Homework 2: Decision Trees

Due 10/21 at 11:59pm

Note: There are two notebooks in Homework 2. Please also complete the other notebook `HW2_Linear_Models.ipynb` for full credit on this assignment.

Q4 : Decision Trees

Download the dataset from this website : https://archive.ics.uci.edu/ml/machine-learning-databases/adult/adult.data The data is a csv file with the following columns:

age: continuous.

workclass: Private, Self-emp-not-inc, Self-emp-inc, Federal-gov, Local-gov, State-gov, Without-pay, Never-worked.

fnlwgt: continuous.

education: Bachelors, Some-college, 11th, HS-grad, Prof-school, Assoc-acdm, Assoc-voc, 9th, 7th-8th, 12th, Masters, 1st-4th, 10th, Doctorate, 5th-6th, Preschool.

education-num: continuous.

marital-status: Married-civ-spouse, Divorced, Never-married, Separated, Widowed, Married-spouse-absent, Married-AF-spouse.

occupation: Tech-support, Craft-repair, Other-service, Sales, Exec-managerial, Prof-specialty, Handlers-cleaners, Machine-op-inspct, Adm-clerical, Farming-fishing, Transport-moving, Priv-house-serv, Protective-serv, Armed-Forces.

relationship: Wife, Own-child, Husband, Not-in-family, Other-relative, Unmarried.

race: White, Asian-Pac-Islander, Amer-Indian-Eskimo, Other, Black.

sex: Female, Male.

capital-gain: continuous.

capital-loss: continuous.

hours-per-week: continuous.

native-country: United-States, Cambodia, England, Puerto-Rico, Canada, Germany, Outlying-US(Guam-USVI-etc), India, Japan, Greece, South, China, Cuba, Iran, Honduras, Philippines, Italy, Poland, Jamaica, Vietnam, Mexico, Portugal, Ireland, France, Dominican-Republic, Laos, Ecuador, Taiwan, Haiti, Columbia, Hungary, Guatemala, Nicaragua, Scotland, Thailand, Yugoslavia, El-Salvador, Trinadad&Tobago, Peru, Hong, Holand-Netherlands.

target: >50K, <=50K.

1. Read the data into a dataframe and assign column names

In [54]:
```python
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib.ticker as mtick
from sklearn.model_selection import train_test_split
from sklearn.compose import make_column_transformer
from sklearn.tree import DecisionTreeRegressor
from sklearn.preprocessing import StandardScaler, OneHotEncoder, OrdinalEncoder
from category_encoders import TargetEncoder
from sklearn.pipeline import make_pipeline
from sklearn import tree
from sklearn.model_selection import GridSearchCV

header_list = ["age", "workclass", "fnlwgt", "education", "education-num", "mari
               "occupation", "relationship", "race", "sex", "capital-gain", "cap
               "hours-per-week", "native-country", "target"]
read_file = pd.read_csv (r'/Users/Griffin/repos/assignment-2-klettg/adult.data')
read_file.to_csv (r'/Users/Griffin/repos/assignment-2-klettg/adult.csv', index=N
df = pd.read_csv('/Users/Griffin/repos/assignment-2-klettg/adult.csv', names=hea
df.head(100)
```

Out[54]:

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race	
0	39	State-gov	77516	Bachelors	13	Never-married	Adm-clerical	Not-in-family	White	
1	50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Exec-managerial	Husband	White	
2	38	Private	215646	HS-grad	9	Divorced	Handlers-cleaners	Not-in-family	White	
3	53	Private	234721	11th	7	Married-civ-spouse	Handlers-cleaners	Husband	Black	
4	28	Private	338409	Bachelors	13	Married-civ-spouse	Prof-specialty	Wife	Black	Fe
...	...	...	...	...	...	...	...	...	...	
95	29	Local-gov	115585	Some-college	10	Never-married	Handlers-cleaners	Not-in-family	White	
96	48	Self-emp-not-inc	191277	Doctorate	16	Married-civ-spouse	Prof-specialty	Husband	White	
97	37	Private	202683	Some-college	10	Married-civ-spouse	Sales	Husband	White	
98	48	Private	171095	Assoc-acdm	12	Divorced	Exec-managerial	Unmarried	White	Fe

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race
99	32	Federal-gov	249409	HS-grad	9	Never-married	Other-service	Own-child	Black

100 rows × 15 columns

1. Plot % of missing values in each column. Would you consider dropping any columns? Assuming we want to train a decision tree, would you consider imputing the missing values? If not, why?

In [55]:
```python
length = len(df)
feature_df = df.drop('target', 1)
pct_null = []
for col in feature_df:
    pct_null.append(round(((((length - len(feature_df[feature_df[col] != ' ?']))


fig = plt.figure(figsize=(14, 14))
ax = fig.add_subplot(1,1,1)
ax.yaxis.set_major_formatter(mtick.PercentFormatter())
features = header_list[:-1]
x_pos = [i for i, _ in enumerate(pct_null)]

plt.bar(x_pos, pct_null)
plt.xticks(x_pos, features, rotation='vertical')
plt.ylabel('% Missing Values')
plt.xlabel('Column Label')
plt.title('% Missing Values Across Columns')
plt.show()
```

% Missing Values Across Columns
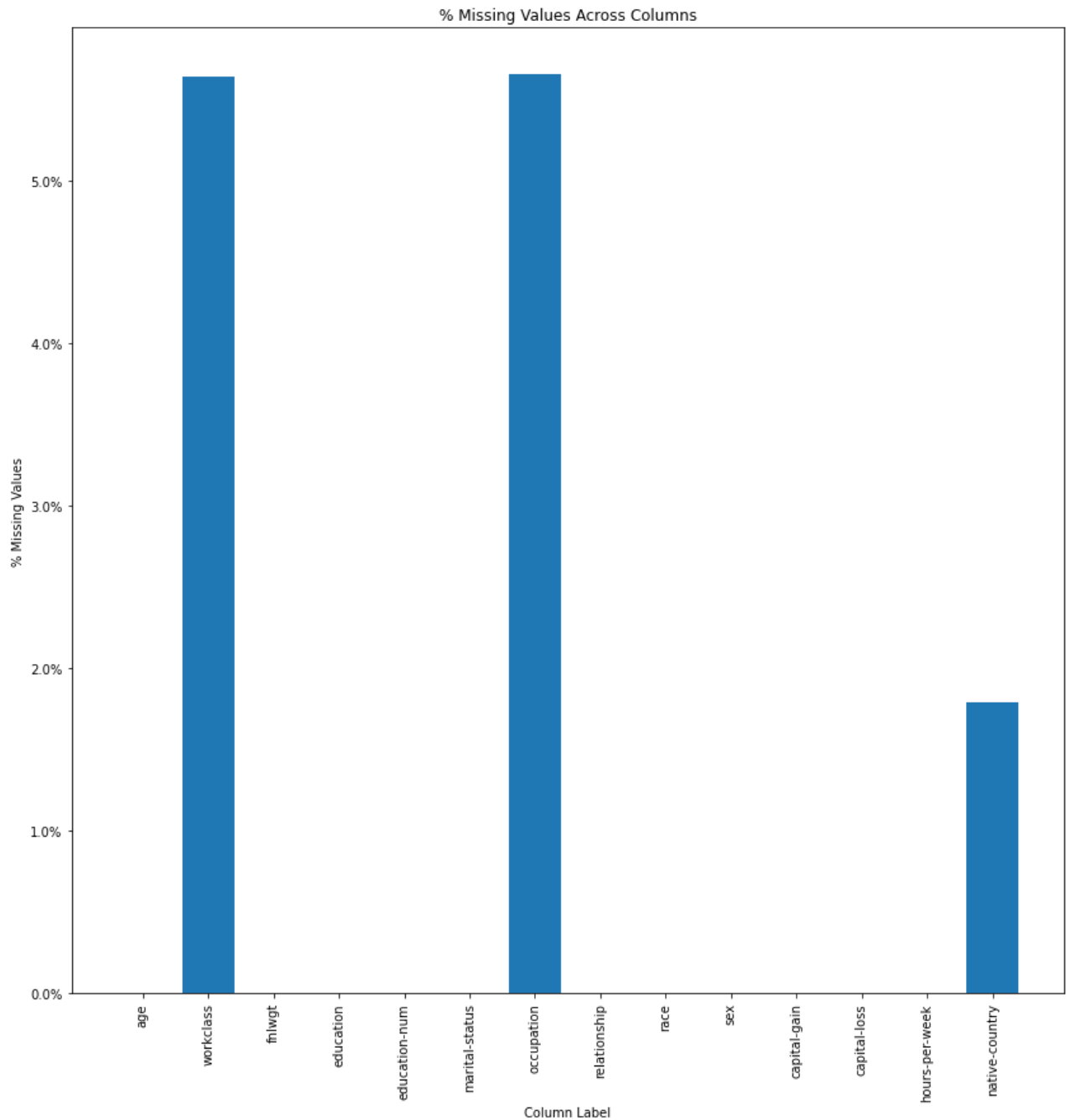
In [56]:
```
#2 Answer: I would consider dropping both workclass and occupation, since both f
#their values. I would not considering imputing values since all three with miss
# and in a decision tree model we may split the tree off the imputed value. I wi
#since this contains the same information as the field education. Also
#I will drop native-country since almost all the values are the same
#and since there are so many categories, it would add a lot
#of dimensionality with not so high information gain

feature_df = feature_df.drop('education-num', 1)
feature_df = feature_df.drop('native-country', 1)
```

1. Pick 3 categorical features and for each categorical feature, plot side-by-side bars (horizontal or vertical) of class distribution for each category.

In [57]:
```
plt.figure()
```

```python
count=0
columns_to_plot = ['workclass', 'occupation', 'race']
for col in columns_to_plot:
    df[col].value_counts().sort_index().plot(
        kind='bar', rot='vertical', ylabel='count',
        xlabel=col, title="count vs %s"%col)
    plt.show()
```


count vs workclass

count vs occupation

count vs race
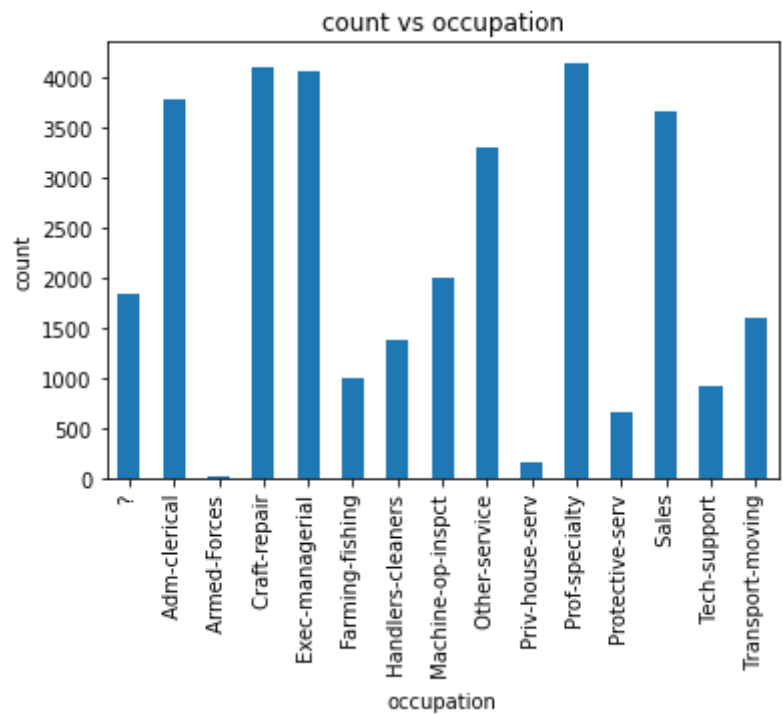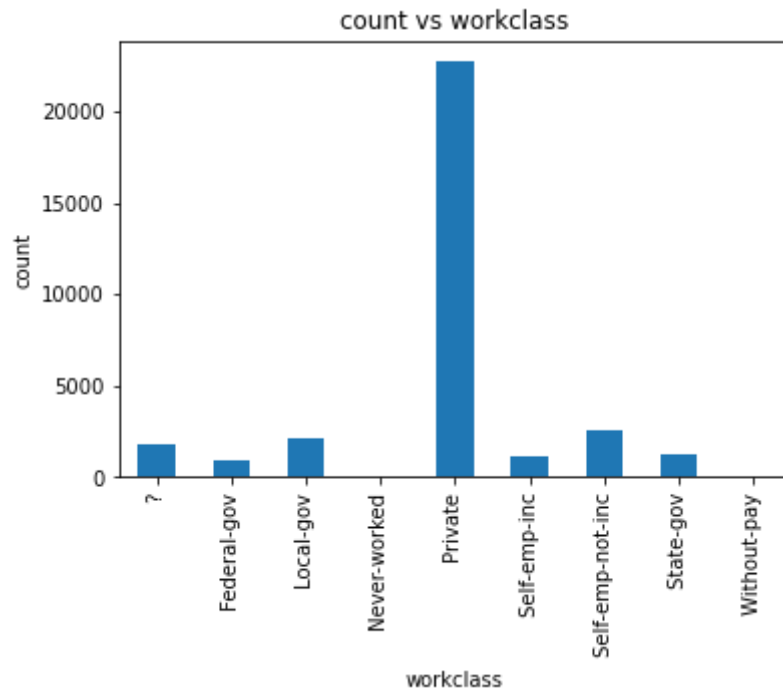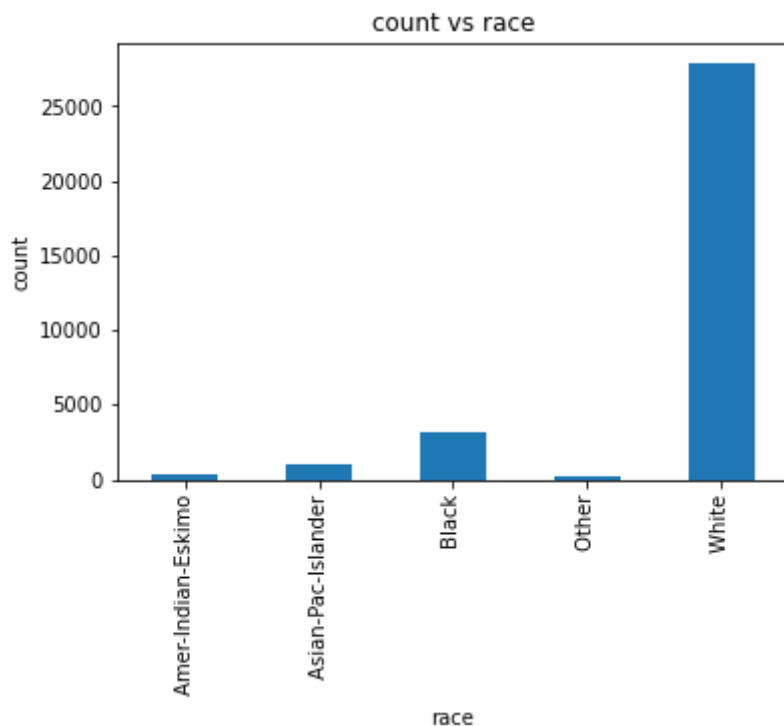
1. Split the dataset into development and test datasets using 80/20 ratio

```
In [58]:   #Preprocessing
           num_features = ['age', 'fnlwgt', 'capital-gain', 'capital-loss', 'hours-per-week

           ohe_features = ['workclass','marital-status','occupation', 'relationship', 'sex'

           te_features = ['education']

           enc = OrdinalEncoder()
           ohe = OneHotEncoder(handle_unknown='ignore')
           df[['target']] = enc.fit_transform(df[['target']])
           df['target'] = df['target'].astype(int)

           #scaler = StandardScaler()
           #feature_df[num_features] = scaler.fit_transform(feature_df[num_features])
           #feature_df[ohe_features] = ohe.fit_transform(feature_df[ohe_features])
           #feature_df.head()
           X_dev, X_test, y_dev, y_test = train_test_split(feature_df, df[['target']], rand
```

1. Fit a Decision Tree on the development data until all leaves are pure. What is the
   performance of the tree on development data and test data?

```
In [6]:    from sklearn.tree import DecisionTreeClassifier, plot_tree, export_graphviz
           from graphviz import Source
           clf = DecisionTreeClassifier(random_state=81)
           preprocess = make_column_transformer((StandardScaler(), num_features),
                                                 (OneHotEncoder(handle_unknown='ignore'),ohe_
                                                 (TargetEncoder(handle_unknown='ignore'),te_f
                                                  remainder="passthrough"
                                                 )
           #pipe = make_pipeline(preprocess,
           #                     clf)
```

```python
#pipe.fit(X_dev, y_dev)
#print(f"Test score:", pipe.score(X_test, y_test))
#print(f"Train score:", pipe.score(X_dev, y_dev))


pipe = make_pipeline(preprocess,
                     GridSearchCV(clf,
                                  param_grid = {},
                                  return_train_score=True))

pipe.fit(X_dev, y_dev)
grid_search_results = pipe.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results.best_score_)
print(f"Best train alpha: ", grid_search_results.best_params_)
print(f"Test score:", pipe.score(X_dev, y_dev))
plt.figure(figsize=(30,50))
best_tree = grid_search_results.best_estimator_

ohe_feature_names = preprocess.named_transformers_["onehotencoder"].get_feature_
te_feature_names = preprocess.named_transformers_["targetencoder"].get_feature_n
feature_names = num_features + ohe_feature_names + te_feature_names
target_values = [" <=50K", " >50K"]
tree_dot = plot_tree(best_tree, feature_names=feature_names, fontsize=9, filled=
plt.show()
```

```
Best train score:  0.8125002754349939
Best train alpha:  {}
Test score: 1.0
```
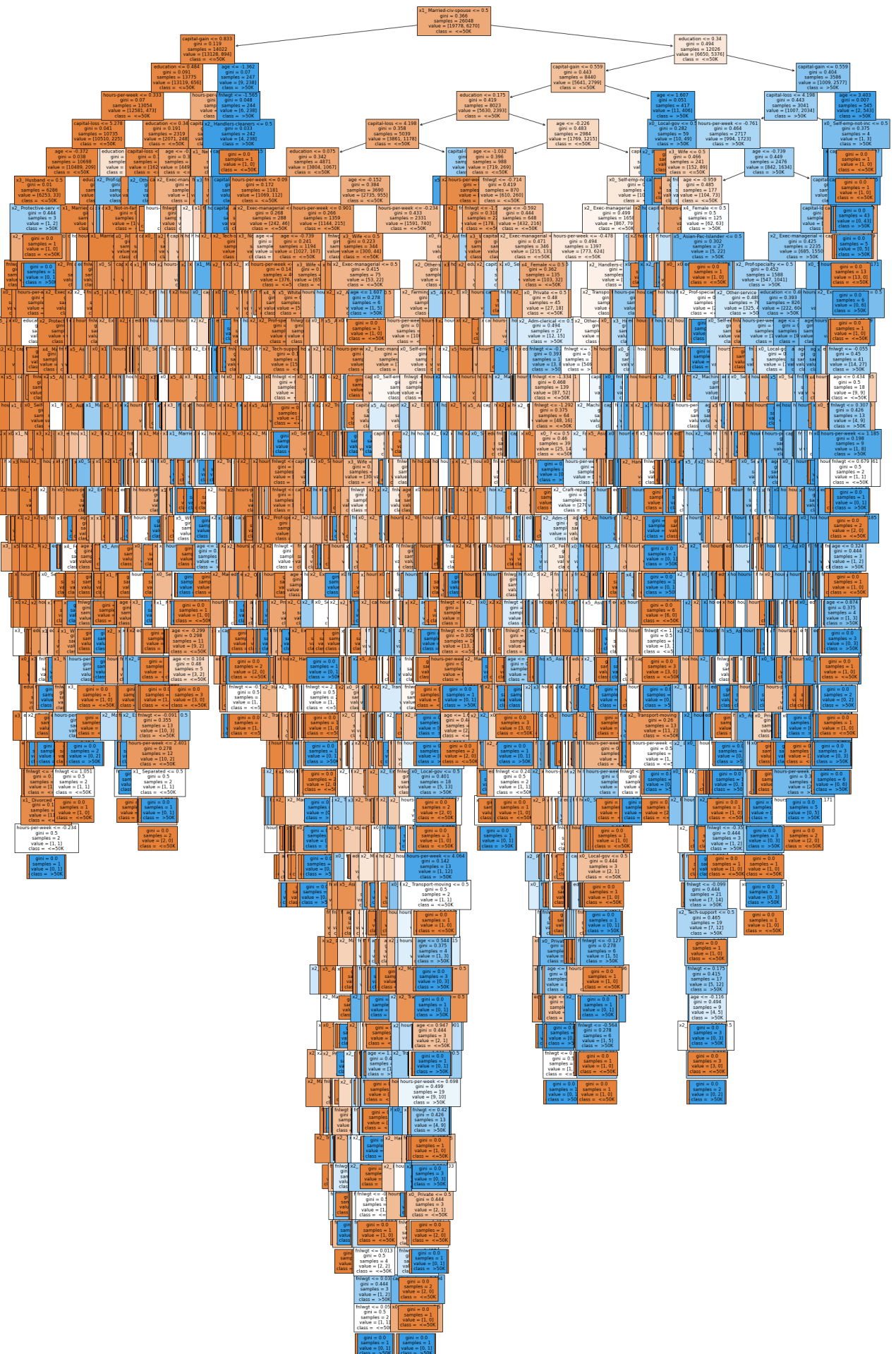
1. Visualize the trained tree

```
In [ ]:   print(tree.export_text(clf))
```

1. Prune the tree using one of the techniques discussed in class and evaluate the performance on the test set again.

```
In [60]:   import numpy as np
           from sklearn.tree import DecisionTreeClassifier, plot_tree, export_graphviz
           clf = DecisionTreeClassifier(random_state=81)
           preprocess = make_column_transformer((StandardScaler(), num_features),
                                                (OneHotEncoder(handle_unknown='ignore'),ohe_
                                                (TargetEncoder(handle_unknown='ignore'),te_f
                                                 remainder="passthrough"
                                                )
           pipe = make_pipeline(preprocess,
                           GridSearchCV(clf,
                                        param_grid = [{"min_impurity_decrease":np.logspa
                                        return_train_score=True))

           pipe.fit(X_dev, y_dev)
           grid_search_results = pipe.named_steps['gridsearchcv']
           print(f"Best train score: ", grid_search_results.best_score_)
           print(f"Best train alpha: ", grid_search_results.best_params_)
           print(f"Test score:", pipe.score(X_test, y_test))
           plt.figure(figsize=(16,25))
           best_tree = grid_search_results.best_estimator_

           ohe_feature_names = preprocess.named_transformers_["onehotencoder"].get_feature_
           te_feature_names = preprocess.named_transformers_["targetencoder"].get_feature_n
           feature_names = num_features + ohe_feature_names + te_feature_names
           target_values = [" <=50K", " >50K"]
           tree_dot = plot_tree(best_tree, feature_names=feature_names, fontsize=10, filled
           plt.show()
```
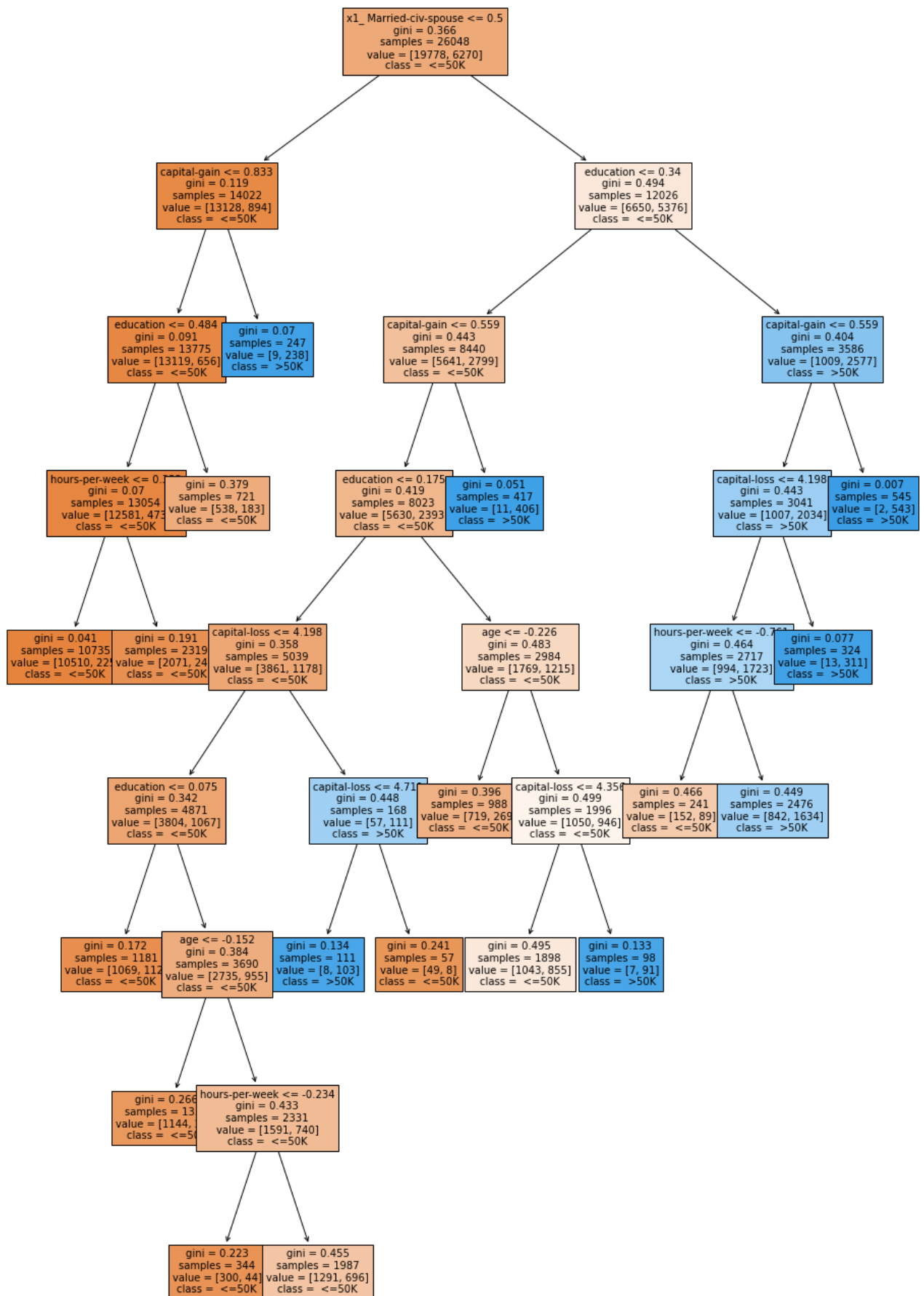
```
Best train score:  0.8521960993983173
Best train alpha:  {'min_impurity_decrease': 0.001}
Test score: 0.8542914171656687
```

1. List the top 3 most important features for this trained tree? How would you justify these features being the most important?

In [61]:
```python
import seaborn as sns
fig, ax = plt.subplots()
# the size of A4 paper
fig.set_size_inches(11.7, 8.27)
ohe_feature_names = preprocess.named_transformers_["onehotencoder"].get_feature_
te_feature_names = preprocess.named_transformers_["targetencoder"].get_feature_n
feature_names = num_features + ohe_feature_names + te_feature_names
feat_imps = zip(feature_names, best_tree.feature_importances_)
feats, imps = zip(*(sorted(list(filter(lambda x: x[1] != 0, feat_imps)), key=lam
ax = sns.barplot(list(feats), list(imps))
ax.tick_params(axis='x', rotation=90)
ax.set_ylabel('feature importance')
ax.set_xlabel('feature')
ax.set_title('feature importance across features')
#Answer:
#: Married/spouse status, education, capital-gain. We can see this using the dec
# feature_importance as well as visually from the tree. These features are at th
# which is gives us the highest impurity splits (most predictive of value)
```

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/seaborn/_decorators.py:
36: FutureWarning: Pass the following variables as keyword args: x, y. From vers
ion 0.12, the only valid positional argument will be `data`, and passing other a
rguments without an explicit keyword will result in an error or misinterpretatio
n.
  warnings.warn(

Out[61]: Text(0.5, 1.0, 'feature importance across features')

feature importance across features
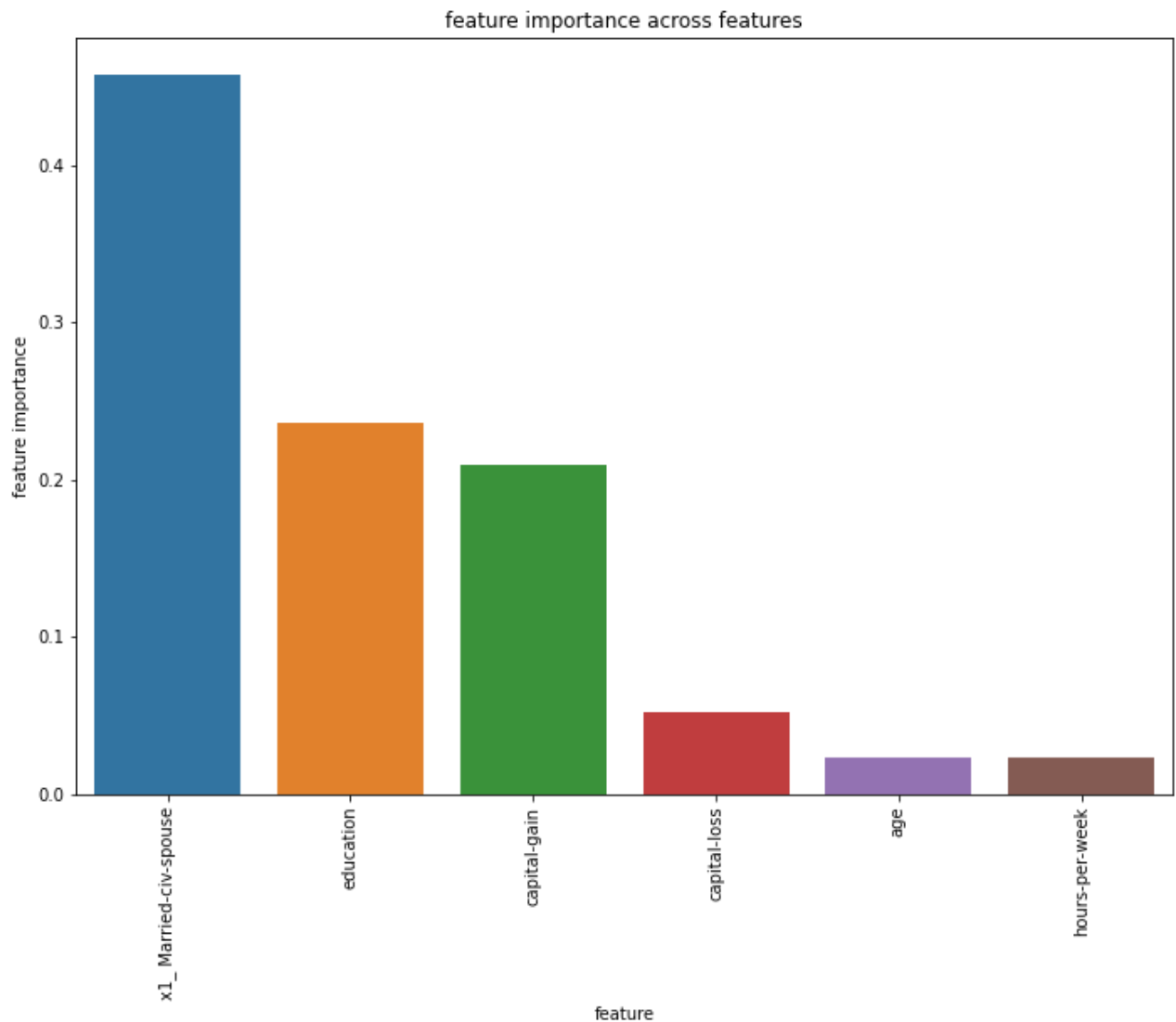
Q5: Random Forests

Let's use the same dataset and the splits created in Q3.

1. Train a Random Forest model on the development dataset using RandomForestClassifier class in sklearn. Use the default parameters. Evaluate the performance of the model on test dataset. Does this perform better than Decision Tree on the test dataset (compare to results in Q 4.5)?

```
In [15]:  from sklearn.ensemble import RandomForestClassifier
          rf = RandomForestClassifier(random_state=81)
          preprocess = make_column_transformer((StandardScaler(), num_features),
                                               (OneHotEncoder(handle_unknown='ignore'),ohe_
                                               (TargetEncoder(handle_unknown='ignore'),te_f
                                                remainder="passthrough"
                                               )
          pipe = make_pipeline(preprocess,
                               GridSearchCV(rf,
                                            param_grid = [{}],
                                            return_train_score=True))

          pipe.fit(X_dev, y_dev)
```

```python
grid_search_results = pipe.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results.best_score_)
print(f"Best train alpha: ", grid_search_results.best_params_)
print(f"Test score:", pipe.score(X_test, y_test))

#ANSWER: Yes the random forest performs slightly better than the decision tree f
#with accuracy 86.3% vs 85.4%
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_validation.py:593: DataConversionWarning: A column-vector y was passed when a
1d array was expected. Please change the shape of y to (n_samples,), for example
using ravel().
  estimator.fit(X_train, y_train, **fit_params)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_validation.py:593: DataConversionWarning: A column-vector y was passed when a
1d array was expected. Please change the shape of y to (n_samples,), for example
using ravel().
  estimator.fit(X_train, y_train, **fit_params)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_validation.py:593: DataConversionWarning: A column-vector y was passed when a
1d array was expected. Please change the shape of y to (n_samples,), for example
using ravel().
  estimator.fit(X_train, y_train, **fit_params)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_validation.py:593: DataConversionWarning: A column-vector y was passed when a
1d array was expected. Please change the shape of y to (n_samples,), for example
using ravel().
  estimator.fit(X_train, y_train, **fit_params)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_validation.py:593: DataConversionWarning: A column-vector y was passed when a
1d array was expected. Please change the shape of y to (n_samples,), for example
using ravel().
  estimator.fit(X_train, y_train, **fit_params)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_search.py:880: DataConversionWarning: A column-vector y was passed when a 1d
array was expected. Please change the shape of y to (n_samples,), for example us
ing ravel().
  self.best_estimator_.fit(X, y, **fit_params)
Best train score:  0.8543461947043524
Best train alpha:  {}
Test score: 0.8630431444802702
<Figure size 1152x1800 with 0 Axes>
```

1. Does all trees in the trained random forest model have pure leaves? How would you verify this?

In [22]:
```python
tree_dot = plot_tree(grid_search_results.best_estimator_.estimators_[0],
                filled=True)
plt.show()

#Yes all the trees in random forest have pure leaves. You can verify
#This by plotting individually one (or all) of the trees that comprise
#the random forest, or by looking at the default params on sklearn
#we see that the max_depth default is none, so nodes are expanded
#until all leaves are pure, and the default min_samples_split = 2
#(so we would split until each leaf has one value if it is not pure yet)
```
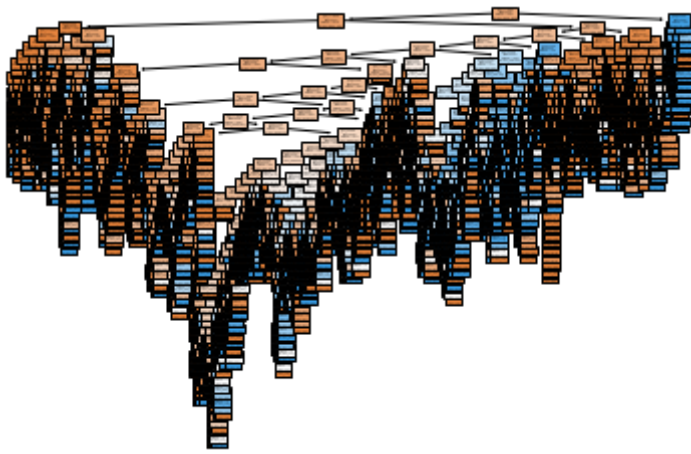
1. Assume you want to improve the performance of this model. Also, assume that you had to pick two hyperparameters that you could tune to improve its performance. Which hyperparameters would you choose and why?

In [ ]:
```
#I would search over different valuese for # of trees and # of features
#given to each tree. These values should vary based on our dataset sample
#size, and our specific dataset's number of features, so they make great
#candidates to have impact on overall performance
```

1. Now, assume you had to choose upto 10 different values (each) for these two hyperparameters. How would you choose these values that could potentially give you a performance lift?

In [62]:
```
#For this part, I would choose values spaced evenly larger and smaller
#than the default hyperparameter values. If further optimization is required
#you could then perform a further search around the area that give you
#the best scores off of the first optimization.
```

1. Perform model selection using the chosen values for the hyperparameters. Use cross-validation for finding the optimal hyperparameters. Report on the optimal hyperparameters. Estimate the performance of the optimal model (model trained with optimal hyperparameters) on test dataset? Has the performance improved over your plain-vanilla random forest model trained in Q5.1?

In [26]:
```
from sklearn.ensemble import RandomForestClassifier

rf = RandomForestClassifier(random_state=81)
preprocess = make_column_transformer((StandardScaler(), num_features),
                                     (OneHotEncoder(handle_unknown='ignore'),ohe_
                                     (TargetEncoder(handle_unknown='ignore'),te_f
                                      remainder="passthrough"
                                     )
n_estimators = [ 50, 100, 150]
n_features = [4, 8, 12]

pipe = make_pipeline(preprocess,
                GridSearchCV(rf,
```

```
                                param_grid = [{'n_estimators': n_estimators,
                                               'max_features': n_features}],
                                return_train_score=True,
                                n_jobs=2))

    pipe.fit(X_dev, y_dev)
    grid_search_results = pipe.named_steps['gridsearchcv']
    print(f"Best train score: ", grid_search_results.best_score_)
    print(f"Best train alpha: ", grid_search_results.best_params_)
    print(f"Test score:", pipe.score(X_test, y_test))
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/model_selectio
n/_search.py:880: DataConversionWarning: A column-vector y was passed when a 1d
array was expected. Please change the shape of y to (n_samples,), for example us
ing ravel().
  self.best_estimator_.fit(X, y, **fit_params)
Best train score:  0.8572638600915514
Best train alpha:  {'max_features': 8, 'n_estimators': 50}
Test score: 0.8615077537233226
```

In [ ]:
```
#Best train score:  0.8572638600915514
#Best train alpha:  {'max_features': 8, 'n_estimators': 50}
#Test score: 0.8615077537233226
```

1. Can you find the top 3 most important features from the model trained in Q5.5? How do these features compare to the important features that you found from Q4.8? If they differ, which feature set makes more sense?

In [27]:
```
best_rf = grid_search_results.best_estimator_
feat_imps = zip(feature_names, best_rf.feature_importances_)
feats, imps = zip(*(sorted(list(filter(lambda x: x[1] != 0, feat_imps)), key=lam
ax = sns.barplot(list(feats), list(imps))
ax.tick_params(axis='x', rotation=90)
ax.set_ylabel('feature importance')
ax.set_xlabel('feature')
ax.set_title('feature importance across features for best random forest')

#ANSWER: The features are different here for random forest - fnlwgt, age,and edu
# with education, captial-gain, and married-spouse status all in top 5.
# I think these make less sense than the decision tree. Perhaps these are more i
# because of how the random forest interactions took place, and how the features
# the smaller trees within the forest.
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/seaborn/_decorators.py:
36: FutureWarning: Pass the following variables as keyword args: x, y. From vers
ion 0.12, the only valid positional argument will be `data`, and passing other a
rguments without an explicit keyword will result in an error or misinterpretatio
n.
  warnings.warn(
```

Out[27]: Text(0.5, 1.0, 'feature importance across features for best random forest')

feature importance across features for best random forest
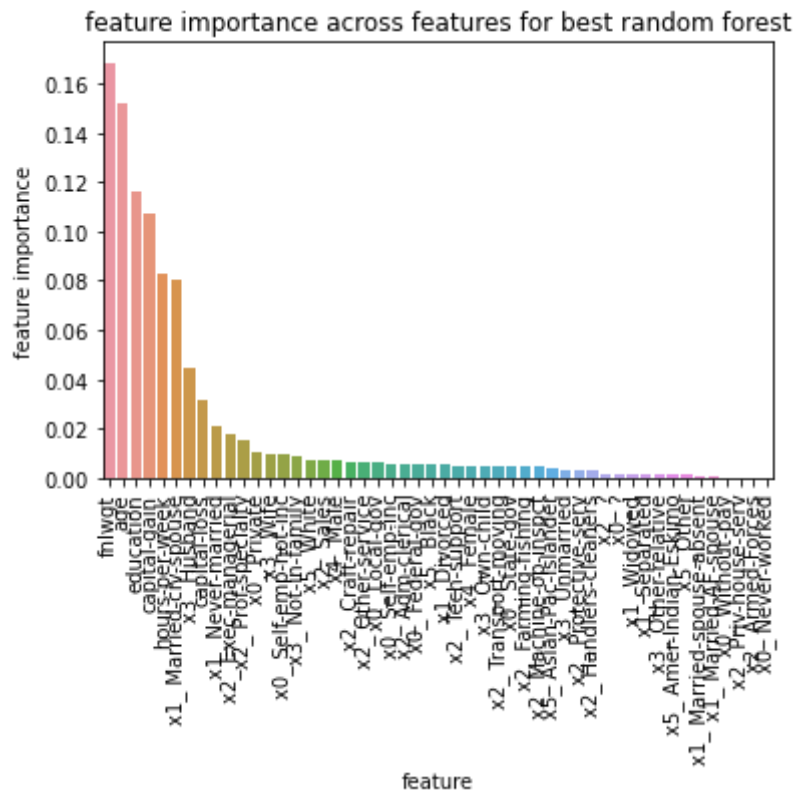
Q6: Gradient Boosted Trees

Let's use the same dataset and the splits created in Q3.

1. Choose three hyperparameters to tune GradientBoostingClassifier and HistGradientBoostingClassifier on the development dataset using 10-fold cross validation. Report on the time taken to do model selection for both the models. Also, report the performance of the test dataset from the optimal models.

In [13]:
```python
from sklearn.ensemble import GradientBoostingClassifier
learning_rate = [.01, .1, .2]
n_estimators = [50, 100, 200]
max_depth = [2,3,6]

gbc = GradientBoostingClassifier(random_state=81)
preprocess = make_column_transformer((StandardScaler(), num_features),
                                     (OneHotEncoder(handle_unknown='ignore'),ohe_
                                     (TargetEncoder(handle_unknown='ignore'),te_f
                                      remainder="passthrough"
                                     )
pipe = make_pipeline(preprocess,
                 GridSearchCV(gbc,
                              param_grid = [{'learning_rate': learning_rate,
                                             'n_estimators': n_estimators,
                                             'max_depth': max_depth}],
                              return_train_score=True,
                              cv=10,
                              n_jobs=2))

pipe.fit(X_dev, y_dev)
grid_search_results = pipe.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results.best_score_)
```

```python
print(f"Best train alpha: ", grid_search_results.best_params_)
print(f"Test score:", pipe.score(X_test, y_test))
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
Best train score:  0.8709694372455191
Best train alpha:  {'learning_rate': 0.2, 'max_depth': 3, 'n_estimators': 200}
Test score: 0.8757868877629357
```

In [17]:
```python
from sklearn.experimental import enable_hist_gradient_boosting
```

```python
from sklearn.ensemble import HistGradientBoostingClassifier
from sklearn.base import TransformerMixin

class DenseTransformer(TransformerMixin):
    def fit(self, X,y=None,**fit_params):
        return self

    def transform(self, X, y=None, **fit_params):
        return X.todense()

learning_rate = [.01, .1, .2]
n_estimators = [50, 100, 200]
max_depth = [2, 3, 6]

hgbc = HistGradientBoostingClassifier(random_state=81)
preprocess = make_column_transformer((StandardScaler(), num_features),
                                     (OneHotEncoder(handle_unknown='ignore'),ohe_
                                     (TargetEncoder(handle_unknown='ignore'),te_f
                                      remainder="passthrough"
                                     )
pipe = make_pipeline(preprocess,
                     DenseTransformer(),
                     GridSearchCV(hgbc,
                                  param_grid = [{'learning_rate': learning_rate,
                                                 'max_iter': n_estimators,
                                                 'max_depth': max_depth}],
                                  return_train_score=True,
                                  cv=10,
                                  n_jobs=2))

pipe.fit(X_dev, y_dev)
grid_search_results = pipe.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results.best_score_)
print(f"Best train alpha: ", grid_search_results.best_params_)
print(f"Test score:", pipe.score(X_test, y_test))
```

```
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
Best train score:  0.8703550274050553
Best train alpha:  {'learning_rate': 0.2, 'max_depth': 3, 'max_iter': 200}
Test score: 0.8780899738983571
```

In [ ]:
```python
#GradientBoost - Test score: 0.8757868877629357 - Model selection ~5 min
#HistGradientBoostingClassifier - Test score: 0.8780899738983571 - Model Selecti
```

1. Train an XGBoost model by tuning 3 hyperparameters using cross-validation. Report on the optimal hyperparameters and the time to train the model. Compare the performance of the trained XGBoost model on test dataset against the performances obtained from 6.1

In [18]:
```python
from xgboost import XGBClassifier

eta = [.01, .1, .2]
max_depth = [3, 6, 9]
n_estimators = [50, 100, 150]
```

```python
xgbc = XGBClassifier(random_state=81)
preprocess = make_column_transformer((StandardScaler(), num_features),
                                     (OneHotEncoder(handle_unknown='ignore'),ohe_
                                     (TargetEncoder(handle_unknown='ignore'),te_f
                                      remainder="passthrough"
                                     )
pipe = make_pipeline(preprocess,
                     GridSearchCV(xgbc,
                                  param_grid = [{'eta': eta,
                                                 'max_depth': max_depth,
                                                 'n_estimators': n_estimators}],
                                  return_train_score=True,
                                  cv=10,
                                  n_jobs=3))

pipe.fit(X_dev, y_dev)
grid_search_results_xgb = pipe.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results_xgb.best_score_)
print(f"Best train alpha: ", grid_search_results_xgb.best_params_)
print(f"Test score:", pipe.score(X_test, y_test))
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:25:57] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
```

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:25:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:00] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:04] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:07] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:10] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:13] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:14] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:15] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:16] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:18] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:19] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:21] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:22] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:24] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:26] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:28] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:30] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:32] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:34] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:37] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:39] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:43] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:45] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:48] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:51] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:26:55] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:26:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:03] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:06] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:10] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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[17:27:13] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:27:17] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:21] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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().
  return f(*args, **kwargs)
[17:27:25] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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[17:27:27] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:30] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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  return f(*args, **kwargs)
[17:27:31] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:33] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:27:35] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:27:37] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:27:39] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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```

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().
  return f(*args, **kwargs)
[17:27:40] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:27:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:27:48] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:27:58] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:28:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:28:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:28:15] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:28:18] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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().
  return f(*args, **kwargs)
[17:28:22] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:28:26] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:28:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:28:35] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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().
  return f(*args, **kwargs)
[17:28:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:28:47] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:28:52] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:28:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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[17:29:13] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:24] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:29:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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[17:29:30] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:31] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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[17:29:32] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:29:34] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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  return f(*args, **kwargs)
[17:29:37] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:29:38] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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  return f(*args, **kwargs)
[17:29:39] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:40] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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  return f(*args, **kwargs)
[17:29:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:29:42] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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[17:29:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:29:45] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:29:47] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:29:49] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:29:51] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:53] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:54] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:56] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:29:57] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:29:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:30:01] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:30:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:30:03] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:04] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:06] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:07] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:08] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:11] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:13] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:15] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:17] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:19] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel().
  return f(*args, **kwargs)
[17:30:21] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: 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.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:1224: UserWarning: The use of label encoder in XGBClassifier is deprecated and will be removed in a future release. To remove this warning, do the following: 1) Pass option use_label_encoder=False when constructing XGBClassifier object; and 2) Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_class - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validation.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().
  return f(*args, **kwargs)
[17:30:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: 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.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:1224: UserWarning: The use of label encoder in XGBClassifier is deprecated and will be removed in a future release. To remove this warning, do the following: 1) Pass option use_label_encoder=False when constructing XGBClassifier object; and 2) Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_class - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validation.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().
  return f(*args, **kwargs)
[17:30:25] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: 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.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:1224: UserWarning: The use of label encoder in XGBClassifier is deprecated and will be removed in a future release. To remove this warning, do the following: 1) Pass option use_label_encoder=False when constructing XGBClassifier object; and 2) Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_class - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validation.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples,), for example using ravel().
  return f(*args, **kwargs)
[17:30:27] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: 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.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:1224: UserWarning: The use of label encoder in XGBClassifier is deprecated and will be removed in a future release. To remove this warning, do the following: 1) Pass option use_label_encoder=False when constructing XGBClassifier object; and 2) Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_class - 1].
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:30:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:31] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:33] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:35] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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().
  return f(*args, **kwargs)
[17:30:38] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:47] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:50] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:53] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:56] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:30:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:31:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:31:04] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:31:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:31:07] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:31:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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[17:31:11] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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[17:31:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:14] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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().
  return f(*args, **kwargs)
[17:31:16] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:18] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:20] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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().
  return f(*args, **kwargs)
[17:31:26] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:32] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:35] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:38] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:47] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:50] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:54] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:31:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:32:03] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:32:07] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:32:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
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[17:32:16] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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[17:32:20] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:25] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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[17:32:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:38] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:40] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:32:42] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:32:43] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples,), for example using ravel
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[17:32:45] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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expected. Please change the shape of y to (n_samples,), for example using ravel
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[17:32:46] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:48] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:32:51] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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().
  return f(*args, **kwargs)
[17:32:52] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:32:54] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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().
  return f(*args, **kwargs)
[17:32:55] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:32:57] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:32:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:00] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:03] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:06] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:07] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:08] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:33:10] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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[17:33:11] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:33:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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expected. Please change the shape of y to (n_samples,), for example using ravel
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  return f(*args, **kwargs)
[17:33:14] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:33:15] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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[17:33:17] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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  return f(*args, **kwargs)
[17:33:19] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:22] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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().
  return f(*args, **kwargs)
[17:33:24] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:26] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:28] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:30] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:32] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:33:34] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:36] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:38] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:41] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:44] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:47] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:50] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:53] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:56] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:33:59] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:05] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:06] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:08] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:09] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:11] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:12] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:14] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:15] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:17] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:18] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

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().
  return f(*args, **kwargs)
[17:34:20] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
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expected. Please change the shape of y to (n_samples, ), for example using ravel
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[17:34:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:34:26] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
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  return f(*args, **kwargs)
[17:34:29] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:34:31] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:34:34] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:34:37] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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```

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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:34:40] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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s - 1].
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
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expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:43] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:46] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:49] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:53] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was

expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:34:58] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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s option use_label_encoder=False when constructing XGBClassifier object; and 2)
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:35:02] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.

/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:35:06] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples,), for example using ravel
().
  return f(*args, **kwargs)
[17:35:10] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
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[17:35:19] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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[17:35:23] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
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/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:35:28] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
```

```
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
[17:35:32] WARNING: /Users/travis/build/dmlc/xgboost/src/learner.cc:1115: Starti
ng in XGBoost 1.3.0, the default evaluation metric used with the objective 'bina
ry:logistic' was changed from 'error' to 'logloss'. Explicitly set eval_metric i
f you'd like to restore the old behavior.
Best train score:  0.871391584186148
Best train alpha:  {'eta': 0.2, 'max_depth': 3, 'n_estimators': 150}
Test score: 0.877475817595578
```

In [ ]:
```
#Results:
#Best train score:  0.871391584186148
#Best train alpha:  {'eta': 0.2, 'max_depth': 3, 'n_estimators': 150}
#Test score: 0.877475817595578
```

1. Compare the results on the test dataset from XGBoost, HistGradientBoostingClassifier,
   GradientBoostingClassifier with results from Q4.5 and Q5.5. Which model tends to perform
   the best and which one does the worst? How big is the difference between the two? Which
   model would you choose among these 5 models and why?

In [15]:
```
# XGBOOST: Test score - 0.871391584186148
# HISTGRADIENTBOOSTINGCLASSIFIER: Test score - 0.8780899738983571
# GRADIENTBOOSTINGCLASSIFIER: Test score - 0.8757868877629357
# 4.5 Default Decision Tree: Test score - 0.8125002754349939
# 5.5 Optimized Random Forest: Test score - 0.8615077537233226
# HISTGRADIENTBOOSTINGCLASSIFIER seems to perform the best, but the margin is ve
# I would likely choose the histgradientboostingclassifier since it runs much fa
# and also has the best performance on the test set!
```

1. Can you list the top 3 features from the trained XGBoost model? How do they differ from
   the features found from Random Forest and Decision Tree? Which one would you trust the
   most?

In [21]:
```
ohe_feature_names = preprocess.named_transformers_["onehotencoder"].get_feature_
te_feature_names = preprocess.named_transformers_["targetencoder"].get_feature_n
feature_names = num_features + ohe_feature_names + te_feature_names
best_xgb = grid_search_results_xgb.best_estimator_
xgb_feat_imps = zip(feature_names, best_xgb.feature_importances_)
_xgb_feats, xgb_imps = zip(*(sorted(list(filter(lambda x: x[1] != 0, feat_imps))
ax = sns.barplot(list(feats), list(imps))
ax.tick_params(axis='x', rotation=90)
ax.set_ylabel('feature importance')
ax.set_xlabel('feature')
ax.set_title('feature importance across features for best XGBoost')

#ANSWER: For XGB, Marital-Status (specifically, whether someone is married with
# These are the exact same as the original decision tree top features (Married/s
# They differ from the Random Forest's (fnlwgt, age,and education)
# I would trust the original decision tree the most because of the interpretabil
# and explain the gini impurity difference to justify the importance
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/seaborn/_decorators.py:
36: FutureWarning: Pass the following variables as keyword args: x, y. From vers
ion 0.12, the only valid positional argument will be `data`, and passing other a
```

```
rguments without an explicit keyword will result in an error or misinterpretatio
n.
  warnings.warn(
```

Out[21]:   Text(0.5, 1.0, 'feature importance across features for best XGBoost')

feature importance across features for best XGBoost
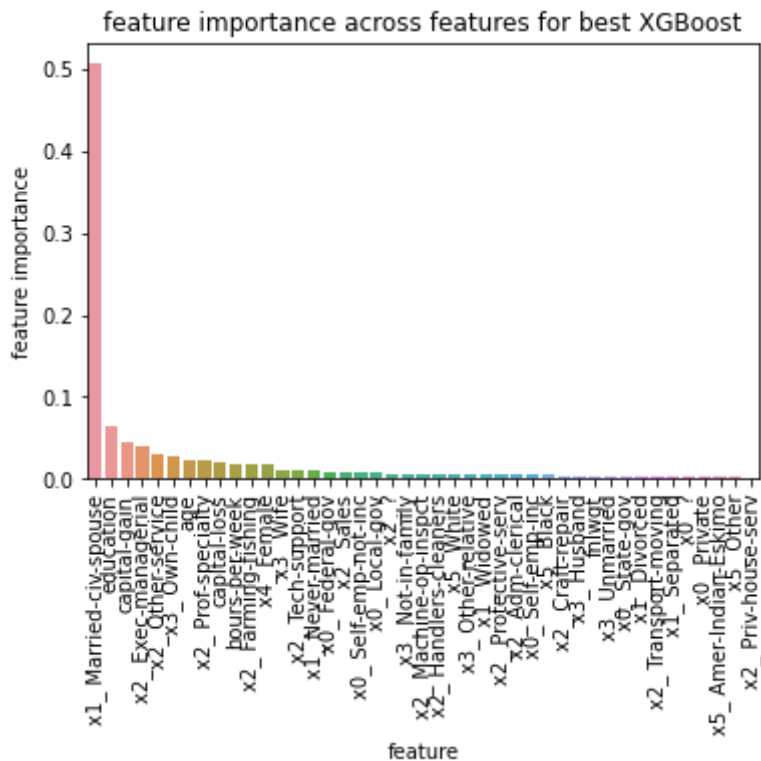
1. Can you choose the top 7 features (as given by feature importances from XGBoost) and repeat Q6.2? Does this model perform better than the one trained in Q6.2? Why or why not is the performance better?

In [45]:
```python
top_7_xgb_feats = feats[:7]
feature_names = num_features + ohe_feature_names + te_feature_names
for ele in feature_names:
    if ele  in top_7_xgb_feats:
        feature_names.remove(ele)

columns_to_drop = feature_names
print(columns_to_drop)
```

```
['fnlwgt', 'capital-loss', 'hours-per-week', 'x0_ ?', 'x0_ Federal-gov', 'x0_ Lo
cal-gov', 'x0_ Never-worked', 'x0_ Private', 'x0_ Self-emp-inc', 'x0_ Self-emp-n
ot-inc', 'x0_ State-gov', 'x0_ Without-pay', 'x1_ Divorced', 'x1_ Married-AF-spo
use', 'x1_ Married-spouse-absent', 'x1_ Never-married', 'x1_ Separated', 'x1_ Wi
dowed', 'x2_ ?', 'x2_ Adm-clerical', 'x2_ Armed-Forces', 'x2_ Craft-repair', 'x2
_ Farming-fishing', 'x2_ Handlers-cleaners', 'x2_ Machine-op-inspct', 'x2_ Priv-
house-serv', 'x2_ Prof-specialty', 'x2_ Protective-serv', 'x2_ Sales', 'x2_ Tech
-support', 'x2_ Transport-moving', 'x3_ Husband', 'x3_ Not-in-family', 'x3_ Othe
r-relative', 'x3_ Unmarried', 'x3_ Wife', 'x4_ Female', 'x4_ Male', 'x5_ Amer-In
dian-Eskimo', 'x5_ Asian-Pac-Islander', 'x5_ Black', 'x5_ Other', 'x5_ White']
```

In [53]:
```python
print(top_7_xgb_feats)
from xgboost import XGBClassifier

eta = [.01, .1, .2]
max_depth = [3, 6, 9]
```

```python
n_estimators = [50, 100, 150]
print(columns_to_drop)
xgbc_top_feat = XGBClassifier(random_state=81)
preprocess_xgbc_top_feat = make_column_transformer((StandardScaler(), num_featur
                                  (OneHotEncoder(handle_unknown='ignore'),ohe_
                                  (TargetEncoder(handle_unknown='ignore'),te_f
                                  ("drop", columns_to_drop),
                                   remainder="passthrough"
                                  )
pipe_top_xgb = make_pipeline(preprocess_xgbc_top_feat,
                  GridSearchCV(xgbc_top_feat,
                               param_grid = [{'eta': eta,
                                              'max_depth': max_depth,
                                              'n_estimators': n_estimators}],
                               return_train_score=True,
                               cv=10,
                               n_jobs=3,
                               verbose=True))

pipe_top_xgb.fit(X_dev, y_dev)
grid_search_results_xgb_top = pipe_top_xgb.named_steps['gridsearchcv']
print(f"Best train score: ", grid_search_results_xgb_top.best_score_)
print(f"Best train alpha: ", grid_search_results_xgb_top.best_params_)
print(f"Test score:", pipe_top_xgb.score(X_test, y_test))
```

```
('x1_ Married-civ-spouse', 'education', 'capital-gain', 'x2_ Exec-managerial',
'x2_ Other-service', 'x3_ Own-child', 'age')
['fnlwgt', 'capital-loss', 'hours-per-week', 'x0_ ?', 'x0_ Federal-gov', 'x0_ Lo
cal-gov', 'x0_ Never-worked', 'x0_ Private', 'x0_ Self-emp-inc', 'x0_ Self-emp-n
ot-inc', 'x0_ State-gov', 'x0_ Without-pay', 'x1_ Divorced', 'x1_ Married-AF-spo
use', 'x1_ Married-spouse-absent', 'x1_ Never-married', 'x1_ Separated', 'x1_ Wi
dowed', 'x2_ ?', 'x2_ Adm-clerical', 'x2_ Armed-Forces', 'x2_ Craft-repair', 'x2
_ Farming-fishing', 'x2_ Handlers-cleaners', 'x2_ Machine-op-inspct', 'x2_ Priv-
house-serv', 'x2_ Prof-specialty', 'x2_ Protective-serv', 'x2_ Sales', 'x2_ Tech
-support', 'x2_ Transport-moving', 'x3_ Husband', 'x3_ Not-in-family', 'x3_ Othe
r-relative', 'x3_ Unmarried', 'x3_ Wife', 'x4_ Female', 'x4_ Male', 'x5_ Amer-In
dian-Eskimo', 'x5_ Asian-Pac-Islander', 'x5_ Black', 'x5_ Other', 'x5_ White']
---------------------------------------------------------------------
KeyError                                 Traceback (most recent call last)
~/opt/anaconda3/lib/python3.8/site-packages/pandas/core/indexes/base.py in get_l
oc(self, key, method, tolerance)
   3079             try:
-> 3080                 return self._engine.get_loc(casted_key)
   3081             except KeyError as err:

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/index.pyx in pandas._libs.index.IndexEngine.get_loc()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHashTa
ble.get_item()

pandas/_libs/hashtable_class_helper.pxi in pandas._libs.hashtable.PyObjectHashTa
ble.get_item()

KeyError: 'x0_ ?'

The above exception was the direct cause of the following exception:

KeyError                                  Traceback (most recent call last)
~/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/__init__.py in _get_co
lumn_indices(X, key)
   395             for col in columns:
```

```
--> 396                        col_idx = all_columns.get_loc(col)
    397                        if not isinstance(col_idx, numbers.Integral):

~/opt/anaconda3/lib/python3.8/site-packages/pandas/core/indexes/base.py in get_l
oc(self, key, method, tolerance)
   3081                except KeyError as err:
-> 3082                    raise KeyError(key) from err
   3083

KeyError: 'x0_ ?'

The above exception was the direct cause of the following exception:

ValueError                               Traceback (most recent call last)
<ipython-input-53-cb40d3b86454> in <module>
     23                                verbose=True))
     24
---> 25 pipe_top_xgb.fit(X_dev, y_dev)
     26 grid_search_results_xgb_top = pipe_top_xgb.named_steps['gridsearchcv']
     27 print(f"Best train score: ", grid_search_results_xgb_top.best_score_)

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/pipeline.py in fit(self, X,
 y, **fit_params)
    339            """
    340            fit_params_steps = self._check_fit_params(**fit_params)
--> 341            Xt = self._fit(X, y, **fit_params_steps)
    342            with _print_elapsed_time('Pipeline',
    343                                     self._log_message(len(self.steps) -
 1)):

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/pipeline.py in _fit(self, X,
 y, **fit_params_steps)
    301                    cloned_transformer = clone(transformer)
    302                # Fit or load from cache the current transformer
--> 303                X, fitted_transformer = fit_transform_one_cached(
    304                    cloned_transformer, X, y, None,
    305                    message_clsname='Pipeline',

~/opt/anaconda3/lib/python3.8/site-packages/joblib/memory.py in __call__(self, *
args, **kwargs)
    350
    351     def __call__(self, *args, **kwargs):
--> 352         return self.func(*args, **kwargs)
    353
    354     def call_and_shelve(self, *args, **kwargs):

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/pipeline.py in _fit_transfor
m_one(transformer, X, y, weight, message_clsname, message, **fit_params)
    752     with _print_elapsed_time(message_clsname, message):
    753         if hasattr(transformer, 'fit_transform'):
--> 754             res = transformer.fit_transform(X, y, **fit_params)
    755         else:
    756             res = transformer.fit(X, y, **fit_params).transform(X)

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/compose/_column_transformer.
py in fit_transform(self, X, y)
    504            self._validate_transformers()
    505            self._validate_column_callables(X)
--> 506            self._validate_remainder(X)
    507
    508            result = self._fit_transform(X, y, _fit_transform_one)

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/compose/_column_transformer.
py in _validate_remainder(self, X)
    330            cols = []
```

```
        331              for columns in self._columns:
--> 332                  cols.extend(_get_column_indices(X, columns))
        333
        334              remaining_idx = sorted(set(range(self._n_features)) - set(cols))

~/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/__init__.py in _get_co
lumn_indices(X, key)
        401
        402              except KeyError as e:
--> 403                  raise ValueError(
        404                      "A given column is not a column of the dataframe"
        405                  ) from e

ValueError: A given column is not a column of the dataframe
```

Q7: Calibration

Let's use the same dataset and the splits created in Q3. Let's use the XGBoost model that you trained in Q6.2.

1. Estimate the brier score for the XGBoost model (trained with optimal hyperparameters from Q6.2) scored on the test dataset.

In [64]:
```python
from sklearn.metrics import brier_score_loss
xgb_best_estimator = grid_search_results_xgb.best_estimator_

#xgb_best_estimator.fit(X_dev,y_dev)
#print(xgb_best_estimator.feature_importances_)
#predictions = xgb_best_estimator.predict(X_test)
#brier_score = brier_score_loss(predictions, y_test)
```

```
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py:122
4: UserWarning: The use of label encoder in XGBClassifier is deprecated and will
be removed in a future release. To remove this warning, do the following: 1) Pas
s option use_label_encoder=False when constructing XGBClassifier object; and 2)
Encode your labels (y) as integers starting with 0, i.e. 0, 1, 2, ..., [num_clas
s - 1].
  warnings.warn(label_encoder_deprecation_msg, UserWarning)
/Users/Griffin/opt/anaconda3/lib/python3.8/site-packages/sklearn/utils/validatio
n.py:63: DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using ravel
().
  return f(*args, **kwargs)
----------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-64-bf1a6ac440ef> in <module>
      2 xgb_best_estimator = grid_search_results_xgb.best_estimator_
      3
----> 4 xgb_best_estimator.fit(X_dev,y_dev)
      5 #print(xgb_best_estimator.feature_importances_)
      6

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/core.py in inner_f(*args, **
kwargs)
        504              for k, arg in zip(sig.parameters, args):
        505                  kwargs[k] = arg
--> 506              return f(**kwargs)
        507
        508      return inner_f
```

```
~/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py in fit(self, X,
 y, sample_weight, base_margin, eval_set, eval_metric, early_stopping_rounds, ve
rbose, xgb_model, sample_weight_eval_set, base_margin_eval_set, feature_weights,
callbacks)
   1229
   1230            model, feval, params = self._configure_fit(xgb_model, eval_metri
c, params)
-> 1231            train_dmatrix, evals = _wrap_evaluation_matrices(
   1232                missing=self.missing,
   1233                X=X,

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py in _wrap_evaluati
on_matrices(missing, X, y, group, qid, sample_weight, base_margin, feature_weigh
ts, eval_set, sample_weight_eval_set, base_margin_eval_set, eval_group, eval_qi
d, create_dmatrix, enable_categorical, label_transform)
    284
    285        """
--> 286        train_dmatrix = create_dmatrix(
    287            data=X,
    288            label=label_transform(y),

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/sklearn.py in <lambda>(**kwa
rgs)
   1243                eval_group=None,
   1244                eval_qid=None,
-> 1245                create_dmatrix=lambda **kwargs: DMatrix(nthread=self.n_jobs,
**kwargs),
   1246                enable_categorical=self.enable_categorical,
   1247                label_transform=label_transform,

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/core.py in inner_f(*args, **
kwargs)
    504            for k, arg in zip(sig.parameters, args):
    505                kwargs[k] = arg
--> 506        return f(**kwargs)
    507
    508    return inner_f

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/core.py in __init__(self, da
ta, label, weight, base_margin, missing, silent, feature_names, feature_types, n
thread, group, qid, label_lower_bound, label_upper_bound, feature_weights, enabl
e_categorical)
    614            return
    615
--> 616        handle, feature_names, feature_types = dispatch_data_backend(
    617            data,
    618            missing=self.missing,

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/data.py in dispatch_data_bac
kend(data, missing, threads, feature_names, feature_types, enable_categorical)
    705            return _from_tuple(data, missing, threads, feature_names, featur
e_types)
    706        if _is_pandas_df(data):
--> 707        return _from_pandas_df(data, enable_categorical, missing, thread
s,
    708                                      feature_names, feature_types)
    709        if _is_pandas_series(data):

~/opt/anaconda3/lib/python3.8/site-packages/xgboost/data.py in _from_pandas_df(d
ata, enable_categorical, missing, nthread, feature_names, feature_types)
    295        feature_types: Optional[List[str]],
    296    ):
--> 297        data, feature_names, feature_types = _transform_pandas_df(
    298            data, enable_categorical, feature_names, feature_types)
    299        return _from_numpy_array(data, missing, nthread, feature_names,
```

```
~/opt/anaconda3/lib/python3.8/site-packages/xgboost/data.py in _transform_pandas
_df(data, enable_categorical, feature_names, feature_types, meta, meta_type)
    240                     categorical type is supplied, DMatrix parameter `enable_
categorical` must
    241                     be set to `True`."""
--> 242             raise ValueError(msg + ', '.join(bad_fields))
    243
    244     # handle feature names

ValueError: DataFrame.dtypes for data must be int, float, bool or category.  Whe
n
                categorical type is supplied, DMatrix parameter `enable_categori
cal` must
                be set to `True`.workclass, education, marital-status, occupatio
n, relationship, race, sex
```

1. Calibrate the trained XGBoost model using isotonic regression as well as Platt scaling. Plot predicted v.s. actual on test datasets from both the calibration methods

In [ ]:
```python
cal_svc = CalibratedClassifierCV(xgb_best_estimator, cv='prefit', method='sigmoi
cal_svc.fit(X_calib, y_calib)
display = CalibrationDisplay.from_estimator(
    cal_svc, X_test, y_test, n_bins=10)

#For isotonic, same thing but use diff method w/in
#CalibratedClassifierCV

cal_svc = CalibratedClassifierCV(xgb_best_estimator, cv='prefit', method='isoton
cal_svc.fit(X_calib, y_calib)
display = CalibrationDisplay.from_estimator(
    cal_svc, X_test, y_test, n_bins=10)
```

1. Report brier scores from both the calibration methods. Do the calibration methods help in having better predicted probabilities?

In [ ]:
```python
#code here
```

In [ ]: