]: KNeighborsClassifier()

```
In [55]: pred = knn.predict(X_test_std)
```

```
In [56]: print("Accuracy Score ", accuracy_score(pred, test['class']))
print("Recall Score ", recall_score(pred, test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9874375
Recall Score 0.8686440677966102
[[15594 170]
 [31 205]]



Cost

```
In [57]: tn, fp, fn, tp = confusion_matrix(pred, test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[57]: 17200

Random Search

```
In [58]: param_grid = dict(n_neighbors = list(range(1, 26)))

rf_random = RandomizedSearchCV(estimator = knn,
                               param_distributions = param_grid,
                               cv = 10,
                               verbose=2,
                               random_state=42,
                               n_jobs = -1)

%time rf_random.fit(X_std,y)
```

Fitting 10 folds for each of 10 candidates, totalling 100 fits
Wall time: 20min 5s

```
Out[58]: RandomizedSearchCV(cv=10, estimator=KNeighborsClassifier(), n_jobs=-1,
                           param_distributions={'n_neighbors': [1, 2, 3, 4, 5, 6, 7, 8,
                                                                9, 10, 11, 12, 13, 14,
                                                                15, 16, 17, 18, 19, 20,
                                                                21, 22, 23, 24, 25]},
                           random_state=42, verbose=2)
```

```
In [59]: rf_random.best_params_
```

Out[59]: {'n_neighbors': 1}

```
In [60]: knn = KNeighborsClassifier(n_neighbors=1)
%time knn.fit(X,y)
```

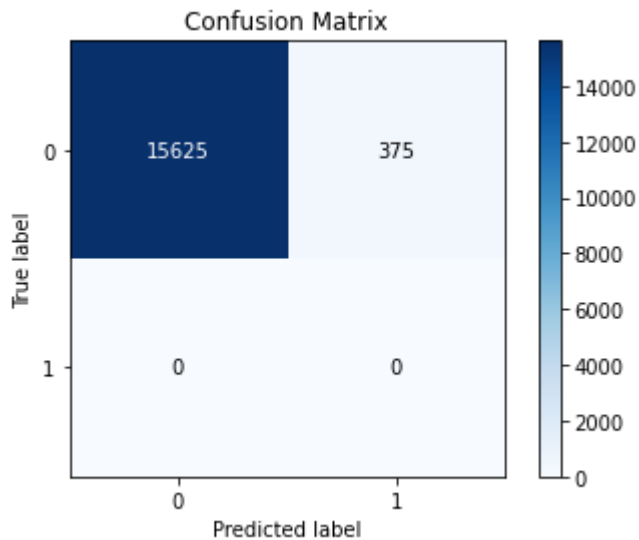
Wall time: 168 ms

Out[60]: KNeighborsClassifier(n_neighbors=1)

```
In [61]: pred = knn.predict(X_test_std)
```

```
In [62]: print("Accuracy Score ", accuracy_score(pred, test['class']))
print("Recall Score ", recall_score(pred, test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9765625
Recall Score 0.0
[[15625 375]
 [0 0]]



Cost

```
In [63]: tn, fp, fn, tp = confusion_matrix(pred, test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[63]: 3750

Random Forest Classifier

```
In [64]: from sklearn.ensemble import RandomForestClassifier
clf = RandomForestClassifier()
%time clf.fit(X,y)
```

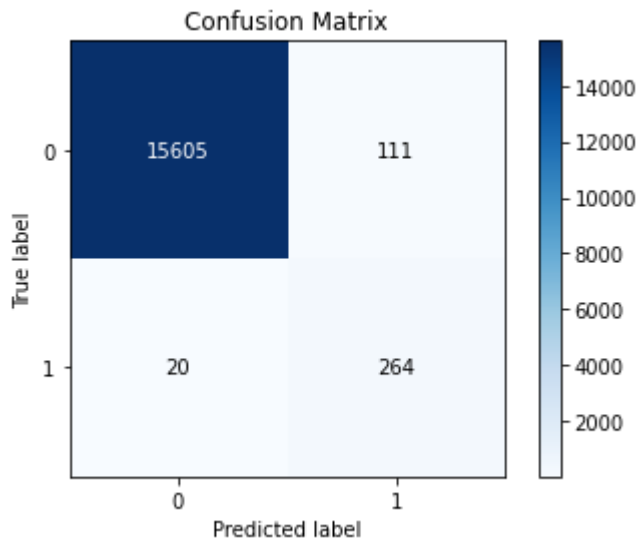
Wall time: 45.9 s

Out[64]: RandomForestClassifier()

```
In [65]: pred = clf.predict(X_test)
```

```
In [66]: print("Accuracy Score ", accuracy_score(pred, test['class']))
print("Recall Score ", recall_score(pred, test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9918125
Recall Score 0.9295774647887324
[[15605 111]
[20 264]]



```
In [67]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[67]: 11110

Random Search

```
In [68]: random_grid = {'n_estimators': [100,300,500,600,700,800],
                        'max_depth': [5,10,15,20,25,50]}

clf = RandomForestClassifier()

rf_random = RandomizedSearchCV(estimator = clf,
                               param_distributions = random_grid,
                               cv = 10,
                               verbose=2,
                               random_state=42,
                               n_jobs = -1)

%time rf_random.fit(X,y)
```

Fitting 10 folds for each of 10 candidates, totalling 100 fits
Wall time: 1h 1min 48s

```
Out[68]: RandomizedSearchCV(cv=10, estimator=RandomForestClassifier(), n_jobs=-1,
                             param_distributions={'max_depth': [5, 10, 15, 20, 25, 50],
                                                  'n_estimators': [100, 300, 500, 600,
                                                                  700, 800]}),
                             random_state=42, verbose=2)
```

```
In [69]: rf_random.best_params_
```

Out[69]: {'n_estimators': 500, 'max_depth': 25}

```
In [70]: clf = RandomForestClassifier(n_estimators = 500,max_depth=25)
%time clf.fit(X,y)
```

Wall time: 3min 47s

Out[70]: RandomForestClassifier(max_depth=25, n_estimators=500)

In [71]:

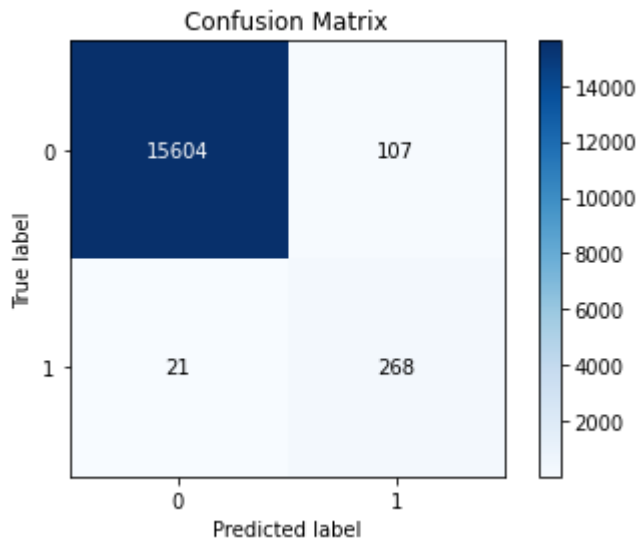
```
pred = clf.predict(X_test)
```

In [72]:

```
print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.992

Recall Score 0.9273356401384083

[[15604 107]
[21 268]]In [73]:

```
tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[73]: 11570

In []:

Decision Tree Classifier

In [74]:

```
from sklearn.tree import DecisionTreeClassifier
clf1 = DecisionTreeClassifier()
%time clf1.fit(X,y)
```

Wall time: 9.4 s

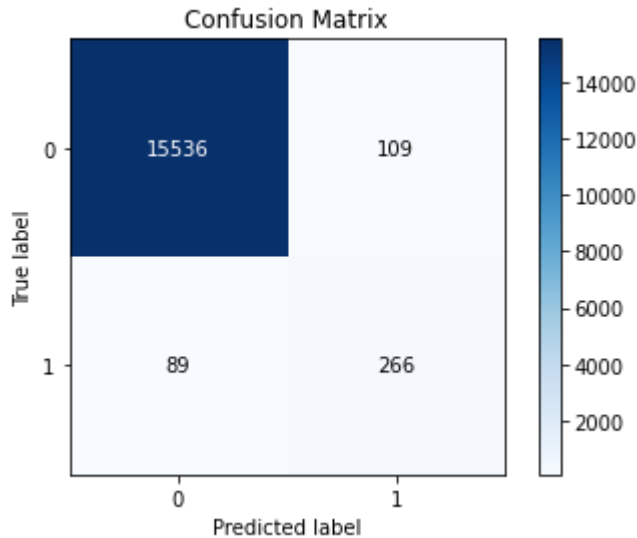
Out[74]: DecisionTreeClassifier()

In [75]:

```
pred = clf1.predict(X_test)
```

```
In [76]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

```
Accuracy Score 0.987625
Recall Score 0.7492957746478873
[[15536 109]
 [ 89 266]]
```



```
In [77]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

```
Out[77]: 45590
```

```
In [ ]:
```

Random Search

```
In [78]: parameters = {'max_depth': np.random.randint(10,25,5)}

rf_random = RandomizedSearchCV(estimator = clf1,
                               param_distributions = parameters,
                               n_iter = 100,
                               cv = 10,
                               verbose=2,
                               random_state=42,
                               n_jobs = -1)

%time rf_random.fit(X,y)
```

```
Fitting 10 folds for each of 5 candidates, totalling 50 fits
Wall time: 1min 3s
```

```
Out[78]: RandomizedSearchCV(cv=10, estimator=DecisionTreeClassifier(), n_iter=100,
```

```
n_jobs=-1,
param_distributions={'max_depth': array([20, 13, 12, 15, 13])},
random_state=42, verbose=2)
```

```
In [79]: rf_random.best_params_
```

```
Out[79]: {'max_depth': 12}
```

```
In [ ]:
```

```
In [80]: clf1 = DecisionTreeClassifier(max_depth =13)
%time clf1.fit(X,y)
```

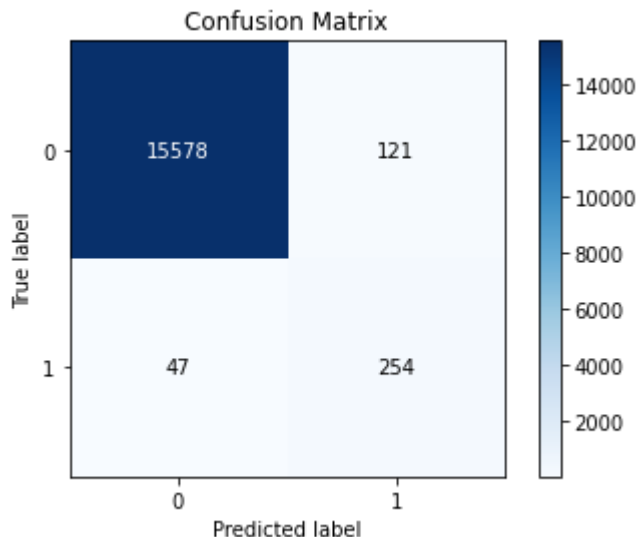
Wall time: 5.24 s

```
Out[80]: DecisionTreeClassifier(max_depth=13)
```

```
In [81]: pred = clf1.predict(X_test)
```

```
In [82]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

```
Accuracy Score 0.9895
Recall Score 0.8438538205980066
[[15578  121]
 [   47  254]]
```



```
In [83]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

```
Out[83]: 24710
```

XGB Classifier

```
In [84]: from xgboost import XGBClassifier
         xg = XGBClassifier()
         %time xg.fit(X,y)
```

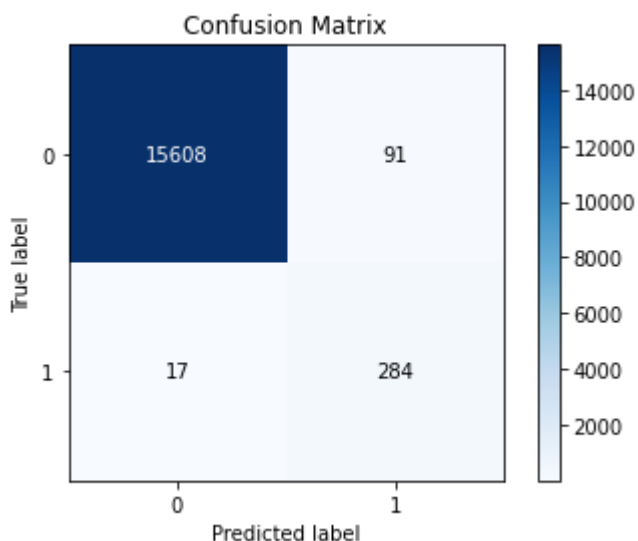
[08:14:25] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
Wall time: 13.6 s

```
Out[84]: XGBClassifier(base_score=0.5, booster='gbtree', colsample_bylevel=1,
                      colsample_bynode=1, colsample_bytree=1, gamma=0, gpu_id=-1,
                      importance_type='gain', interaction_constraints='',
                      learning_rate=0.300000012, max_delta_step=0, max_depth=6,
                      min_child_weight=1, missing=nan, monotone_constraints='()',
                      n_estimators=100, n_jobs=8, num_parallel_tree=1, random_state=0,
                      reg_alpha=0, reg_lambda=1, scale_pos_weight=1, subsample=1,
                      tree_method='exact', validate_parameters=1, verbosity=None)
```

```
In [85]: pred = xg.predict(X_test)
```

```
In [86]: print("Accuracy Score ",accuracy_score(pred,test['class']))
         print("Recall Score ",recall_score(pred,test['class']))
         print(confusion_matrix(pred, test['class']))
         skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
         plt.show()
```

```
Accuracy Score  0.99325
Recall Score  0.9435215946843853
[[15608   91]
 [   17  284]]
```



```
In [87]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
         cost = 10*fp + 500*fn
         cost
```

```
Out[87]: 9410
```

Random Search

```
In [88]: random_grid = { 'n_estimators': [100, 200, 500],
                        'learning_rate': [0.01,0.05,0.1,0.2],
                        'base_score': [0.2, 0.5, 1],
                        'max_depth': range(3,10,2),
                        }

rf_random = RandomizedSearchCV(estimator = xg,
                              param_distributions = random_grid,
                              cv = 10,
                              verbose=2,
                              random_state=42,
                              n_jobs = -1)

%time rf_random.fit(X,y)
```

Fitting 10 folds for each of 10 candidates, totalling 100 fits

[08:50:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

Wall time: 36min 5s

```
Out[88]: RandomizedSearchCV(cv=10,
                          estimator=XGBClassifier(base_score=0.5, booster='gbtree',
                                                  colsample_bylevel=1,
                                                  colsample_bynode=1,
                                                  colsample_bytree=1, gamma=0,
                                                  gpu_id=-1, importance_type='gain',
                                                  interaction_constraints='',
                                                  learning_rate=0.300000012,
                                                  max_delta_step=0, max_depth=6,
                                                  min_child_weight=1, missing=nan,
                                                  monotone_constraints='()',
                                                  n_estimators=100, n_jobs=8,
                                                  num_parallel_tree=1, random_state=0,
                                                  reg_alpha=0, reg_lambda=1,
                                                  scale_pos_weight=1, subsample=1,
                                                  tree_method='exact',
                                                  validate_parameters=1,
                                                  verbosity=None),
                          n_jobs=-1,
                          param_distributions={'base_score': [0.2, 0.5, 1],
                                              'learning_rate': [0.01, 0.05, 0.1, 0.2],
                                              'max_depth': range(3, 10, 2),
                                              'n_estimators': [100, 200, 500]},
                          random_state=42, verbose=2)
```

```
In [89]: rf_random.best_params_
```

```
Out[89]: {'n_estimators': 200, 'max_depth': 9, 'learning_rate': 0.1, 'base_score': 0.5}
```

```
In [90]: xg = XGBClassifier(n_estimators=500, learning_rate=0.1, base_score=0.2)
%time xg.fit(X,y)
```

[08:50:45] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric

ic if you'd like to restore the old behavior.

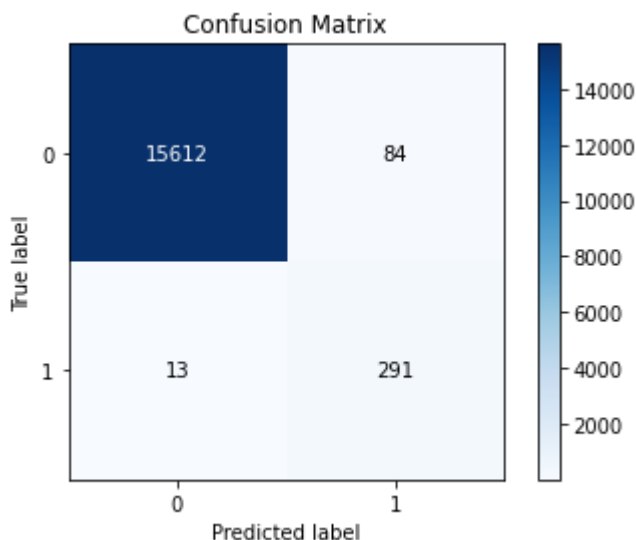
Wall time: 1min 4s

```
Out[90]: XGBClassifier(base_score=0.2, booster='gbtree', colsample_bylevel=1,
                    colsample_bynode=1, colsample_bytree=1, gamma=0, gpu_id=-1,
                    importance_type='gain', interaction_constraints='',
                    learning_rate=0.1, max_delta_step=0, max_depth=6,
                    min_child_weight=1, missing=nan, monotone_constraints='()',
                    n_estimators=500, n_jobs=8, num_parallel_tree=1, random_state=0,
                    reg_alpha=0, reg_lambda=1, scale_pos_weight=1, subsample=1,
                    tree_method='exact', validate_parameters=1, verbosity=None)
```

```
In [91]: pred = xg.predict(X_test)
```

```
In [92]: print("Accuracy Score ",accuracy_score(pred,test['class']))
        print("Recall Score ",recall_score(pred,test['class']))
        print(confusion_matrix(pred, test['class']))
        skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
        plt.show()
```

```
Accuracy Score  0.9939375
Recall Score  0.9572368421052632
[[15612   84]
 [   13  291]]
```



```
In [93]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
        cost = 10*fp + 500*fn
        cost
```

```
Out[93]: 7340
```

```
In [94]: import pickle

        Pkl_Filename = "XGBClassifier.pkl"

        with open(Pkl_Filename, 'wb') as file:
            pickle.dump(xg, file)
```

Gradient Boosting Classifier

```
In [95]: from sklearn.ensemble import GradientBoostingClassifier
gb = GradientBoostingClassifier()
%time gb.fit(X,y)
```

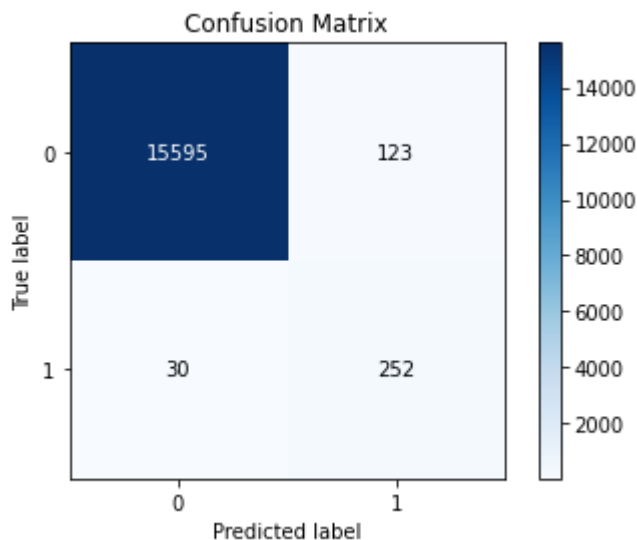
Wall time: 1min 56s

```
Out[95]: GradientBoostingClassifier()
```

```
In [96]: pred = gb.predict(X_test)
```

```
In [97]: print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9904375
Recall Score 0.8936170212765957
[[15595 123]
[30 252]]



```
In [98]: tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

```
Out[98]: 16230
```

Random Search

```
In [99]: parameters = {"n_estimators":[5,50,100,200,500,700],
                      "max_depth":[1,3,5,7,9],
                      "learning_rate":[0.01,0.1,1]}

rf_random = RandomizedSearchCV(gb,parameters,cv=5 ,verbose=2,random_state=42, n_jobs =
%time rf_random.fit(X,y)
```


Fitting 5 folds for each of 10 candidates, totalling 50 fits

Wall time: 1h 29min 20s

```
Out[99]: RandomizedSearchCV(cv=5, estimator=GradientBoostingClassifier(), n_jobs=-1,
                        param_distributions={'learning_rate': [0.01, 0.1, 1],
                                           'max_depth': [1, 3, 5, 7, 9],
                                           'n_estimators': [5, 50, 100, 200, 500,
                                                             700]},
                        random_state=42, verbose=2)
```

```
In [100... rf_random.best_params_
```

```
Out[100... {'n_estimators': 500, 'max_depth': 3, 'learning_rate': 0.1}
```

```
In [101... gb = GradientBoostingClassifier(n_estimators=500,max_depth=3,learning_rate=0.1)
%time gb.fit(X,y)
```

Wall time: 13min 33s

```
Out[101... GradientBoostingClassifier(n_estimators=500)
```

```
In [102... pred = gb.predict(X_test)
```

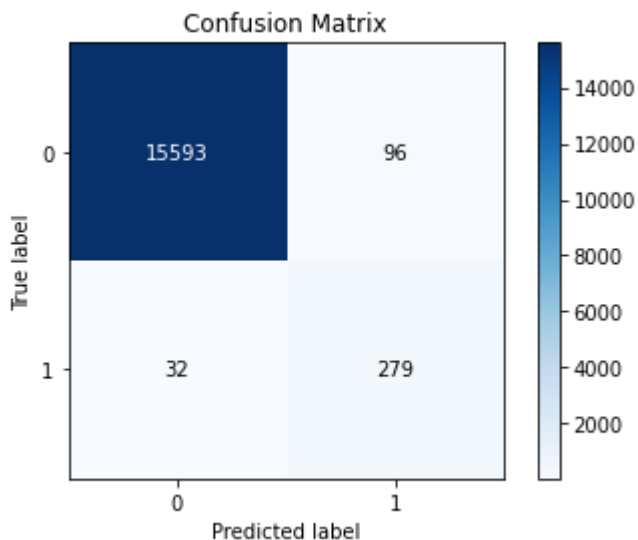
```
In [103... print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.992

Recall Score 0.8971061093247589

```
[[15593  96]
```

```
 [  32 279]]
```



```
In [104... tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

```
Out[104... 16960
```

Voting Classifier

```
In [105... from sklearn.ensemble import ExtraTreesClassifier, RandomForestClassifier, VotingClassifier
```

```
In [106... clf2 = RandomForestClassifier(n_estimators = 500, max_depth=25)
clf3 = XGBClassifier(n_estimators=500, learning_rate=0.1, base_score=0.2)
clf4 = GradientBoostingClassifier(n_estimators=500, max_depth=3, learning_rate=0.1)
```

```
In [107... vt = VotingClassifier(estimators=[ ('clf', clf2), ('xg', clf3), ('gb', clf4)], weights=[
%time vt.fit(X, y)
```

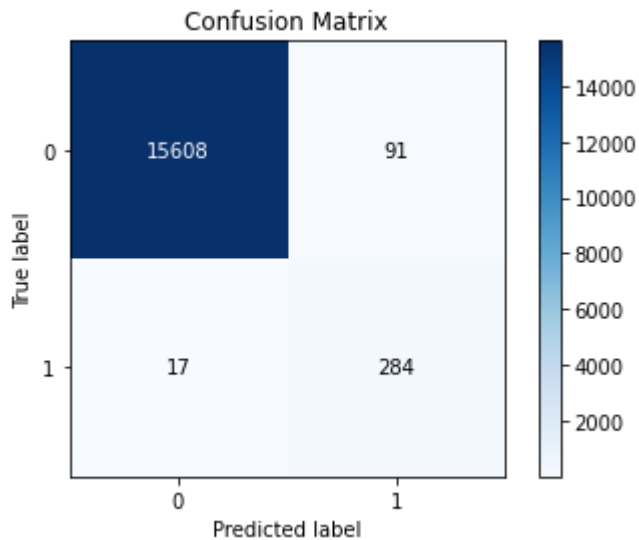
[10:40:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
Wall time: 14min 58s

```
Out[107... VotingClassifier(estimators=[('clf',
                                RandomForestClassifier(max_depth=25,
                                                         n_estimators=500)),
                                ('xg',
                                 XGBClassifier(base_score=0.2, booster=None,
                                                colsample_bylevel=None,
                                                colsample_bynode=None,
                                                colsample_bytree=None, gamma=None,
                                                gpu_id=None, importance_type='gain',
                                                interaction_constraints=None,
                                                learning_rate=0.1,
                                                max_delta_step=None, max_depth=None,
                                                min_child_weight=None, missing=nan,
                                                monotone_constraints=None,
                                                n_estimators=500, n_jobs=None,
                                                num_parallel_tree=None,
                                                random_state=None, reg_alpha=None,
                                                reg_lambda=None,
                                                scale_pos_weight=None,
                                                subsample=None, tree_method=None,
                                                validate_parameters=None,
                                                verbosity=None)),
                                ('gb',
                                 GradientBoostingClassifier(n_estimators=500))),
                                voting='soft', weights=[1, 1, 1])
```

```
In [108... pred = vt.predict(X_test)
```

```
In [109... print("Accuracy Score ", accuracy_score(pred, test['class']))
print("Recall Score ", recall_score(pred, test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.99325
Recall Score 0.9435215946843853
[[15608 91]
 [17 284]]



```
In [110...] tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[110...] 9410

Custom Stacking classifier:

```
In [111...] def stacking_classifier(X,y,n_estimators,Xtest,Y_test ):
    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,stratify =
    X_train1, X_train2, y_train1, y_train2 = train_test_split(X_train, y_train, test_si

    list_input_data =[]
    list_output_data =[]

    for i in range(0,n_estimators):

        selecting_rows = np.random.choice(list(range(X_train1.shape[0])),size=int(0.6 *
        sample_data = X_train1.iloc[selecting_rows,: ]
        target_of_sample_data = y_train1.iloc[selecting_rows]

        list_input_data.append(sample_data)
        list_output_data.append(target_of_sample_data)

    models = {}

    for i in tqdm(range(n_estimators)):
        best_model = XGBClassifier()
        best_model.fit( list_input_data[i] , list_output_data[i] )
        models['model_'+str(i)] = best_model

    predictions = []
    for model in models.values():
        y_pred = model.predict(X_train2)
        predictions.append(y_pred)

    df = pd.DataFrame()
    for i in range(len(models)):
```

```

df['prediction_'+str(i)] = predictions[i]

meta_model = LogisticRegression()
meta_model.fit(df,y_train2)

prediction = []
for model in models.values():
    y_pred = model.predict(Xtest)
    prediction.append(y_pred)

df2 = pd.DataFrame()
for i in range(len(models)):
    df2['prediction_'+str(i)] = prediction[i]

ypred = meta_model.predict(df2)

return ypred

```

In [112...

```
pred = stacking_classifier(X,y,20,X_test,test['class'])
```

```

0%|
| 0/20 [00:00<?, ?it/s]
[10:51:42] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

5%|
| 1/20 [00:01<00:33, 1.78s/it]
[10:51:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

10%|
| 2/20 [00:03<00:35, 1.95s/it]
[10:51:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

15%|
| 3/20 [00:05<00:33, 1.99s/it]
[10:51:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|
| 4/20 [00:07<00:31, 1.95s/it]
[10:51:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

25%|
| 5/20 [00:09<00:30, 2.02s/it]
[10:51:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

30%|

```

```
| 6/20 [00:12<00:29, 2.07s/it]
[10:51:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
35%|███████████|
| 7/20 [00:14<00:27, 2.08s/it]
[10:51:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
40%|███████████|
| 8/20 [00:15<00:23, 1.97s/it]
[10:51:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
45%|███████████|
| 9/20 [00:17<00:21, 1.95s/it]
[10:52:00] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
50%|███████████|
| 10/20 [00:19<00:19, 1.92s/it]
[10:52:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
55%|███████████|
| 11/20 [00:21<00:18, 2.02s/it]
[10:52:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
60%|███████████|
| 12/20 [00:23<00:15, 1.98s/it]
[10:52:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
65%|███████████|
| 13/20 [00:26<00:14, 2.06s/it]
[10:52:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
70%|███████████|
| 14/20 [00:28<00:12, 2.03s/it]
[10:52:10] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
75%|███████████|
| 15/20 [00:29<00:10, 2.01s/it]
[10:52:12] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
80%|███████████|
```



```
In [115... tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
cost = 10*fp + 500*fn
cost
```

Out[115... 8210

Custom Stacking Classifier

```
In [116... from sklearn.ensemble import ExtraTreesClassifier, RandomForestClassifier, VotingClassif
```

```
In [117... def StackingClassifier(X,y,n_estimators,Xtest,Y_test ):
    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, stratify =
    X_train1, X_train2, y_train1, y_train2 = train_test_split(X_train, y_train, test_si

    list_input_data = []
    list_output_data = []

    for i in range(0,n_estimators):

        selecting_rows = np.random.choice(list(range(X_train1.shape[0])),size=int(0.6 *
        sample_data = X_train1.iloc[selecting_rows,:]
        target_of_sample_data = y_train1.iloc[selecting_rows]

        list_input_data.append(sample_data)
        list_output_data.append(target_of_sample_data)

    models = {}

    for i in tqdm(range(n_estimators)):
        clf2 = RandomForestClassifier(n_estimators = 500,max_depth=25,n_jobs = -1)
        clf3 = XGBClassifier(n_estimators=500,learning_rate=0.1,base_score=0.2)
        clf1 = GradientBoostingClassifier(n_estimators=500,max_depth=3,learning_rate=0.
        best_model = np.random.choice([clf1,clf2,clf3])
        best_model.fit( list_input_data[i] , list_output_data[i] )
        models['model_'+str(i)] = best_model

    predictions = []
    for model in models.values():
        y_pred = model.predict(X_train2)
        predictions.append(y_pred)

    df = pd.DataFrame()
    for i in range(len(models)):
        df['prediction_'+str(i)] = predictions[i]

    meta_model = LogisticRegression()
    meta_model.fit(df,y_train2)

    prediction = []
    for model in models.values():
        y_pred = model.predict(Xtest)
        prediction.append(y_pred)

    df2 = pd.DataFrame()
    for i in range(len(models)):
        df2['prediction_'+str(i)] = prediction[i]
```

```
ypred = meta_model.predict(df2)

return ypred
```

In [118...

```
esti = [20,50,100,200]
for i in esti:
    pred = stacking_classifer(X,y,i,X_test,test['class'])
    print("Recall Score ",recall_score(pred,test['class']))
    tn, fp, fn, tp = confusion_matrix(pred,test['class']).ravel()
    cost = 10*fp + 500*fn
    print(cost)
```

```
0%|
| 0/20 [00:00<?, ?it/s]
[10:52:25] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

5%|
| 1/20 [00:01<00:37, 1.96s/it]
[10:52:27] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

10%|
| 2/20 [00:04<00:37, 2.07s/it]
[10:52:29] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

15%|
| 3/20 [00:06<00:36, 2.15s/it]
[10:52:31] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

20%|
| 4/20 [00:08<00:35, 2.21s/it]
[10:52:34] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

25%|
| 5/20 [00:11<00:34, 2.27s/it]
[10:52:36] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

30%|
| 6/20 [00:13<00:30, 2.20s/it]
[10:52:38] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.

35%|
| 7/20 [00:15<00:29, 2.25s/it]
```



```
[10:53:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

90% |

| 18/20 [00:39<00:04, 2.18s/it]

```
[10:53:05] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

95% |

| 19/20 [00:41<00:02, 2.16s/it]

```
[10:53:07] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

100% |

20/20 [00:43<00:00, 2.19s/it]

Recall Score 0.9122807017543859

13650

0% |

```
| 0/50 [00:00<?, ?it/s]
```

```
[10:53:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

2% | ■ ■

```
| 1/50 [00:01<01:35, 1.95s/it]
```

```
[10:53:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

4% |

| 2/50 [00:04<01:48, 2.27s/it]

```
[10:53:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

6% | ██████████

| 3/50 [00:06<01:47, 2.28s/it]

```
[10:53:18] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

8% |

| 4/50 [00:08<01:42, 2.22s/it]

```
[10:53:20] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

10% |

| 5/50 [00:10<01:38. 2.19s/it]

```
[10:53:22] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

12% |

```
| 6/50 [00:12<01:33, 2.12s/it]
```

```
[10:53:24] WARNING: C:/Users/Administrator/workspace/xgboost-win64 release 1.3.0/src/lea
```

rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

14%|██████████
| 7/50 [00:14<01:28, 2.07s/it]
[10:53:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

16%|██████████
| 8/50 [00:16<01:23, 1.98s/it]
[10:53:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

18%|██████████
| 9/50 [00:19<01:25, 2.09s/it]
[10:53:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|██████████
| 10/50 [00:21<01:25, 2.15s/it]
[10:53:32] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

22%|██████████
| 11/50 [00:23<01:21, 2.09s/it]
[10:53:34] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

24%|██████████
| 12/50 [00:25<01:22, 2.17s/it]
[10:53:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

26%|██████████
| 13/50 [00:27<01:18, 2.13s/it]
[10:53:39] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

28%|██████████
| 14/50 [00:29<01:15, 2.10s/it]
[10:53:41] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

30%|██████████
| 15/50 [00:32<01:15, 2.17s/it]
[10:53:43] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

32%|██████████
| 16/50 [00:33<01:09, 2.05s/it]

```
[10:53:45] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
34%|███████████████████████████████████|
| 17/50 [00:35<01:08, 2.06s/it]
[10:53:47] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
36%|███████████          | 18/50 [00:38<01:08, 2.13s/it]
[10:53:49] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
38%|██████████████████████████████████████|  
| 19/50 [00:40<01:07, 2.16s/it]  
[10:53:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
40%|███████████████████████████████████████|
| 20/50 [00:42<01:06, 2.21s/it]
[10:53:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
42%|███████████████████████████████████████|  
| 21/50 [00:44<01:02, 2.15s/it]  
[10:53:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
44%|███████████  
22/50 [00:46<00:59, 2.14s/it]  
[10:53:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
46%|███████████████████████████████████████|
| 23/50 [00:49<00:58, 2.17s/it]
[10:54:00] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
48%|██████████████████████████████████████████████████████████████████████████████|
| 24/50 [00:51<00:55, 2.12s/it]
[10:54:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
50%|██████████████████████████████████████████████████████████████████████████████|
25/50 [00:53<00:53, 2.13s/it]
[10:54:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

52% |

```
| 26/50 [00:55<00:49, 2.08s/it]
[10:54:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

54%|███████████████████████████████████████|
| 27/50 [00:57<00:48, 2.13s/it]
[10:54:09] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

56%|███████████████████████████████████████|
| 28/50 [00:59<00:46, 2.11s/it]
[10:54:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

58%|███████████████████████████████████████|
| 29/50 [01:01<00:43, 2.07s/it]
[10:54:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

60%|███████████████████████████████████████|
| 30/50 [01:03<00:40, 2.03s/it]
[10:54:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

62%|███████████████████████████████████████|
| 31/50 [01:05<00:38, 2.03s/it]
[10:54:17] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

64%|███████████████████████████████████████|
| 32/50 [01:07<00:37, 2.08s/it]
[10:54:19] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

66%|███████████████████████████████████████|
| 33/50 [01:10<00:36, 2.16s/it]
[10:54:21] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

68%|███████████████████████████████████████|
| 34/50 [01:12<00:33, 2.10s/it]
[10:54:23] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

70%|███████████████████████████████████████|
| 35/50 [01:14<00:31, 2.13s/it]
[10:54:25] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

[illegible]

```
92%|███████████████████████████████████████|
| 46/50 [01:38<00:08, 2.24s/it]
[10:54:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

94%|███████████████████████████████████████|
| 47/50 [01:41<00:06, 2.24s/it]
[10:54:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

96%|███████████████████████████████████████|
| 48/50 [01:43<00:04, 2.16s/it]
[10:54:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

98%|███████████████████████████████████████|
| 49/50 [01:45<00:02, 2.18s/it]
[10:54:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

100%|███████████████████████████████████████|
50/50 [01:47<00:00, 2.15s/it]
Recall Score 0.9228070175438596
12120

0%|
| 0/100 [00:00<?, ?it/s]
[10:55:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

1%|███
| 1/100 [00:02<03:43, 2.25s/it]
[10:55:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

2%|████
| 2/100 [00:04<03:49, 2.34s/it]
[10:55:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

3%|█████
| 3/100 [00:06<03:40, 2.28s/it]
[10:55:10] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

4%|██████
| 4/100 [00:08<03:33, 2.22s/it]
[10:55:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

5%|███████
```

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5/100 [00:11<03:28, 2.19s/it]
[10:55:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

6%|██████|
| 6/100 [00:13<03:28, 2.22s/it]
[10:55:17] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

7%|██████|
| 7/100 [00:15<03:20, 2.15s/it]
[10:55:19] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

8%|██████|
| 8/100 [00:17<03:16, 2.14s/it]
[10:55:21] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

9%|██████|
| 9/100 [00:19<03:17, 2.17s/it]
[10:55:23] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

10%|██████|
| 10/100 [00:21<03:09, 2.11s/it]
[10:55:25] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

11%|██████|
| 11/100 [00:23<03:10, 2.14s/it]
[10:55:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

12%|██████|
| 12/100 [00:25<03:02, 2.08s/it]
[10:55:29] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

13%|██████|
| 13/100 [00:28<03:07, 2.16s/it]
[10:55:32] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

14%|██████|
| 14/100 [00:30<03:13, 2.25s/it]
[10:55:34] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```


15%|██████████|
15/100 [00:33<03:16, 2.31s/it]
[10:55:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

16%|██████████|
16/100 [00:35<03:08, 2.24s/it]
[10:55:39] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

17%|██████████|
17/100 [00:37<03:05, 2.24s/it]
[10:55:41] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

18%|██████████|
18/100 [00:39<02:59, 2.19s/it]
[10:55:43] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

19%|██████████|
19/100 [00:41<02:57, 2.19s/it]
[10:55:45] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|██████████|
20/100 [00:44<02:59, 2.25s/it]
[10:55:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

21%|██████████|
21/100 [00:46<02:54, 2.21s/it]
[10:55:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

22%|██████████|
22/100 [00:48<02:48, 2.16s/it]
[10:55:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

23%|██████████|
23/100 [00:50<02:49, 2.20s/it]
[10:55:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

24%|██████████|
24/100 [00:52<02:49, 2.23s/it]
[10:55:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj

ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set `eval_metric` if you'd like to restore the old behavior.

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rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.
```

```
[10:56:41] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

45% |

45/100 [01:39<01:59, 2.18s/it]

```
[10:56:43] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

46% |

46/100 [01:41<01:58, 2.20s/it]

```
[10:56:45] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

47% |

47/100 [01:43<01:54, 2.15s/it]

```
[10:56:47] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

48% |

48/100 [01:45<01:48, 2.09s/it]

```
[10:56:49] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

49%

49/100 [01:47<01:46, 2.09s/it]

```
[10:56:51] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

50% 

50/100 [01:50<01:50, 2.21s/it]

```
[10:56:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

51%

51/100 [01:52<01:47, 2.20s/it]

```
[10:56:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

52% |

52/100 [01:54<01:41, 2.11s/it]

```
[10:56:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

53% |

53/100 [01:56<01:41, 2.17s/it]

```
[10:57:00] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
[01:58<01:37, 2.13s/it]
[10:57:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

55%

```
55/100 [02:00<01:34, 2.11s/it]
[10:57:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

56%

```
56/100 [02:02<01:36, 2.20s/it]
[10:57:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

57%

```
57/100 [02:05<01:33, 2.18s/it]
[10:57:09] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

58%

```
58/100 [02:07<01:31, 2.18s/it]
[10:57:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

59%

```
59/100 [02:09<01:31, 2.23s/it]
[10:57:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

60%

```
60/100 [02:11<01:29, 2.24s/it]
[10:57:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

61%

```
61/100 [02:14<01:28, 2.28s/it]
[10:57:18] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

62%

```
62/100 [02:16<01:22, 2.18s/it]
[10:57:20] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

63%

```
63/100 [02:18<01:22, 2.22s/it]
[10:57:22] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```


ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

```
74%|███████████████████████████████████████████████████████████████████████████████|
74/100 [02:42<00:55, 2.12s/it]
[10:57:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
76%|██████████████████████████████████████████████████████████████████████████████| 1  
76/100 [02:46<00:51, 2.16s/it]  
[10:57:51] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
77%|██████████████████████████████████████████████████████████████████████████████|
77/100 [02:48<00:47, 2.07s/it]
[10:57:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
78%|███████████████████████████████████████████████████████████████|
78/100 [02:50<00:44, 2.04s/it]
[10:57:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.
```



```
[10:58:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

94% |

94/100 [03:26<00:13, 2.23s/it]

```
[10:58:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

95%|

95/100 [03:28<00:10, 2.18s/it]

```
[10:58:32] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

96% |

96/100 [03:31<00:08, 2.21s/it]

```
[10:58:35] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

97%

97/100 [03:33<00:06, 2.20s/it]

```
[10:58:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

98% |

98/100 [03:35<00:04, 2.10s/it]

```
[10:58:39] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

99% |

99/100 [03:37<00:02, 2.14s/it]

```
[10:58:41] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

100% | 1

```
00/100 [03:39<00:00, 2.20s/it]
```

Recall Score 0.9227941176470589

11740

0% |

```
| 0/200 [00:00<?, ?it/s]
```

```
[10:58:53] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

0% | ■

```
| 1/200 [00:02<07:47, 2.35s/it]
```

```
[10:58:55] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

1% | ■

```
| 2/200 [00:04<06:54, 2.09s/it]
```

```
[10:58:57] WARNING: C:/Users/Administrator/workspace/xgboost-win64 release 1.3.0/src/lea
```

rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

2%|■■■

| 3/200 [00:06<07:16, 2.21s/it]

[10:58:59] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

2%|■■■

| 4/200 [00:08<07:18, 2.23s/it]

[10:59:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

2%|■■■

| 5/200 [00:11<07:28, 2.30s/it]

[10:59:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

3%|■■■

| 6/200 [00:13<07:29, 2.32s/it]

[10:59:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

4%|■■■

| 7/200 [00:15<07:18, 2.27s/it]

[10:59:09] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

4%|■■■

| 8/200 [00:17<07:08, 2.23s/it]

[10:59:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

4%|■■■

| 9/200 [00:19<06:48, 2.14s/it]

[10:59:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

5%|■■■

| 10/200 [00:22<06:53, 2.18s/it]

[10:59:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

6%|■■■

| 11/200 [00:24<06:39, 2.11s/it]

[10:59:17] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

6%|■■■

| 12/200 [00:26<06:46, 2.16s/it]

[10:59:19] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

6%|██████|

13/200 [00:28<06:43, 2.16s/it]

[10:59:21] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

7%|██████|

14/200 [00:30<06:41, 2.16s/it]

[10:59:24] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

8%|██████|

15/200 [00:33<06:46, 2.20s/it]

[10:59:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

8%|██████|

16/200 [00:35<06:52, 2.24s/it]

[10:59:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

8%|██████|

17/200 [00:37<06:44, 2.21s/it]

[10:59:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

9%|██████|

18/200 [00:39<06:53, 2.27s/it]

[10:59:33] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

10%|██████|

19/200 [00:41<06:36, 2.19s/it]

[10:59:35] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

10%|██████|

20/200 [00:44<06:52, 2.29s/it]

[10:59:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

10%|██████|

21/200 [00:46<06:50, 2.29s/it]

[10:59:40] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

11%|██████|

22/200 [00:49<06:51, 2.31s/it]
[10:59:42] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

12%|██████████|

23/200 [00:51<06:43, 2.28s/it]
[10:59:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

12%|██████████|

24/200 [00:53<06:29, 2.21s/it]
[10:59:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

12%|██████████|

25/200 [00:55<06:30, 2.23s/it]
[10:59:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

13%|██████████|

26/200 [00:57<06:12, 2.14s/it]
[10:59:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

14%|██████████|

27/200 [00:59<06:10, 2.14s/it]
[10:59:53] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

14%|██████████|

28/200 [01:01<06:02, 2.11s/it]
[10:59:55] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

14%|██████████|

29/200 [01:03<06:03, 2.13s/it]
[10:59:57] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

15%|██████████|

30/200 [01:05<05:57, 2.11s/it]
[10:59:59] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

16%|██████████|

31/200 [01:08<06:09, 2.19s/it]
[11:00:01] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

16%|██████████|
32/200 [01:10<06:10, 2.21s/it]
[11:00:03] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

16%|██████████|
33/200 [01:12<06:00, 2.16s/it]
[11:00:05] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

17%|██████████|
34/200 [01:14<05:57, 2.15s/it]
[11:00:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

18%|██████████|
35/200 [01:16<05:38, 2.05s/it]
[11:00:09] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

18%|██████████|
36/200 [01:18<05:35, 2.04s/it]
[11:00:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

18%|██████████|
37/200 [01:20<05:35, 2.06s/it]
[11:00:14] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

19%|██████████|
38/200 [01:22<05:32, 2.05s/it]
[11:00:16] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|██████████|
39/200 [01:24<05:31, 2.06s/it]
[11:00:18] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|██████████|
40/200 [01:26<05:32, 2.08s/it]
[11:00:20] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

20%|██████████|
41/200 [01:29<05:30, 2.08s/it]
[11:00:22] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

21% ██████████ |
42/200 [01:31<05:31, 2.10s/it]
[11:00:24] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

22% ██████████ |
43/200 [01:33<05:22, 2.06s/it]
[11:00:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

22% ██████████ |
44/200 [01:35<05:29, 2.11s/it]
[11:00:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

22% ██████████ |
45/200 [01:37<05:34, 2.16s/it]
[11:00:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

23% ██████████ |
46/200 [01:39<05:30, 2.15s/it]
[11:00:33] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

24% ██████████ |
47/200 [01:42<05:37, 2.21s/it]
[11:00:35] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

24% ██████████ |
48/200 [01:44<05:45, 2.27s/it]
[11:00:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

24% ██████████ |
49/200 [01:46<05:45, 2.29s/it]
[11:00:40] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

25% ██████████ |
50/200 [01:48<05:27, 2.19s/it]
[11:00:42] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

26% ██████████ |
51/200 [01:50<05:24, 2.18s/it]
[11:00:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea

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rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr
ic if you'd like to restore the old behavior.
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27%|███████████|
54/200 [01:57<05:06, 2.10s/it]
[11:00:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
28%|███████████████████████████████| 0.00sec/it
55/200 [01:59<05:11, 2.15s/it]
[11:00:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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28%|███████████████████████████████████████| 100%  
56/200 [02:01<05:14, 2.18s/it]  
[11:00:55] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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29%|███████████████████████████████████████| 0.00sec/it
58/200 [02:05<04:49, 2.04s/it]
[11:00:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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30%|███████████████████████████████| |
59/200 [02:08<05:03, 2.15s/it]
[11:01:01] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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30%|███████████|
60/200 [02:09<04:54, 2.10s/it]
[11:01:03] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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[11:01:05] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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32%|███████████|
64/200 [02:19<05:06, 2.25s/it]
[11:01:12] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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32%|███████████| 65/200 [02:21<04:51, 2.16s/it]
[11:01:14] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

36% |


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71/200 [02:33<04:28, 2.08s/it]
[11:01:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

36%|███████████|

72/200 [02:35<04:29, 2.10s/it]
[11:01:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

36%|███████████|

73/200 [02:37<04:32, 2.14s/it]
[11:01:31] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

37%|███████████|

74/200 [02:40<04:32, 2.16s/it]
[11:01:33] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

38%|███████████|

75/200 [02:42<04:31, 2.17s/it]
[11:01:35] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

38%|███████████|

76/200 [02:44<04:27, 2.16s/it]
[11:01:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

38%|███████████|

77/200 [02:46<04:28, 2.18s/it]
[11:01:39] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

39%|███████████|

78/200 [02:48<04:26, 2.18s/it]
[11:01:42] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

40%|███████████|

79/200 [02:51<04:26, 2.20s/it]
[11:01:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

40%|███████████|

80/200 [02:53<04:18, 2.16s/it]
[11:01:46] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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40%|███████████|
81/200 [02:55<04:23, 2.21s/it]
[11:01:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

41%|███████████|
82/200 [02:57<04:23, 2.23s/it]
[11:01:51] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

42%|███████████|
83/200 [02:59<04:17, 2.20s/it]
[11:01:53] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

42%|███████████|
84/200 [03:02<04:12, 2.18s/it]
[11:01:55] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

42%|███████████|
85/200 [03:04<04:08, 2.16s/it]
[11:01:57] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

43%|███████████|
86/200 [03:06<04:08, 2.18s/it]
[11:01:59] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

44%|███████████|
87/200 [03:08<04:12, 2.23s/it]
[11:02:02] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

44%|███████████|
88/200 [03:10<04:10, 2.24s/it]
[11:02:04] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

44%|███████████|
89/200 [03:13<04:01, 2.18s/it]
[11:02:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

45%|███████████|
90/200 [03:15<04:03, 2.22s/it]
[11:02:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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46%|███████████|
91/200 [03:17<04:03, 2.23s/it]
[11:02:10] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

46%|███████████|
92/200 [03:19<03:56, 2.19s/it]
[11:02:12] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

46%|███████████|
93/200 [03:21<03:53, 2.18s/it]
[11:02:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

47%|███████████|
94/200 [03:23<03:49, 2.17s/it]
[11:02:17] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

48%|███████████|
95/200 [03:26<03:51, 2.20s/it]
[11:02:19] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

48%|███████████|
96/200 [03:28<03:43, 2.15s/it]
[11:02:21] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

48%|███████████|
97/200 [03:30<03:49, 2.23s/it]
[11:02:24] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

49%|███████████|
98/200 [03:33<03:53, 2.29s/it]
[11:02:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

50%|███████████|
99/200 [03:34<03:35, 2.14s/it]
[11:02:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

50%|███████████|
00/200 [03:37<03:32, 2.12s/it]
[11:02:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the ob
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set `eval_metric` if you'd like to restore the old behavior.

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50%|███████████          |  
101/200 [03:39<03:26,  2.09s/it]  
[11:02:32] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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51%|███████████████████████████████████████████████████████████████████████████████|
102/200 [03:41<03:22, 2.06s/it]
[11:02:34] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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52%|███████████████████████████████████|
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103/200 [03:43<03:21, 2.08s/it]
[11:02:36] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

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52%|███████████ | 1  
04/200 [03:45<03:29, 2.18s/it]  
[11:02:38] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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52%|███████████████████████████████████████████          | 1  
05/200 [03:47<03:22, 2.14s/it]  
[11:02:40] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
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53%|██████████████████████████████████████████████████████████████████████████████| 106/200 [03:49<03:22, 2.16s/it]
[11:02:43] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
54%|███████████████████████████████████████████████████████|
107/200 [03:51<03:15, 2.11s/it]
[11:02:45] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
54%|██████████████████████████████████████████████████████████████████████████████|
108/200 [03:54<03:18, 2.16s/it]
[11:02:47] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
55%|███████████████████████████████████████████████████          | 1  
09/200 [03:56<03:22, 2.22s/it]  
[11:02:49] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
55%|██████████████████████████████████████████████████████████████████████████████| 1  
10/200 [03:58<03:24, 2.27s/it]  
[11:02:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set `eval_metric` if you'd like to restore the old behavior.

```
56%|███████████          |  
111/200 [04:01<03:26,   2.32s/it]  
[11:02:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
56%|███████████████████████████████████████████████████████████████████████████████|
112/200 [04:03<03:17, 2.24s/it]
[11:02:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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56%|██████████████████████████████████████| 0.00sec
113/200 [04:05<03:06, 2.14s/it]
[11:02:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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57%|███████████████████████████████████████          | 1
14/200 [04:07<03:05, 2.15s/it]
[11:03:00] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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57%|██████████████████████████████████████          | 1  
15/200 [04:09<03:08, 2.22s/it]  
[11:03:03] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
58%|██████████████████████████████████████████████████████████████████████████████|
116/200 [04:11<02:58, 2.13s/it]
[11:03:05] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
58%|███████████████████████████████████████████████████████████████████████████████|
117/200 [04:13<02:56, 2.12s/it]
[11:03:07] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
59%|███████████████████████████████████████████████████████████████████████████████|
118/200 [04:16<02:59, 2.19s/it]
[11:03:09] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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60%|███████████████████████████████| 19/200 [04:18<02:54, 2.15s/it] | 1
```

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[11:03:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
60%|███████████ | 1  
20/200 [04:20<03:00, 2.25s/it]  
[11:03:14] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

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60%|███████████████████████████████████| |  
121/200 [04:22<02:55, 2.23s/it]  
[11:03:16] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
61%|███████████████████████████████████████████████████████████████████████████████|
122/200 [04:24<02:46, 2.13s/it]
[11:03:18] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
62%|██████████████████████████████████████████████████████████████████████████████| 1  
123/200 [04:27<02:46, 2.17s/it]  
[11:03:20] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
62%|███████████████████████████████████████████████████████████████████████████| 1
24/200 [04:29<02:40, 2.12s/it]
[11:03:22] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
62%|███████████████████████████████████ | 1  
25/200 [04:31<02:42, 2.17s/it]  
[11:03:24] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
63%|███████████████████████████████████████████████████████████████████████████|
126/200 [04:33<02:37, 2.13s/it]
[11:03:26] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
64%|███████████████████████████████████████████████████████████████████████████|
127/200 [04:35<02:37, 2.16s/it]
[11:03:28] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
64%|██████████████████████████████████████████████████████████████████████████████| 1  
128/200 [04:37<02:31, 2.11s/it]  
[11:03:30] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
64%|███████████████████████████████████████████████████████| 1  
29/200 [04:39<02:32, 2.14s/it]  
[11:03:33] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
65%|██████████████████████████████████████████████████████████████████████████████| 1  
30/200 [04:42<02:34, 2.20s/it]  
[11:03:35] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

```
66%|██████████████████████████████████████████████████████████████████████████████|
131/200 [04:44<02:37, 2.28s/it]
[11:03:37] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
66%|███████████████████████████████████████████████████████████████████████████████|
132/200 [04:46<02:34, 2.27s/it]
[11:03:40] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
66%|██████████████████████████████████████████████████████████████████████████████|
133/200 [04:49<02:34, 2.31s/it]
[11:03:42] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
67%|██████████████████████████████████████████████████████████████████████████████| 1
34/200 [04:51<02:33, 2.33s/it]
[11:03:44] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
68%|██████████████████████████████████████████████████████████████████████████████| 1
35/200 [04:54<02:32, 2.34s/it]
[11:03:47] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
68%|███████████████████████████████████████████████████████████████████████████|
136/200 [04:56<02:26, 2.29s/it]
[11:03:49] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
68%|███████████████████████████████████████████████████████████████████████████████|
137/200 [04:58<02:27, 2.34s/it]
[11:03:51] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
69%|██████████████████████████████████████████████████████████████████████████████| 1  
138/200 [05:00<02:21, 2.29s/it]  
[11:03:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/le  
aner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
70%|███████████████████████████████████████|          | 1  
39/200 [05:03<02:19, 2.29s/it]  
[11:03:56] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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70%|███████████████████████████████████████          | 1  
40/200 [05:05<02:20, 2.34s/it]  
[11:03:58] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

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86%|██████████████████████████████████████████████████████████████████████████████|
171/200 [06:13<01:01, 2.13s/it]
[11:05:06] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
86%|███████████████████████████████████████████████████████████████████████████████|
172/200 [06:15<00:58, 2.10s/it]
[11:05:08] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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86%|███████████████████████████████████████████████████████████|  
173/200 [06:17<00:57, 2.15s/it]  
[11:05:11] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
87%|██████████████████████████████████████████████████████████████████████████████| 1
74/200 [06:20<00:56, 2.16s/it]
[11:05:13] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
88%|██████████████████████████████████████████████████████████████████████████████| 1
75/200 [06:22<00:54, 2.17s/it]
[11:05:15] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
88%|██████████████████████████████████████████████████████████████████████████████|
176/200 [06:24<00:50, 2.11s/it]
[11:05:17] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
88%|███████████████████████████████████████████████████████████████████████████████|
177/200 [06:26<00:49, 2.15s/it]
[11:05:19] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

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90%|██████████████████████████████████████████████████████████████████████████████| 1
79/200 [06:30<00:43, 2.07s/it]
[11:05:23] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
90%|██████████████████████████████████████████████████████████████████████████████| 1  
80/200 [06:32<00:40, 2.05s/it]  
[11:05:25] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj
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ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set `eval_metric` if you'd like to restore the old behavior.

```
96%|██████████████████████████████████████████████████████████████████████████████| 1  
191/200 [06:55<00:18, 2.02s/it]  
[11:05:48] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
96%|███████████████████████████████████████████████████████████████████████████| |
192/200 [06:57<00:16, 2.00s/it]
[11:05:50] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.
```

```
96%|██████████████████████████████████████████████████████████████████████████████| 1  
193/200 [06:59<00:14, 2.08s/it]  
[11:05:52] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
97%|██████████████████████████████████████████████████████████████████████████████| 1  
94/200 [07:01<00:12, 2.06s/it]  
[11:05:54] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

```
99%|██████████████████████████████████████████████████████████████████████████████| 1  
198/200 [07:10<00:04, 2.18s/it]  
[11:06:03] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/lea  
rner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the obj  
ective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metr  
ic if you'd like to restore the old behavior.
```

In []:

Stacking Classifier

In [121...

```
from mlxtend.classifier import StackingClassifier
```

In [122...

```
clf2 = RandomForestClassifier(n_estimators = 500,max_depth=25)
clf3 = XGBClassifier(n_estimators=500,learning_rate=0.1,base_score=0.2)
clf1 = GradientBoostingClassifier(n_estimators=500,max_depth=3,learning_rate=0.1)
lr = LogisticRegression()

sclf = StackingClassifier(classifiers=[clf1, clf2, clf3], meta_classifier=lr)
```

In [123...

```
sclf.fit(X, y)
```

[11:29:47] WARNING: C:/Users/Administrator/workspace/xgboost-win64_release_1.3.0/src/learner.cc:1061: Starting in XGBoost 1.3.0, the default evaluation metric used with the objective 'binary:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric if you'd like to restore the old behavior.

Out[123...

```
StackingClassifier(classifiers=[GradientBoostingClassifier(n_estimators=500),
                    RandomForestClassifier(max_depth=25,
                                          n_estimators=500),
                    XGBClassifier(base_score=0.2, booster=None,
                                  colsample_bylevel=None,
                                  colsample_bynode=None,
                                  colsample_bytree=None, gamma=None,
                                  gpu_id=None,
                                  importance_type='gain',
                                  interaction_constraints=None,
                                  learning_rate=0.1,
                                  max_delta_step=None,
                                  max_depth=None,
                                  min_child_weight=None,
                                  missing=nan,
                                  monotone_constraints=None,
                                  n_estimators=500, n_jobs=None,
                                  num_parallel_tree=None,
                                  random_state=None, reg_alpha=None,
                                  reg_lambda=None,
                                  scale_pos_weight=None,
                                  subsample=None, tree_method=None,
                                  validate_parameters=None,
                                  verbosity=None)],
                    meta_classifier=LogisticRegression())
```

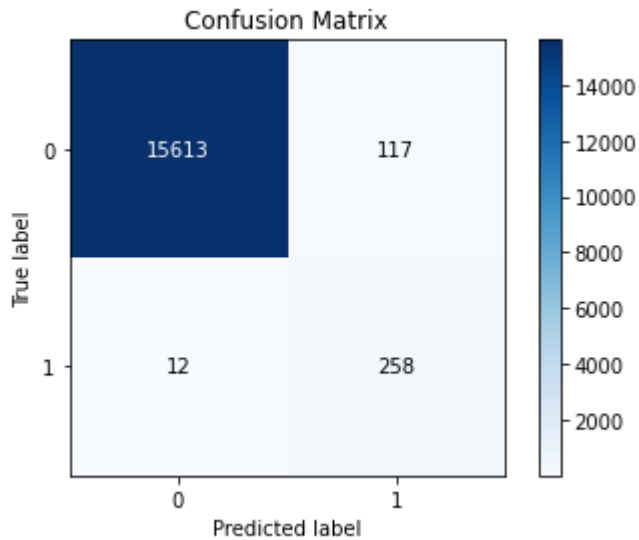
In [124...

```
pred = sclf.predict(X_test)
```

In [125...

```
print("Accuracy Score ",accuracy_score(pred,test['class']))
print("Recall Score ",recall_score(pred,test['class']))
print(confusion_matrix(pred, test['class']))
skplt.metrics.plot_confusion_matrix(pred, test['class'], normalize=False)
plt.show()
```

Accuracy Score 0.9919375
 Recall Score 0.9555555555555556
 [[15613 117]
 [12 258]]



```
In [126... tn, fp, fn, tp = confusion_matrix(pred, test['class']).ravel()
cost = 10*fp + 500*fn
print(cost)
```

7170

```
In [137... from prettytable import PrettyTable

table=PrettyTable()

table.field_names = ['Model', 'recall Score', 'cost']
table.add_row(['Logistic Regression', 0.8392, 23900])
table.add_row(['SVM', 0.9004, 12350])
table.add_row(['KNN', 0, 3750])
table.add_row(['Decision Trees', 0.8438, 45590])
table.add_row(['Random Forest', 0.9273, 11570])
table.add_row(['Gradient Boosted Decision Trees', 0.8971, 16960])
table.add_row(['XG Boosting', 0.9572, 7340])
table.add_row(['VotingClassifier', 0.9435, 9410])
table.add_row(['Custom stacking classifier', 0.9477, 8210])
table.add_row(['stacking classifier', 0.9555, 7170])
print(table)
```

Model	recall Score	cost
Logistic Regression	0.8392	23900
SVM	0.9004	12350
KNN	0	3750
Decision Trees	0.8438	45590
Random Forest	0.9273	11570
Gradient Boosted Decision Trees	0.8971	16960
XG Boosting	0.9572	7340
VotingClassifier	0.9435	9410
Custom stacking classifier	0.9477	8210
stacking classifier	0.9555	7170

In []:

In []: