03_Modelling.ipynb

October 4, 2021

1 Initialisation

[ ]:
```
# Importations
import sys
sys.path.append('..')

import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.model_selection import StratifiedKFold, RepeatedStratifiedKFold
from sklearn.model_selection import cross_validate
from imblearn.pipeline import Pipeline

from sklearn.linear_model import SGDClassifier
from sklearn.ensemble import RandomForestClassifier
from lightgbm import LGBMClassifier
from sklearn.metrics import confusion_matrix, classification_report
from imblearn.combine import SMOTETomek, SMOTEENN
from imblearn.under_sampling import TomekLinks, RandomUnderSampler
from preprocessing import preprocessor as prep
from styles import *
```

[ ]:
```
# Initialisation
train = pd.read_csv('../02_data/application_train.csv')
test = pd.read_csv('../02_data/application_test.csv')

id_error_msg = lambda x: '`SK_ID_CURR` is not unic for {} set!'.format(x)
assert len(train.SK_ID_CURR.unique()) == train.shape[0], id_error_msg('train')
assert len(test.SK_ID_CURR.unique()) == test.shape[0], id_error_msg('test')
train.set_index('SK_ID_CURR', inplace=True)
test.set_index('SK_ID_CURR', inplace=True)

print('Training set dimensions :', train.shape)

cls_size = train.TARGET.value_counts()
cls_freq = train.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
```

```
                    'freq': cls_freq.apply(lambda x: '%.3f' % x)}))
```

```
Training set dimensions : (307511, 121)
     size   freq
0  282686  0.919
1   24825  0.081
```

[ ]:
```
train_sample = train[::10]
print('Sampled training set dimensions :', train_sample.shape)
cls_size = train_sample.TARGET.value_counts()
cls_freq = train_sample.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
                    'freq': cls_freq.apply(lambda x: '%.3f' % x)}))
```

```
Sampled training set dimensions : (30752, 121)
    size   freq
0  28303  0.920
1   2449  0.080
```

On échantillonne le dataset en prenant 10% des points de données

[ ]:
```
X, y = train.iloc[:, 1:], train.iloc[:, 0]#.values.reshape(-1,1)
Xs, ys = train_sample.iloc[:, 1:], train_sample.iloc[:, 0]#.values.reshape(-1,1)

X_train, X_test, y_train, y_test = train_test_split(Xs, ys, test_size=.2,
                                                    random_state=0)
print('X_train:', X_train.shape)
print('y_train:', y_train.shape)
print('X_test:', X_test.shape)
print('y_test:', y_test.shape)
```

```
X_train: (24601, 120)
y_train: (24601,)
X_test: (6151, 120)
y_test: (6151,)
```

2 Rééquilibrage de classes - SMOTE/Tomek

Il y a ~8% de cas de défaut dans le jeu d'entraînement contre 92% de cas sans défaut. Le déséquilibre des classes pose problème dans le cadre de la prédiction de la classe minoritaire par un algorithme de ml.

Il faut rééquilibrer les classes du jeu d'entraînement avant de sélectionner le meilleur modèle de ml

2.1 Impact de SMOTE Tomek sur la répartition des classes

[ ]:
```
resamplr = SMOTETomek(tomek=TomekLinks(sampling_strategy='majority'))
udsamplr = SMOTEENN(random_state=42)
rusamplr = RandomUnderSampler(random_state=42)
```

[ ]:
```
X_train_trans = prep.fit_transform(X_train)
print(X_train_trans.shape)
print(X_train_trans)
print(y_train.shape)
print(y_train.value_counts())
```

```
(24601, 235)
[[0.         0.09011628 0.07823375 … 1.         0.         0.        ]
 [0.         0.01162791 0.01353611 … 0.         1.         0.        ]
 [0.         0.05232558 0.15492746 … 0.         1.         0.        ]
 …
 [0.         0.14244186 0.1340753  … 0.         1.         0.        ]
 [0.1        0.12790698 0.28631022 … 0.         0.         0.        ]
 [0.3        0.06395349 0.25047455 … 0.         1.         0.        ]]
(24601,)
0    22659
1     1942
Name: TARGET, dtype: int64
```

[ ]:
```
X_train_resampl, y_train_resampl = resamplr.fit_resample(X_train_trans, y_train)
print(X_train_resampl.shape)
print(y_train_resampl.value_counts())
```

```
(45318, 235)
0    22659
1    22659
Name: TARGET, dtype: int64
```

[ ]:
```
X_train_udsampl, y_train_udsampl = udsamplr.fit_resample(X_train_trans, y_train)
print(X_train_udsampl.shape)
print(y_train_udsampl.value_counts())
```

```
(33702, 235)
1    22628
0    11074
Name: TARGET, dtype: int64
```

[ ]:
```
X_train_rusampl, y_train_rusampl = rusamplr.fit_resample(X_train_trans, y_train)
print(X_train_rusampl.shape)
print(y_train_rusampl.value_counts())
```

```
(3884, 235)
```

```
0    1942
1    1942
Name: TARGET, dtype: int64
```

Rééquilibrage exécuté en 1min environ pour un jeu d'entraînement divisé par 10.

2.2 Impact de SMOTE Tomek sur l'entraînement d'un modèle

[ ]:
```
sgd = Pipeline([('p', prep), ('m', SGDClassifier())])
cv = StratifiedKFold(n_splits=5, shuffle=True, random_state=42)
#cv = RepeatedStratifiedKFold(n_splits=5, n_repeats=3, random_state=42)
scoring = ['precision_macro','recall_macro'] #, 'accuracy']
sgd_scor = cross_validate(sgd, X_train, y_train, scoring=scoring, cv=cv)
print('Model 1\n' + line_decor)
#print('accuracy scores:', sgd_scor['test_accuracy'])
print('precision scores:', sgd_scor['test_precision_macro'])
print('recall scores:', sgd_scor['test_recall_macro'])
#print('Mean Accuracy: %.4f' % np.mean(sgd_scores['test_accuracy']))
print('Mean Precision: %.4f' % np.nanmean(sgd_scor['test_precision_macro']))
print('Mean Recall: %.4f' % np.nanmean(sgd_scor['test_recall_macro']))
```

```
Model 1
--------
precision scores: [       nan 0.46056911 0.46056911 0.46056911        nan]
recall scores: [nan 0.5 0.5 0.5 nan]
Mean Precision: 0.4606
Mean Recall: 0.5000
```

Validation croisée sans SMOTE Tomek : 8.7s avec un échantillon divisé par 10

[ ]:
```
sgd_imb = Pipeline([('p', prep), ('r', resamplr), ('m', SGDClassifier())])
cv = StratifiedKFold(n_splits=5, shuffle=True, random_state=42)
#cv = RepeatedStratifiedKFold(n_splits=5, n_repeats=3, random_state=42)
scoring = ['precision_macro','recall_macro'] #, 'accuracy']
sgd_imb_scor = cross_validate(sgd_imb, X_train, y_train, scoring=scoring, cv=5)
print('Model 1 - with imbalance handling\n' + line_decor)
#print('accuracy scores:', sgd_imb_scor['test_accuracy'])
print('precision scores:', sgd_imb_scor['test_precision_macro'])
print('recall scores:', sgd_imb_scor['test_recall_macro'])
#print('Mean Accuracy: %.4f' % np.mean(sgd_imb_scores['test_accuracy']))
print('Mean Precision: %.4f' % np.nanmean(sgd_imb_scor['test_precision_macro']))
print('Mean Recall: %.4f' % np.nanmean(sgd_imb_scor['test_recall_macro']))
```

```
Model 1 - with imbalance handling
--------
precision scores: [       nan 0.55255999 0.5584412         nan 0.55571135]
recall scores: [       nan 0.66237227 0.63354292        nan 0.67955739]
Mean Precision: 0.5556
Mean Recall: 0.6585
```

Validation croisée avec SMOTE Tomek (stratégie majoritaire) : 207.6s avec un échantillon divisé par 10

[ ]:
```
smote_unsmote_ratio = 207.6 / 8.7
print('{:.2f}'.format(smote_unsmote_ratio))
```

```
23.86
```

[ ]:
```
smote_unsmote_ratio = 186.5 / 9.6
print('{:2f}'.format(smote_unsmote_ratio))
```

```
19.427083
```

Le SMOTE Tomek multiplie par un facteur 19 à 24 le temps d'exécution du modèle

Essai d'une validation croisée sans SMOTE Tomek avec tous les points du jeu d'entraînement

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=.2)
print('X_train:', X_train.shape)
print('y_train:', y_train.shape)
print('X_test:', X_test.shape)
print('y_test:', y_test.shape)
```

```
X_train: (246008, 120)
y_train: (246008, 1)
X_test: (61503, 120)
y_test: (61503, 1)
```

[ ]:
```
sgd = Pipeline([('p', prep), ('m', SGDClassifier())])
cv = StratifiedKFold(n_splits=5, shuffle=True, random_state=42)
#cv = RepeatedStratifiedKFold(n_splits=5, n_repeats=3, random_state=42)
scoring = ['precision_macro','recall_macro'] #, 'accuracy']
sgd_scor = cross_validate(sgd, X_train, y_train, scoring=scoring, cv=cv)
print('Model 1\n' + line_decor)
#print('accuracy scores:', sgd_scor['test_accuracy'])
print('precision scores:', sgd_scor['test_precision_macro'])
print('recall scores:', sgd_scor['test_recall_macro'])
#print('Mean Accuracy: %.4f' % np.mean(sgd_scores['test_accuracy']))
print('Mean Precision: %.4f' % np.nanmean(sgd_scor['test_precision_macro']))
print('Mean Recall: %.4f' % np.nanmean(sgd_scor['test_recall_macro']))
```

```
Model 1
--------
precision scores: [0.45967644 0.45966627 0.45966627 0.45967562 0.45967562]
recall scores: [0.5 0.5 0.5 0.5 0.5]
Mean Precision: 0.4597
Mean Recall: 0.5000
```

Validation croisée sans SMOTE Tomek exécutée en 57.9s sur tout le jeu de données

[ ]:
```
unsampled_sampled_ratio = 57.9 / 8.7
print('{:.2f}'.format(unsampled_sampled_ratio))
```

```
6.66
```

Il faut 7 fois plus de temps pour exécuter la même chose sur 10 fois plus de données (pas parfaitement linéaire donc)

[ ]:
```
print('{:.2f}'.format(207.6 * unsampled_sampled_ratio))
```

```
1381.61
```

[ ]:
```
1381 / 60
```

[ ]:
```
23.016666666666666
```

Il faudrait 23 minutes rien que pour faire du rééquilibrage avec le jeu de données actuel. Pas souhaitable.

Il faut trouver un moyen de raccourcir le temps d'exécution du rééquilibrage.

2.3 Réduction du temps de rééquilibrage en supppprimant des colonnes

[ ]:
```
X_train_resampl_cut, y_train_resampl_cut = resamplr.fit_resample(
    X_train_trans[:,:50], y_train
    )
print(X_train_resampl_cut.shape)
print(y_train_resampl_cut.value_counts())
```

```
(45313, 50)
1    22659
0    22654
Name: TARGET, dtype: int64
```

temps d'entraînement 52s pour un jeu d'entraînement divisé par 10 avec seulement les 50 premières colonnes contre 60.5s avec toutes les colonnes.

3 Sous-échantillonage aléatoire

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=.2)
print('X_train:', X_train.shape)
print('y_train:', y_train.shape)
print('X_test:', X_test.shape)
print('y_test:', y_test.shape)
```

```
X_train: (246008, 120)
y_train: (246008,)
X_test: (61503, 120)
y_test: (61503,)
```

[ ]:
```
sgd_imb = Pipeline([('p', prep), ('r', rusamplr), ('m', SGDClassifier())])
cv = StratifiedKFold(n_splits=5, shuffle=True, random_state=42)
#cv = RepeatedStratifiedKFold(n_splits=5, n_repeats=3, random_state=42)
scoring = ['precision_macro','recall_macro'] #, 'accuracy']
sgd_imb_scor = cross_validate(sgd_imb, X_train, y_train, scoring=scoring, cv=5)
print('Model 1 - with imbalance handling\n' + line_decor)
#print('accuracy scores:', sgd_imb_scor['test_accuracy'])
print('precision scores:', sgd_imb_scor['test_precision_macro'])
print('recall scores:', sgd_imb_scor['test_recall_macro'])
#print('Mean Accuracy: %.4f' % np.mean(sgd_imb_scores['test_accuracy']))
print('Mean Precision: %.4f' % np.nanmean(sgd_imb_scor['test_precision_macro']))
print('Mean Recall: %.4f' % np.nanmean(sgd_imb_scor['test_recall_macro']))
```

```
Model 1 - with imbalance handling
--------
precision scores: [0.54163367        nan 0.56050468 0.55293874        nan]
recall scores: [0.62721639        nan 0.67366715 0.67118886        nan]
Mean Precision: 0.5517
Mean Recall: 0.6574
```

4 Modèle 1 : SGD Classifier

[ ]:
```
model1 = Pipeline([('p', prep), ('m', SGDClassifier())])
model1.fit(X_train, y_train)
y_pred = model1.predict(X_test)
conf_mat = confusion_matrix(y_test, y_pred)
print('Model 1\n' + line_decor)
print('Score: %.4f' % model1.score(X_test, y_test))
print(line_decor + '\nConfusion matrix\n' + str(conf_mat))
print(classification_report(y_test, y_pred))
```

```
Model 1
--------
Score: 0.9190
--------
Confusion matrix
[[56522     0]
 [ 4981     0]]
              precision    recall  f1-score   support

           0       0.92      1.00      0.96     56522
           1       0.00      0.00      0.00      4981

    accuracy                           0.92     61503
   macro avg       0.46      0.50      0.48     61503
weighted avg       0.84      0.92      0.88     61503
```

5 Modèle 2 : Random Forest Classifier

[ ]:
```
model2 = Pipeline([('p', prep), ('m', RandomForestClassifier())])
cv = RepeatedStratifiedKFold(n_splits=10, n_repeats=3, random_state=1)
scoring = ['accuracy','precision_macro','recall_macro']
scores_model2 = cross_validate(model2, X_train, y_train, scoring=scoring, cv=cv,
                               n_jobs=-1)

print('Model 2\n' + 8 * '-')
print('Mean Accuracy: %.4f' % np.mean(scores_model2['test_accuracy']))
print('Mean Precision: %.4f' % np.mean(scores_model2['test_precision_macro']))
print('Mean Recall: %.4f' % np.mean(scores_model2['test_recall_macro']))
```

[ ]:
```
model2 = Pipeline([('p', prep), ('m', RandomForestClassifier())])
model2.fit(X_train, y_train)
y_pred = model2.predict(X_test)
conf_mat = confusion_matrix(y_test, y_pred)
print('Model 2\n' + 8 * '-')
print('Score: %.4f' % model2.score(X_test, y_test))
print(8 * '-' + '\nConfusion matrix\n' + str(conf_mat))
print(classification_report(y_test, y_pred))
```

```
Model 1
--------
Score: 0.9185
--------
Confusion matrix
[[56485     4]
 [ 5011     3]]
              precision    recall  f1-score   support

           0       0.92      1.00      0.96     56489
           1       0.43      0.00      0.00      5014

    accuracy                           0.92     61503
   macro avg       0.67      0.50      0.48     61503
weighted avg       0.88      0.92      0.88     61503
```

[ ]:
```
# undersmpling
# foret d'arbre -> feature importance
# lightgbm
# si besoin pca ou autre

# optimisation du threshold
# flask
```

[ ]:
```
y_pred = model2.predict(X_test)
conf_mat = confusion_matrix(y_test, y_pred)
print(conf_mat)
```

```
[[56512     5]
 [ 4979     7]]
```

[ ]:
```
model2.get_params()
```

6 Modèle 3 : LightGBM

[ ]:
```
model3 = Pipeline([('p', prep), ('m', LGBMClassifier())])
model3.fit(X_train, y_train)
print('Score:', model3.score(X_test, y_test))
```

```
Score: 0.9192071931450498
```

[ ]:
```
y_pred = model3.predict(X_test)
conf_mat = confusion_matrix(y_test, y_pred)
print(conf_mat)
```

```
[[56447    81]
 [ 4888    87]]
```

[ ]:
```
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.92      1.00      0.96     56528
           1       0.52      0.02      0.03      4975

    accuracy                           0.92     61503
   macro avg       0.72      0.51      0.50     61503
weighted avg       0.89      0.92      0.88     61503
```

[ ]:
```
# à faire

# smote tomek
# random search precision des deux classes (privilégier light_gbm)
#
# choisir optimisation recall(classe 1)
# fonction coût : manque à gagner pour chaque treshold
# treshold = + = + precision - recall
# precision élevée = on accepte tout le monde
# recall élevée = on refuse tout le monde
# regarder crer une colonne intérêts (amt credit - good price),
```

```
# optimiser mon threshold % de ça
```

7 2021-09-30 : Modélisation avec sous-échantillonage aléatoire de la classe majoriaire

[ ]:
```
# Importations
import sys
sys.path.append('..')

import pandas as pd
import numpy as np
from preprocessing import preprocessor as prep
from preprocessing import CreditInfosImputer
from imblearn.under_sampling import RandomUnderSampler
from imblearn.pipeline import Pipeline
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import classification_report, confusion_matrix
```

[ ]:
```
# Initialisation
train = pd.read_csv('../02_data/application_train.csv')
#test = pd.read_csv('../02_data/application_test.csv')

id_error_msg = lambda x: '`SK_ID_CURR` is not unic for {} set!'.format(x)
assert len(train.SK_ID_CURR.unique()) == train.shape[0], id_error_msg('train')
#assert len(test.SK_ID_CURR.unique()) == test.shape[0], id_error_msg('test')
train.set_index('SK_ID_CURR', inplace=True)
#test.set_index('SK_ID_CURR', inplace=True)

print('Training set dimensions :', train.shape)
df = train.copy()

cls_size = df.TARGET.value_counts()
cls_freq = df.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
                    'freq': cls_freq.apply(lambda x: '%.3f' % x)}))
```

```
Training set dimensions : (307511, 121)
     size   freq
0  282686  0.919
1   24825  0.081
```

7.1 Test de CreditInfosImputer

7.1.1 Tout seul

[ ]:
```
credit_imputer = CreditInfosImputer()

credit_imputer.fit(df)
```

[ ]:
```
CreditInfosImputer()
```

[ ]:
```
df = train.copy()
X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2)
```

[ ]:
```
credit_imputer.fit_transform(X_train, y_train)
```

[ ]:
```
            NAME_CONTRACT_TYPE CODE_GENDER FLAG_OWN_CAR FLAG_OWN_REALTY  \
SK_ID_CURR
346746             Cash loans           F            N               Y
123400             Cash loans           F            N               Y
371653             Cash loans           F            N               Y
324835             Cash loans           M            Y               Y
429236        Revolving loans           M            Y               Y
…                            …         …            …               …
447394             Cash loans           F            N               N
210991             Cash loans           M            N               N
112635             Cash loans           M            Y               Y
117429             Cash loans           F            N               N
157055             Cash loans           F            Y               N

            CNT_CHILDREN  AMT_INCOME_TOTAL  AMT_CREDIT  AMT_ANNUITY  \
SK_ID_CURR
346746                 0          103500.0     78192.0       6399.0
123400                 0           85500.0    314100.0      13833.0
371653                 0          247500.0   1059781.5      56592.0
324835                 0          427500.0    675000.0      49117.5
429236                 1          135000.0    270000.0      13500.0
…                    …                …           …           …
447394                 0           81000.0    135000.0      10665.0
210991                 0          112500.0     76500.0       5670.0
112635                 0          157500.0    454500.0      23206.5
117429                 0          112500.0    296280.0      15124.5
157055                 0          270000.0    180000.0      17046.0

            AMT_GOODS_PRICE NAME_TYPE_SUITE  … FLAG_DOCUMENT_18  \
SK_ID_CURR                                   …
346746              67500.0   Unaccompanied  …                0
123400             225000.0   Unaccompanied  …                0
```

```
371653             954000.0          Family  …                0
324835             675000.0   Unaccompanied  …                0
429236             270000.0   Unaccompanied  …                0
…                     …              …  …              …
447394             135000.0          Family  …                0
210991              76500.0   Unaccompanied  …                0
112635             454500.0   Unaccompanied  …                0
117429             225000.0   Unaccompanied  …                0
157055             180000.0          Family  …                0

           FLAG_DOCUMENT_19 FLAG_DOCUMENT_20 FLAG_DOCUMENT_21  \
SK_ID_CURR
346746                    0                0                0
123400                    0                0                0
371653                    0                0                0
324835                    0                0                0
429236                    0                0                0
…                       …                …                …
447394                    0                0                0
210991                    0                0                0
112635                    0                0                0
117429                    0                0                0
157055                    0                0                0

           AMT_REQ_CREDIT_BUREAU_HOUR  AMT_REQ_CREDIT_BUREAU_DAY  \
SK_ID_CURR
346746                            0.0                        0.0
123400                            0.0                        0.0
371653                            0.0                        0.0
324835                            0.0                        0.0
429236                            0.0                        0.0
…                                 …                          …
447394                            NaN                        NaN
210991                            0.0                        0.0
112635                            0.0                        0.0
117429                            0.0                        0.0
157055                            0.0                        0.0

           AMT_REQ_CREDIT_BUREAU_WEEK  AMT_REQ_CREDIT_BUREAU_MON  \
SK_ID_CURR
346746                            0.0                        0.0
123400                            0.0                        0.0
371653                            0.0                        0.0
324835                            0.0                        0.0
429236                            0.0                        0.0
…                                 …                          …
447394                            NaN                        NaN
```

```
210991                              0.0                          0.0
112635                              0.0                          0.0
117429                              0.0                          1.0
157055                              0.0                          0.0

            AMT_REQ_CREDIT_BUREAU_QRT  AMT_REQ_CREDIT_BUREAU_YEAR
SK_ID_CURR
346746                            0.0                          4.0
123400                            0.0                          0.0
371653                            1.0                          3.0
324835                            0.0                          2.0
429236                            0.0                          3.0
…                                 …                            …
447394                            NaN                          NaN
210991                            0.0                          3.0
112635                            0.0                          0.0
117429                            0.0                          4.0
157055                            0.0                          0.0

[246008 rows x 120 columns]
```

[ ]:
```
credit_imputer.fit_transform(df)
```

[ ]:
```
            TARGET NAME_CONTRACT_TYPE CODE_GENDER FLAG_OWN_CAR  \
SK_ID_CURR
100002           1         Cash loans           M            N
100003           0         Cash loans           F            N
100004           0    Revolving loans           M            Y
100006           0         Cash loans           F            N
100007           0         Cash loans           M            N
…              …                 …           …            …
456251           0         Cash loans           M            N
456252           0         Cash loans           F            N
456253           0         Cash loans           F            N
456254           1         Cash loans           F            N
456255           0         Cash loans           F            N

           FLAG_OWN_REALTY  CNT_CHILDREN  AMT_INCOME_TOTAL  AMT_CREDIT  \
SK_ID_CURR
100002                   Y             0          202500.0    406597.5
100003                   N             0          270000.0   1293502.5
100004                   Y             0           67500.0    135000.0
100006                   Y             0          135000.0    312682.5
100007                   Y             0          121500.0    513000.0
…                      …             …                …          …
456251                   N             0          157500.0    254700.0
456252                   Y             0           72000.0    269550.0
```

```
456253                  Y             0          153000.0    677664.0
456254                  Y             0          171000.0    370107.0
456255                  N             0          157500.0    675000.0

            AMT_ANNUITY  AMT_GOODS_PRICE  … FLAG_DOCUMENT_18  \
SK_ID_CURR                                …
100002          24700.5         351000.0  …                 0
100003          35698.5        1129500.0  …                 0
100004           6750.0         135000.0  …                 0
100006          29686.5         297000.0  …                 0
100007          21865.5         513000.0  …                 0
…                 …              …  …              …
456251          27558.0         225000.0  …                 0
456252          12001.5         225000.0  …                 0
456253          29979.0         585000.0  …                 0
456254          20205.0         319500.0  …                 0
456255          49117.5         675000.0  …                 0

           FLAG_DOCUMENT_19 FLAG_DOCUMENT_20 FLAG_DOCUMENT_21  \
SK_ID_CURR
100002                    0                0                 0
100003                    0                0                 0
100004                    0                0                 0
100006                    0                0                 0
100007                    0                0                 0
…                       …                …              …
456251                    0                0                 0
456252                    0                0                 0
456253                    0                0                 0
456254                    0                0                 0
456255                    0                0                 0

           AMT_REQ_CREDIT_BUREAU_HOUR  AMT_REQ_CREDIT_BUREAU_DAY  \
SK_ID_CURR
100002                            0.0                        0.0
100003                            0.0                        0.0
100004                            0.0                        0.0
100006                            NaN                        NaN
100007                            0.0                        0.0
…                                 …                        …
456251                            NaN                        NaN
456252                            NaN                        NaN
456253                            1.0                        0.0
456254                            0.0                        0.0
456255                            0.0                        0.0

            AMT_REQ_CREDIT_BUREAU_WEEK  AMT_REQ_CREDIT_BUREAU_MON  \
```

```
SK_ID_CURR
100002                                0.0                                0.0
100003                                0.0                                0.0
100004                                0.0                                0.0
100006                                NaN                                NaN
100007                                0.0                                0.0
…                                     …                                  …
456251                                NaN                                NaN
456252                                NaN                                NaN
456253                                0.0                                1.0
456254                                0.0                                0.0
456255                                0.0                                2.0

            AMT_REQ_CREDIT_BUREAU_QRT  AMT_REQ_CREDIT_BUREAU_YEAR
SK_ID_CURR
100002                              0.0                         1.0
100003                              0.0                         0.0
100004                              0.0                         0.0
100006                              NaN                         NaN
100007                              0.0                         0.0
…                                   …                           …
456251                              NaN                         NaN
456252                              NaN                         NaN
456253                              0.0                         1.0
456254                              0.0                         0.0
456255                              0.0                         1.0

[307511 rows x 121 columns]
```

7.1.2 Dans une pipeline de prétraitements

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2)

train_prep = prep.fit_transform(X_train, y_train)
print(train_prep.shape)
#print(train_prep.shape)
```

```
(246008, 237)
```

[ ]:
```
train_prep[:5]
```

[ ]:
```
array([[0.07041798, 0.06742717, 0.05723906, …, 0.        , 0.        ,
        0.        ],
       [0.15842697, 0.2458231 , 0.15937149, …, 0.        , 0.        ,
        0.        ],
       [0.04719101, 0.03624079, 0.04826038, …, 0.        , 1.        ,
```

```
        0.        ],
       [0.12282584, 0.09124254, 0.10549944, …, 0.        , 1.        ,
        0.        ],
       [0.02247191, 0.04956125, 0.02356902, …, 0.        , 0.        ,
        0.        ]])
```

[ ]:
```
from preprocessing import get_preprocessed_set_column_names as get_feat_names

print(get_feat_names(prep))
```

```
['AMT_CREDIT', 'AMT_ANNUITY', 'AMT_GOODS_PRICE', 'CNT_CHILDREN',
'AMT_INCOME_TOTAL', 'REGION_POPULATION_RELATIVE', 'DAYS_BIRTH', 'DAYS_EMPLOYED',
'DAYS_REGISTRATION', 'DAYS_ID_PUBLISH', 'OWN_CAR_AGE', 'CNT_FAM_MEMBERS',
'REGION_RATING_CLIENT', 'REGION_RATING_CLIENT_W_CITY',
'HOUR_APPR_PROCESS_START', 'EXT_SOURCE_1', 'EXT_SOURCE_2', 'EXT_SOURCE_3',
'OBS_30_CNT_SOCIAL_CIRCLE', 'DEF_30_CNT_SOCIAL_CIRCLE',
'OBS_60_CNT_SOCIAL_CIRCLE', 'DEF_60_CNT_SOCIAL_CIRCLE',
'DAYS_LAST_PHONE_CHANGE', 'AMT_REQ_CREDIT_BUREAU_HOUR',
'AMT_REQ_CREDIT_BUREAU_DAY', 'AMT_REQ_CREDIT_BUREAU_WEEK',
'AMT_REQ_CREDIT_BUREAU_MON', 'AMT_REQ_CREDIT_BUREAU_QRT',
'AMT_REQ_CREDIT_BUREAU_YEAR', 'APARTMENTS_AVG', 'BASEMENTAREA_AVG',
'YEARS_BEGINEXPLUATATION_AVG', 'YEARS_BUILD_AVG', 'COMMONAREA_AVG',
'ELEVATORS_AVG', 'ENTRANCES_AVG', 'FLOORSMAX_AVG', 'FLOORSMIN_AVG',
'LANDAREA_AVG', 'LIVINGAPARTMENTS_AVG', 'LIVINGAREA_AVG',
'NONLIVINGAPARTMENTS_AVG', 'NONLIVINGAREA_AVG', 'APARTMENTS_MEDI',
'BASEMENTAREA_MEDI', 'YEARS_BEGINEXPLUATATION_MEDI', 'YEARS_BUILD_MEDI',
'COMMONAREA_MEDI', 'ELEVATORS_MEDI', 'ENTRANCES_MEDI', 'FLOORSMAX_MEDI',
'FLOORSMIN_MEDI', 'LANDAREA_MEDI', 'LIVINGAPARTMENTS_MEDI', 'LIVINGAREA_MEDI',
'NONLIVINGAPARTMENTS_MEDI', 'NONLIVINGAREA_MEDI', 'APARTMENTS_MODE',
'BASEMENTAREA_MODE', 'YEARS_BEGINEXPLUATATION_MODE', 'YEARS_BUILD_MODE',
'COMMONAREA_MODE', 'ELEVATORS_MODE', 'ENTRANCES_MODE', 'FLOORSMAX_MODE',
'FLOORSMIN_MODE', 'LANDAREA_MODE', 'LIVINGAPARTMENTS_MODE', 'LIVINGAREA_MODE',
'NONLIVINGAPARTMENTS_MODE', 'NONLIVINGAREA_MODE', 'TOTALAREA_MODE',
'NAME_CONTRACT_TYPE', 'FLAG_OWN_CAR', 'FLAG_OWN_REALTY', 'EMERGENCYSTATE_MODE',
'CODE_GENDER', 'WEEKDAY_APPR_PROCESS_START', 'FLAG_MOBIL', 'FLAG_EMP_PHONE',
'FLAG_WORK_PHONE', 'FLAG_CONT_MOBILE', 'FLAG_PHONE', 'FLAG_EMAIL',
'REG_REGION_NOT_LIVE_REGION', 'REG_REGION_NOT_WORK_REGION',
'LIVE_REGION_NOT_WORK_REGION', 'REG_CITY_NOT_LIVE_CITY',
'REG_CITY_NOT_WORK_CITY', 'LIVE_CITY_NOT_WORK_CITY', 'FLAG_DOCUMENT_2',
'FLAG_DOCUMENT_3', 'FLAG_DOCUMENT_4', 'FLAG_DOCUMENT_5', 'FLAG_DOCUMENT_6',
'FLAG_DOCUMENT_7', 'FLAG_DOCUMENT_8', 'FLAG_DOCUMENT_9', 'FLAG_DOCUMENT_10',
'FLAG_DOCUMENT_11', 'FLAG_DOCUMENT_12', 'FLAG_DOCUMENT_13', 'FLAG_DOCUMENT_14',
'FLAG_DOCUMENT_15', 'FLAG_DOCUMENT_16', 'FLAG_DOCUMENT_17', 'FLAG_DOCUMENT_18',
'FLAG_DOCUMENT_19', 'FLAG_DOCUMENT_20', 'FLAG_DOCUMENT_21',
'NAME_TYPE_SUITE_children', 'NAME_TYPE_SUITE_family',
'NAME_TYPE_SUITE_group_of_people', 'NAME_TYPE_SUITE_other_a',
'NAME_TYPE_SUITE_other_b', 'NAME_TYPE_SUITE_spouse_or_partner',
```

```
'NAME_TYPE_SUITE_unaccompanied', 'NAME_TYPE_SUITE_unknown',
'NAME_INCOME_TYPE_businessman', 'NAME_INCOME_TYPE_commercial_associate',
'NAME_INCOME_TYPE_maternity_leave', 'NAME_INCOME_TYPE_pensioner',
'NAME_INCOME_TYPE_state_servant', 'NAME_INCOME_TYPE_student',
'NAME_INCOME_TYPE_unemployed', 'NAME_INCOME_TYPE_working',
'NAME_EDUCATION_TYPE_academic_degree', 'NAME_EDUCATION_TYPE_higher_education',
'NAME_EDUCATION_TYPE_incomplete_higher', 'NAME_EDUCATION_TYPE_lower_secondary',
'NAME_EDUCATION_TYPE_secondary_or_secondary_special',
'NAME_FAMILY_STATUS_civil_marriage', 'NAME_FAMILY_STATUS_married',
'NAME_FAMILY_STATUS_separated', 'NAME_FAMILY_STATUS_single_or_not_married',
'NAME_FAMILY_STATUS_unknown', 'NAME_FAMILY_STATUS_widow',
'NAME_HOUSING_TYPE_coop_apartment', 'NAME_HOUSING_TYPE_house_or_apartment',
'NAME_HOUSING_TYPE_municipal_apartment', 'NAME_HOUSING_TYPE_office_apartment',
'NAME_HOUSING_TYPE_rented_apartment', 'NAME_HOUSING_TYPE_with_parents',
'OCCUPATION_TYPE_accountants', 'OCCUPATION_TYPE_cleaning_staff',
'OCCUPATION_TYPE_cooking_staff', 'OCCUPATION_TYPE_core_staff',
'OCCUPATION_TYPE_drivers', 'OCCUPATION_TYPE_high_skill_tech_staff',
'OCCUPATION_TYPE_hr_staff', 'OCCUPATION_TYPE_it_staff',
'OCCUPATION_TYPE_laborers', 'OCCUPATION_TYPE_lowskill_laborers',
'OCCUPATION_TYPE_managers', 'OCCUPATION_TYPE_medicine_staff',
'OCCUPATION_TYPE_private_service_staff', 'OCCUPATION_TYPE_realty_agents',
'OCCUPATION_TYPE_sales_staff', 'OCCUPATION_TYPE_secretaries',
'OCCUPATION_TYPE_security_staff', 'OCCUPATION_TYPE_unknown',
'OCCUPATION_TYPE_waitersorbarmen_staff', 'ORGANIZATION_TYPE_advertising',
'ORGANIZATION_TYPE_agriculture', 'ORGANIZATION_TYPE_bank',
'ORGANIZATION_TYPE_business_entity_type_1',
'ORGANIZATION_TYPE_business_entity_type_2',
'ORGANIZATION_TYPE_business_entity_type_3', 'ORGANIZATION_TYPE_cleaning',
'ORGANIZATION_TYPE_construction', 'ORGANIZATION_TYPE_culture',
'ORGANIZATION_TYPE_electricity', 'ORGANIZATION_TYPE_emergency',
'ORGANIZATION_TYPE_government', 'ORGANIZATION_TYPE_hotel',
'ORGANIZATION_TYPE_housing', 'ORGANIZATION_TYPE_industry_type_1',
'ORGANIZATION_TYPE_industry_type_10', 'ORGANIZATION_TYPE_industry_type_11',
'ORGANIZATION_TYPE_industry_type_12', 'ORGANIZATION_TYPE_industry_type_13',
'ORGANIZATION_TYPE_industry_type_2', 'ORGANIZATION_TYPE_industry_type_3',
'ORGANIZATION_TYPE_industry_type_4', 'ORGANIZATION_TYPE_industry_type_5',
'ORGANIZATION_TYPE_industry_type_6', 'ORGANIZATION_TYPE_industry_type_7',
'ORGANIZATION_TYPE_industry_type_8', 'ORGANIZATION_TYPE_industry_type_9',
'ORGANIZATION_TYPE_insurance', 'ORGANIZATION_TYPE_kindergarten',
'ORGANIZATION_TYPE_legal_services', 'ORGANIZATION_TYPE_medicine',
'ORGANIZATION_TYPE_military', 'ORGANIZATION_TYPE_mobile',
'ORGANIZATION_TYPE_other', 'ORGANIZATION_TYPE_police',
'ORGANIZATION_TYPE_postal', 'ORGANIZATION_TYPE_realtor',
'ORGANIZATION_TYPE_religion', 'ORGANIZATION_TYPE_restaurant',
'ORGANIZATION_TYPE_school', 'ORGANIZATION_TYPE_security',
'ORGANIZATION_TYPE_security_ministries', 'ORGANIZATION_TYPE_selfemployed',
'ORGANIZATION_TYPE_services', 'ORGANIZATION_TYPE_telecom',
'ORGANIZATION_TYPE_trade_type_1', 'ORGANIZATION_TYPE_trade_type_2',
```

```
'ORGANIZATION_TYPE_trade_type_3', 'ORGANIZATION_TYPE_trade_type_4',
'ORGANIZATION_TYPE_trade_type_5', 'ORGANIZATION_TYPE_trade_type_6',
'ORGANIZATION_TYPE_trade_type_7', 'ORGANIZATION_TYPE_transport_type_1',
'ORGANIZATION_TYPE_transport_type_2', 'ORGANIZATION_TYPE_transport_type_3',
'ORGANIZATION_TYPE_transport_type_4', 'ORGANIZATION_TYPE_university',
'ORGANIZATION_TYPE_xna', 'FONDKAPREMONT_MODE_not_specified',
'FONDKAPREMONT_MODE_org_spec_account', 'FONDKAPREMONT_MODE_reg_oper_account',
'FONDKAPREMONT_MODE_reg_oper_spec_account', 'FONDKAPREMONT_MODE_unknown',
'HOUSETYPE_MODE_block_of_flats', 'HOUSETYPE_MODE_specific_housing',
'HOUSETYPE_MODE_terraced_house', 'HOUSETYPE_MODE_unknown',
'WALLSMATERIAL_MODE_block', 'WALLSMATERIAL_MODE_mixed',
'WALLSMATERIAL_MODE_monolithic', 'WALLSMATERIAL_MODE_others',
'WALLSMATERIAL_MODE_panel', 'WALLSMATERIAL_MODE_stone_or_brick',
'WALLSMATERIAL_MODE_unknown', 'WALLSMATERIAL_MODE_wooden']
```

7.2 Test de Random Undersampler

[ ]:
```
rand_usampl = RandomUnderSampler()
```

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2)
resampling = rand_usampl.fit_resample(X_train, y_train)
```

[ ]:
```
resampling[0].shape
```

[ ]:
```
(39798, 120)
```

[ ]:
```
resampling[1].value_counts()
```

[ ]:
```
0    19899
1    19899
Name: TARGET, dtype: int64
```

7.3 Essais avec un classifieur en arbre de décision

[ ]:
```
tree_imb = Pipeline(steps=[
    ('r', rand_usampl),
    ('p', prep),
    ('m', DecisionTreeClassifier())
    ])
```

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2)
```

[ ]:
```
tree_imb.fit(X_train, y_train)
```

[ ]:
```
Pipeline(steps=[('r', RandomUnderSampler()),
                ('p',
                 ColumnTransformer(remainder='passthrough',
                                   transformers=[('creditinfosimputer',
                                                  CreditInfosImputer(),
                                                  ['AMT_CREDIT', 'AMT_ANNUITY',
                                                   'AMT_GOODS_PRICE']),
                                                 ('simpleimputer-1',
    SimpleImputer(strategy='median'),
                                                  ['CNT_CHILDREN',
                                                   'AMT_INCOME_TOTAL',
                                                   'REGION_POPULATION_RELATIVE',
                                                   'DAYS_BIRTH',
                                                   'DAYS_EMPLOYED',
                                                   'DAYS_REGI…
    FunctionTransformer(func=<function <lambda> at 0x7f15f0bb90d0>)),
                                                                      ('encoder',
    OneHotEncoder(handle_unknown='ignore'))]),
                                                  ['NAME_TYPE_SUITE',
                                                   'NAME_INCOME_TYPE',
                                                   'NAME_EDUCATION_TYPE',
                                                   'NAME_FAMILY_STATUS',
                                                   'NAME_HOUSING_TYPE',
                                                   'OCCUPATION_TYPE',
                                                   'ORGANIZATION_TYPE',
                                                   'FONDKAPREMONT_MODE',
                                                   'HOUSETYPE_MODE',
                                                   'WALLSMATERIAL_MODE'])])),
                ('m', DecisionTreeClassifier())])
```

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

[ ]:
```
report = classification_report(y_test, y_pred)
print(report)
```

```
              precision    recall  f1-score   support

           0       0.94      0.59      0.72     56559
           1       0.11      0.60      0.19      4944

    accuracy                           0.59     61503
   macro avg       0.53      0.59      0.46     61503
weighted avg       0.88      0.59      0.68     61503
```

[ ]:
```
conf_mat = confusion_matrix(y_test, y_pred)
print(conf_mat)
```

```
[[33287 23272]
 [ 1997  2947]]
```

8 2021-10-01 : Selection du meilleur modèle

[ ]:
```
# Importations
import sys
sys.path.append('..')

# Bibliothèques utiles
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
#import seaborn as sns

# Prétraitements et rééquilibrage
from preprocessing import preprocessor
from imblearn.under_sampling import RandomUnderSampler
from sklearn.preprocessing import StandardScaler
from imblearn.pipeline import Pipeline

# Modèles à tester
from sklearn.model_selection import train_test_split
from sklearn.linear_model import SGDClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier, AdaBoostClassifier
from lightgbm import LGBMClassifier

# Évaluation
from sklearn.metrics import classification_report, confusion_matrix

# Autres
from timer import timer
from styles import *
```

[ ]:
```
# Initialisation
train = pd.read_csv('../02_data/application_train.csv', index_col=0)
#test = pd.read_csv('../02_data/application_test.csv')

print('Training set dimensions :', train.shape)
df = train.copy()

cls_size = df.TARGET.value_counts()
cls_freq = df.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
                    'freq': cls_freq.apply(lambda x: '%.2f' % x)}))
```

```
Training set dimensions : (307511, 121)
     size  freq
0  282686  0.92
1   24825  0.08
```

[ ]:
```
df.head()
```

[ ]:
```
            TARGET NAME_CONTRACT_TYPE CODE_GENDER FLAG_OWN_CAR  \
SK_ID_CURR
100002           1         Cash loans           M            N
100003           0         Cash loans           F            N
100004           0    Revolving loans           M            Y
100006           0         Cash loans           F            N
100007           0         Cash loans           M            N

           FLAG_OWN_REALTY  CNT_CHILDREN  AMT_INCOME_TOTAL  AMT_CREDIT  \
SK_ID_CURR
100002                   Y             0          202500.0    406597.5
100003                   N             0          270000.0   1293502.5
100004                   Y             0           67500.0    135000.0
100006                   Y             0          135000.0    312682.5
100007                   Y             0          121500.0    513000.0

            AMT_ANNUITY  AMT_GOODS_PRICE  … FLAG_DOCUMENT_18  \
SK_ID_CURR                                …
100002          24700.5         351000.0  …                0
100003          35698.5        1129500.0  …                0
100004           6750.0         135000.0  …                0
100006          29686.5         297000.0  …                0
100007          21865.5         513000.0  …                0

           FLAG_DOCUMENT_19 FLAG_DOCUMENT_20 FLAG_DOCUMENT_21  \
SK_ID_CURR
100002                   0                0                0
100003                   0                0                0
100004                   0                0                0
100006                   0                0                0
100007                   0                0                0

           AMT_REQ_CREDIT_BUREAU_HOUR  AMT_REQ_CREDIT_BUREAU_DAY  \
SK_ID_CURR
100002                            0.0                        0.0
100003                            0.0                        0.0
100004                            0.0                        0.0
100006                            NaN                        NaN
100007                            0.0                        0.0
```

```
            AMT_REQ_CREDIT_BUREAU_WEEK  AMT_REQ_CREDIT_BUREAU_MON  \
SK_ID_CURR
100002                             0.0                        0.0
100003                             0.0                        0.0
100004                             0.0                        0.0
100006                             NaN                        NaN
100007                             0.0                        0.0

            AMT_REQ_CREDIT_BUREAU_QRT  AMT_REQ_CREDIT_BUREAU_YEAR
SK_ID_CURR
100002                            0.0                        1.0
100003                            0.0                        0.0
100004                            0.0                        0.0
100006                            NaN                        NaN
100007                            0.0                        0.0

[5 rows x 121 columns]
```

[ ]:
```
# Définition des modèles à tester

# Pour les besoin de l'évaluation, on fige l'aléatoire
# On définit un nombre pour la graine d'aléa
r = 42

undersampler = RandomUnderSampler(random_state=r)
scaler = StandardScaler()

stochastic_grad = Pipeline([('u', undersampler),
                            ('p', preprocessor),
                            ('s', scaler),
                            ('m', SGDClassifier(random_state=r))])

decision_tree = Pipeline([('u', undersampler),
                          ('p', preprocessor),
                          ('m', DecisionTreeClassifier(random_state=r))])

random_forest = Pipeline([('u', undersampler),
                          ('p', preprocessor),
                          ('m', RandomForestClassifier(random_state=r))])

ada_boost = Pipeline([('u', undersampler),
                      ('p', preprocessor),
                      ('m', AdaBoostClassifier(random_state=r))])

light_gbm = Pipeline([('u', undersampler),
                      ('p', preprocessor),
                      ('m', LGBMClassifier(random_state=r))])
```

```
# Liste des modèles à tester
models = {'stochastic_grad': stochastic_grad,
          'decision_tree': decision_tree,
          'random_forest': random_forest,
          'ada_boost': ada_boost,
          'light_gbm': light_gbm}
```

[ ]:
```
# Séparation du jeu de données entre entraînement et évaluation

X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2,
                                                    random_state=r)
```

[ ]:
```
# Fonction d'évaluation des modèles
@timer
def model_eval(model, X_test, y_test):
    y_pred = model.predict(X_test)
    print(confusion_matrix(y_test, y_pred))
    print(classification_report(y_test, y_pred))
```

[ ]:
```
# Boucle d'évaluation des modèles
for model_name, model in models.items():
    print(model_name)
    model_eval(model.fit(X_train, y_train), X_test, y_test)
```

```
stochastic_grad
[[37056 19498]
 [ 1599  3350]]
              precision    recall  f1-score   support

           0       0.96      0.66      0.78     56554
           1       0.15      0.68      0.24      4949

    accuracy                           0.66     61503
   macro avg       0.55      0.67      0.51     61503
weighted avg       0.89      0.66      0.74     61503

'model_eval': successfully processed in 0h00m02.057879s.
decision_tree
[[33015 23539]
 [ 1983  2966]]
              precision    recall  f1-score   support

           0       0.94      0.58      0.72     56554
           1       0.11      0.60      0.19      4949
```

```
    accuracy                           0.59     61503
   macro avg       0.53      0.59      0.45     61503
weighted avg       0.88      0.59      0.68     61503

'model_eval': successfully processed in 0h00m01.834573s.
random_forest
[[39311 17243]
 [ 1714  3235]]
              precision    recall  f1-score   support

           0       0.96      0.70      0.81     56554
           1       0.16      0.65      0.25      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.67      0.53     61503
weighted avg       0.89      0.69      0.76     61503

'model_eval': successfully processed in 0h00m04.378112s.
ada_boost
[[38631 17923]
 [ 1610  3339]]
              precision    recall  f1-score   support

           0       0.96      0.68      0.80     56554
           1       0.16      0.67      0.25      4949

    accuracy                           0.68     61503
   macro avg       0.56      0.68      0.53     61503
weighted avg       0.90      0.68      0.75     61503

'model_eval': successfully processed in 0h00m04.319357s.
light_gbm
[[39135 17419]
 [ 1568  3381]]
              precision    recall  f1-score   support

           0       0.96      0.69      0.80     56554
           1       0.16      0.68      0.26      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.69      0.53     61503
weighted avg       0.90      0.69      0.76     61503

'model_eval': successfully processed in 0h00m01.914349s.
```

8.1 Sélection des meilleures variables

[ ]:
```
from preprocessing import get_preprocessed_set_column_names as get_feat_names

def get_feature_importances(model):
    '''Fonction qui retourne l'importance relative des variables
    pour un modèle donné et un jeu d'entraînement donné'''
    feat_names = get_feat_names(model['p'])
    feat_impor = model['m'].feature_importances_

    importances = pd.Series(data={k:v for k,v in zip(feat_names,feat_impor)},
                            index=feat_names)

    return importances
```

[ ]:
```
models_feat_importances = []
for model in models.values():
    if model != stochastic_grad:
        feat_importances = get_feature_importances(model.fit(X_train, y_train))
        models_feat_importances.append(feat_importances)
```

[ ]:
```
feature_importances = pd.DataFrame(np.asarray(models_feat_importances).T,
                                   columns=[key for key in models.keys()
                                            if key != 'stochastic_grad'],
                                   index=feat_importances.index)
```

[ ]:
```
feature_importances
```

[ ]:
```
                                decision_tree  random_forest  ada_boost  \
AMT_CREDIT                           0.030328       0.029792       0.04
AMT_ANNUITY                          0.036745       0.029496       0.06
AMT_GOODS_PRICE                      0.023268       0.027307       0.04
FLAG_OWN_CAR                         0.001408       0.004184       0.00
OWN_CAR_AGE                          0.014856       0.011977       0.04
…                                         …              …          …
WALLSMATERIAL_MODE_others            0.000083       0.000277       0.00
WALLSMATERIAL_MODE_panel             0.001487       0.001415       0.00
WALLSMATERIAL_MODE_stone_or_brick    0.001640       0.001594       0.00
WALLSMATERIAL_MODE_unknown           0.000466       0.001120       0.00
WALLSMATERIAL_MODE_wooden            0.000309       0.000416       0.00

                                light_gbm
AMT_CREDIT                          143.0
AMT_ANNUITY                         144.0
AMT_GOODS_PRICE                     122.0
FLAG_OWN_CAR                         19.0
OWN_CAR_AGE                          36.0
```

```
…                                        …
WALLSMATERIAL_MODE_others                2.0
WALLSMATERIAL_MODE_panel                 1.0
WALLSMATERIAL_MODE_stone_or_brick        4.0
WALLSMATERIAL_MODE_unknown               1.0
WALLSMATERIAL_MODE_wooden                0.0

[235 rows x 4 columns]
```

[ ]:
```
feature_importances.random_forest.sort_values(ascending=False)[:10]
```

[ ]:
```
EXT_SOURCE_3              0.067334
EXT_SOURCE_2              0.059467
DAYS_BIRTH                0.035314
DAYS_ID_PUBLISH           0.031396
DAYS_EMPLOYED             0.030771
DAYS_LAST_PHONE_CHANGE    0.030171
DAYS_REGISTRATION         0.029835
AMT_CREDIT                0.029792
AMT_ANNUITY               0.029496
EXT_SOURCE_1              0.028689
Name: random_forest, dtype: float64
```

[ ]:
```
feature_importances.loc[feature_importances.random_forest>.01, 'random_forest']
```

[ ]:
```
AMT_CREDIT                    0.029792
AMT_ANNUITY                   0.029496
AMT_GOODS_PRICE               0.027307
OWN_CAR_AGE                   0.011977
AMT_INCOME_TOTAL              0.022573
REGION_POPULATION_RELATIVE    0.024397
DAYS_BIRTH                    0.035314
DAYS_EMPLOYED                 0.030771
DAYS_REGISTRATION             0.029835
DAYS_ID_PUBLISH               0.031396
HOUR_APPR_PROCESS_START       0.020793
EXT_SOURCE_1                  0.028689
EXT_SOURCE_2                  0.059467
EXT_SOURCE_3                  0.067334
OBS_30_CNT_SOCIAL_CIRCLE      0.011729
OBS_60_CNT_SOCIAL_CIRCLE      0.011754
DAYS_LAST_PHONE_CHANGE        0.030171
AMT_REQ_CREDIT_BUREAU_YEAR    0.014815
WEEKDAY_APPR_PROCESS_START    0.015039
Name: random_forest, dtype: float64
```

[ ]:
```
feature_importances.random_forest.sort_values(ascending=True)[:20]
```

```
[ ]: FLAG_DOCUMENT_12                        0.000000e+00
     FLAG_DOCUMENT_10                        0.000000e+00
     FLAG_MOBIL                              0.000000e+00
     FLAG_DOCUMENT_4                         0.000000e+00
     NAME_INCOME_TYPE_maternity_leave        8.804596e-07
     NAME_INCOME_TYPE_student                3.140687e-06
     ORGANIZATION_TYPE_industry_type_8       5.303477e-06
     NAME_EDUCATION_TYPE_academic_degree     7.688181e-06
     ORGANIZATION_TYPE_trade_type_5          8.590358e-06
     ORGANIZATION_TYPE_religion              1.138544e-05
     FLAG_DOCUMENT_2                         1.402962e-05
     FLAG_DOCUMENT_17                        1.746293e-05
     NAME_INCOME_TYPE_unemployed             1.984359e-05
     FLAG_DOCUMENT_7                         2.007277e-05
     ORGANIZATION_TYPE_industry_type_13      2.037465e-05
     ORGANIZATION_TYPE_trade_type_4          2.613527e-05
     FLAG_DOCUMENT_21                        2.898975e-05
     FLAG_DOCUMENT_20                        3.019205e-05
     ORGANIZATION_TYPE_industry_type_6       3.422162e-05
     ORGANIZATION_TYPE_transport_type_1      4.431209e-05
     Name: random_forest, dtype: float64
```

```
[ ]: feature_importances.filter(like='FLAG', axis=0)
```

```
[ ]:                  decision_tree  random_forest  ada_boost  light_gbm
     FLAG_OWN_CAR              0.001408       0.004184       0.00       19.0
     FLAG_OWN_REALTY           0.004182       0.004919       0.00        4.0
     FLAG_MOBIL                0.000000       0.000000       0.00        0.0
     FLAG_EMP_PHONE            0.000947       0.001777       0.00        0.0
     FLAG_WORK_PHONE           0.002777       0.003858       0.00       11.0
     FLAG_CONT_MOBILE          0.000089       0.000102       0.00        0.0
     FLAG_PHONE                0.003196       0.004425       0.00        8.0
     FLAG_EMAIL                0.001866       0.001970       0.00        1.0
     FLAG_DOCUMENT_2           0.000096       0.000014       0.00        0.0
     FLAG_DOCUMENT_3           0.003608       0.004766       0.02       24.0
     FLAG_DOCUMENT_4           0.000000       0.000000       0.00        0.0
     FLAG_DOCUMENT_5           0.001146       0.000842       0.00        1.0
     FLAG_DOCUMENT_6           0.001838       0.001488       0.00        2.0
     FLAG_DOCUMENT_7           0.000000       0.000020       0.00        0.0
     FLAG_DOCUMENT_8           0.001593       0.001884       0.00        2.0
     FLAG_DOCUMENT_9           0.000200       0.000188       0.00        0.0
     FLAG_DOCUMENT_10          0.000000       0.000000       0.00        0.0
     FLAG_DOCUMENT_11          0.000182       0.000171       0.00        0.0
     FLAG_DOCUMENT_12          0.000000       0.000000       0.00        0.0
     FLAG_DOCUMENT_13          0.000090       0.000164       0.02        6.0
     FLAG_DOCUMENT_14          0.000000       0.000114       0.00        1.0
     FLAG_DOCUMENT_15          0.000181       0.000076       0.00        0.0
```

```
FLAG_DOCUMENT_16       0.000880       0.000551       0.02       11.0
FLAG_DOCUMENT_17       0.000000       0.000017       0.00        0.0
FLAG_DOCUMENT_18       0.000191       0.000536       0.02       11.0
FLAG_DOCUMENT_19       0.000082       0.000045       0.00        0.0
FLAG_DOCUMENT_20       0.000000       0.000030       0.00        0.0
FLAG_DOCUMENT_21       0.000000       0.000029       0.00        0.0
```

[ ]:
```
feat_importances[[f for f in feat_importances.index
                  if f[-4:] in ['_AVG','MEDI','MODE']]]
```

[ ]:
```
APARTMENTS_AVG                 23
BASEMENTAREA_AVG               26
YEARS_BEGINEXPLUATATION_AVG    23
YEARS_BUILD_AVG                 6
COMMONAREA_AVG                 24
ELEVATORS_AVG                   6
ENTRANCES_AVG                  11
FLOORSMAX_AVG                   5
FLOORSMIN_AVG                  10
LANDAREA_AVG                   22
LIVINGAPARTMENTS_AVG           12
LIVINGAREA_AVG                 16
NONLIVINGAPARTMENTS_AVG         4
NONLIVINGAREA_AVG              14
APARTMENTS_MEDI                14
BASEMENTAREA_MEDI              12
YEARS_BEGINEXPLUATATION_MEDI    8
YEARS_BUILD_MEDI                2
COMMONAREA_MEDI                11
ELEVATORS_MEDI                  7
ENTRANCES_MEDI                  4
FLOORSMAX_MEDI                  2
FLOORSMIN_MEDI                  0
LANDAREA_MEDI                  11
LIVINGAPARTMENTS_MEDI           9
LIVINGAREA_MEDI                15
NONLIVINGAPARTMENTS_MEDI        5
NONLIVINGAREA_MEDI             12
APARTMENTS_MODE                23
BASEMENTAREA_MODE              13
YEARS_BEGINEXPLUATATION_MODE   15
YEARS_BUILD_MODE                8
COMMONAREA_MODE                11
ELEVATORS_MODE                  3
ENTRANCES_MODE                  8
FLOORSMAX_MODE                  3
FLOORSMIN_MODE                  3
```

```
LANDAREA_MODE                  18
LIVINGAPARTMENTS_MODE          14
LIVINGAREA_MODE                24
NONLIVINGAPARTMENTS_MODE        8
NONLIVINGAREA_MODE              9
TOTALAREA_MODE                 33
EMERGENCYSTATE_MODE             0
dtype: int32
```

- Les variables type `FLAG` semblent peu impactantes pour des modèles en arbre de décision
- Il faut réduire les nombres de colonnes onehot pour les types de métiers et d'organisation car la cardinalité de ces variables est trop grande. Certaines catégories d'organisations ou de métiers sont trop spécifiques et peuvent être regroupées

[ ]:
```
df.ORGANIZATION_TYPE.unique()
```

[ ]:
```
array(['Business Entity Type 3', 'School', 'Government', 'Religion',
       'Other', 'XNA', 'Electricity', 'Medicine',
       'Business Entity Type 2', 'Self-employed', 'Transport: type 2',
       'Construction', 'Housing', 'Kindergarten', 'Trade: type 7',
       'Industry: type 11', 'Military', 'Services', 'Security Ministries',
       'Transport: type 4', 'Industry: type 1', 'Emergency', 'Security',
       'Trade: type 2', 'University', 'Transport: type 3', 'Police',
       'Business Entity Type 1', 'Postal', 'Industry: type 4',
       'Agriculture', 'Restaurant', 'Culture', 'Hotel',
       'Industry: type 7', 'Trade: type 3', 'Industry: type 3', 'Bank',
       'Industry: type 9', 'Insurance', 'Trade: type 6',
       'Industry: type 2', 'Transport: type 1', 'Industry: type 12',
       'Mobile', 'Trade: type 1', 'Industry: type 5', 'Industry: type 10',
       'Legal Services', 'Advertising', 'Trade: type 5', 'Cleaning',
       'Industry: type 13', 'Trade: type 4', 'Telecom',
       'Industry: type 8', 'Realtor', 'Industry: type 6'], dtype=object)
```

[ ]:
```
df.loc[df.ORGANIZATION_TYPE.str.match(r'^Industry'),
       'ORGANIZATION_TYPE'] = 'Industry'
df.loc[df.ORGANIZATION_TYPE.str.match(r'^Transport'),
        'ORGANIZATION_TYPE'] = 'Transport'
df.loc[df.ORGANIZATION_TYPE.str.match(r'^Trade'),
        'ORGANIZATION_TYPE'] = 'Trade'
df.loc[df.ORGANIZATION_TYPE.str.match(r'^Business Entity'),
        'ORGANIZATION_TYPE'] = 'Business Entity'
```

[ ]:
```
print(df.ORGANIZATION_TYPE.unique())
print(len(df.ORGANIZATION_TYPE.unique()))
```

```
['Business Entity' 'School' 'Government' 'Religion' 'Other' 'XNA'
 'Electricity' 'Medicine' 'Self-employed' 'Transport' 'Construction'
 'Housing' 'Kindergarten' 'Trade' 'Industry' 'Military' 'Services'
```

```
 'Security Ministries' 'Emergency' 'Security' 'University' 'Police'
 'Postal' 'Agriculture' 'Restaurant' 'Culture' 'Hotel' 'Bank' 'Insurance'
 'Mobile' 'Legal Services' 'Advertising' 'Cleaning' 'Telecom' 'Realtor']
35
```

[ ]:
```
df.ORGANIZATION_TYPE.value_counts()
```

[ ]:
```
Business Entity         84529
XNA                     55374
Self-employed           38412
Other                   16683
Trade                   14315
Industry                14311
Medicine                11193
Government              10404
Transport                8990
School                   8893
Kindergarten             6880
Construction             6721
Security                 3247
Housing                  2958
Military                 2634
Bank                     2507
Agriculture              2454
Police                   2341
Postal                   2157
Security Ministries      1974
Restaurant               1811
Services                 1575
University               1327
Hotel                     966
Electricity               950
Insurance                 597
Telecom                   577
Emergency                 560
Advertising               429
Realtor                   396
Culture                   379
Mobile                    317
Legal Services            305
Cleaning                  260
Religion                   85
Name: ORGANIZATION_TYPE, dtype: int64
```

[ ]:
```
# Séparation du jeu de données entre entraînement et évaluation
X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2,
```

```
                                                    random_state=r)
```

[ ]:
```
# Boucle d'évaluation des modèles
for model_name, model in models.items():
    print(model_name)
    model_eval(model.fit(X_train, y_train), X_test, y_test)
```

```
decision_tree
[[33134 23420]
 [ 2030  2919]]
              precision    recall  f1-score   support

           0       0.94      0.59      0.72     56554
           1       0.11      0.59      0.19      4949

    accuracy                           0.59     61503
   macro avg       0.53      0.59      0.45     61503
weighted avg       0.88      0.59      0.68     61503

'model_eval': successfully processed in 0h00m01.840444s.
random_forest
[[39346 17208]
 [ 1713  3236]]
              precision    recall  f1-score   support

           0       0.96      0.70      0.81     56554
           1       0.16      0.65      0.25      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.67      0.53     61503
weighted avg       0.89      0.69      0.76     61503

'model_eval': successfully processed in 0h00m03.689332s.
ada_boost
[[38542 18012]
 [ 1614  3335]]
              precision    recall  f1-score   support

           0       0.96      0.68      0.80     56554
           1       0.16      0.67      0.25      4949

    accuracy                           0.68     61503
   macro avg       0.56      0.68      0.53     61503
weighted avg       0.90      0.68      0.75     61503

'model_eval': successfully processed in 0h00m03.281466s.
light_gbm
```

```
[[39073 17481]
 [ 1558  3391]]
              precision    recall  f1-score   support

           0       0.96      0.69      0.80     56554
           1       0.16      0.69      0.26      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.69      0.53     61503
weighted avg       0.90      0.69      0.76     61503

'model_eval': successfully processed in 0h00m01.650653s.
```

[ ]:
```
new_importances = get_feature_importances(random_forest)
```

[ ]:
```
new_importances.sort_values(ascending=False)[:20]
```

[ ]:
```
EXT_SOURCE_3                 0.066164
EXT_SOURCE_2                 0.061207
DAYS_BIRTH                   0.034511
DAYS_EMPLOYED                0.031532
DAYS_ID_PUBLISH              0.031449
DAYS_LAST_PHONE_CHANGE       0.030263
AMT_ANNUITY                  0.030164
EXT_SOURCE_1                 0.030088
DAYS_REGISTRATION            0.030017
AMT_CREDIT                   0.029999
AMT_GOODS_PRICE              0.027940
REGION_POPULATION_RELATIVE   0.023971
AMT_INCOME_TOTAL             0.023164
HOUR_APPR_PROCESS_START      0.020020
WEEKDAY_APPR_PROCESS_START   0.015229
AMT_REQ_CREDIT_BUREAU_YEAR   0.014610
OWN_CAR_AGE                  0.013775
OBS_30_CNT_SOCIAL_CIRCLE     0.011943
OBS_60_CNT_SOCIAL_CIRCLE     0.011638
TOTALAREA_MODE               0.009789
dtype: float64
```

[ ]:
```
new_importances.sort_values(ascending=True)[:20]
```

[ ]:
```
FLAG_MOBIL                          0.000000
FLAG_DOCUMENT_12                    0.000000
FLAG_DOCUMENT_4                     0.000000
FLAG_DOCUMENT_10                    0.000000
NAME_INCOME_TYPE_maternity_leave    0.000002
NAME_INCOME_TYPE_student            0.000003
```

```
FLAG_DOCUMENT_7                         0.000007
FLAG_DOCUMENT_17                        0.000011
NAME_EDUCATION_TYPE_academic_degree     0.000013
NAME_INCOME_TYPE_unemployed             0.000015
FLAG_DOCUMENT_2                         0.000019
FLAG_DOCUMENT_21                        0.000021
FLAG_DOCUMENT_20                        0.000026
ORGANIZATION_TYPE_religion              0.000027
FLAG_DOCUMENT_19                        0.000042
ORGANIZATION_TYPE_cleaning              0.000053
OCCUPATION_TYPE_hr_staff                0.000063
FLAG_DOCUMENT_15                        0.000069
ORGANIZATION_TYPE_legal_services        0.000072
ORGANIZATION_TYPE_realtor               0.000075
dtype: float64
```

8.2 Optimisation des hypers-paramètres

On va optimiser les hypers-paramètres de light-gbm avec une RandomizedSearchCV

[ ]:
```python
# Importations
import sys
sys.path.append('..')

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from preprocessing import preprocessor
from sklearn.model_selection import train_test_split
from imblearn.under_sampling import RandomUnderSampler
from imblearn.pipeline import Pipeline
from lightgbm import LGBMClassifier
from modelling_funcs import model_eval

from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
```

[ ]:
```python
# Initialisation
train = pd.read_csv('../02_data/application_train.csv', index_col=0)
#test = pd.read_csv('../02_data/application_test.csv')

print('Training set dimensions :', train.shape)
df = train.copy()

cls_size = df.TARGET.value_counts()
cls_freq = df.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
```

```
                    'freq': cls_freq.apply(lambda x: '%.2f' % x)}))
```

```
Training set dimensions : (307511, 121)
     size  freq
0  282686  0.92
1   24825  0.08
```

[ ]:
```
# Définition du modèle de base, à optimiser
r = 42
undersampler = RandomUnderSampler(random_state=r)

baseline_model = Pipeline([('u', undersampler),
                           ('p', preprocessor),
                           ('light_gbm', LGBMClassifier(random_state=r))])
```

[ ]:
```
# Séparation du jeu de données entre entraînement et évaluation

X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2,
                                                    random_state=r)
```

[ ]:
```
model_eval(baseline_model.fit(X_train, y_train), X_test, y_test)
```

```
[[39135 17419]
 [ 1568  3381]]
              precision    recall  f1-score   support

           0       0.96      0.69      0.80     56554
           1       0.16      0.68      0.26      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.69      0.53     61503
weighted avg       0.90      0.69      0.76     61503

'model_eval': successfully processed in 0h00m01.721089s.
```

[ ]:
```
hyper_params = {'light_gbm__num_leaves': np.linspace(10, 100, 4, dtype=int),
                'light_gbm__n_estimators': np.linspace(50, 1000, 10, dtype=int)}

param_dims = []
for hyper_param in hyper_params.values():
    param_dims.append(len(hyper_param))
print(np.product(param_dims), 'combinations to test.')
```

```
40 combinations to test.
```

[ ]:
```
grid_search = GridSearchCV(baseline_model, hyper_params, scoring='recall', cv=5)
grid_search.fit(X_train, y_train)
print(grid_search.best_params_)
```

```
{'light_gbm__n_estimators': 350, 'light_gbm__num_leaves': 10}
```

[ ]:
```
best_model = grid_search.best_estimator_
model_eval(best_model, X_test, y_test)
```

```
[[39215 17339]
 [ 1556  3393]]
              precision    recall  f1-score   support

           0       0.96      0.69      0.81     56554
           1       0.16      0.69      0.26      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.69      0.54     61503
weighted avg       0.90      0.69      0.76     61503

'model_eval': successfully processed in 0h00m01.741054s.
```

[ ]:
```
light_gbm.get_params().keys()
```

[ ]:
```
dict_keys(['memory', 'steps', 'verbose', 'u', 'p', 'm', 'u__random_state',
'u__replacement', 'u__sampling_strategy', 'p__n_jobs', 'p__remainder',
'p__sparse_threshold', 'p__transformer_weights', 'p__transformers',
'p__verbose', 'p__creditinfosimputer', 'p__carinfosimputer',
'p__simpleimputer-1', 'p__simpleimputer-2', 'p__simpleimputer-3',
'p__simpleimputer-4', 'p__pipeline-1', 'p__pipeline-2', 'p__pipeline-3',
'p__simpleimputer-1__add_indicator', 'p__simpleimputer-1__copy',
'p__simpleimputer-1__fill_value', 'p__simpleimputer-1__missing_values',
'p__simpleimputer-1__strategy', 'p__simpleimputer-1__verbose',
'p__simpleimputer-2__add_indicator', 'p__simpleimputer-2__copy',
'p__simpleimputer-2__fill_value', 'p__simpleimputer-2__missing_values',
'p__simpleimputer-2__strategy', 'p__simpleimputer-2__verbose',
'p__simpleimputer-3__add_indicator', 'p__simpleimputer-3__copy',
'p__simpleimputer-3__fill_value', 'p__simpleimputer-3__missing_values',
'p__simpleimputer-3__strategy', 'p__simpleimputer-3__verbose',
'p__simpleimputer-4__add_indicator', 'p__simpleimputer-4__copy',
'p__simpleimputer-4__fill_value', 'p__simpleimputer-4__missing_values',
'p__simpleimputer-4__strategy', 'p__simpleimputer-4__verbose',
'p__pipeline-1__memory', 'p__pipeline-1__steps', 'p__pipeline-1__verbose',
'p__pipeline-1__nan_imputer', 'p__pipeline-1__xna_imputer',
'p__pipeline-1__encoder', 'p__pipeline-1__nan_imputer__add_indicator',
'p__pipeline-1__nan_imputer__copy', 'p__pipeline-1__nan_imputer__fill_value',
'p__pipeline-1__nan_imputer__missing_values',
```

```
'p__pipeline-1__nan_imputer__strategy', 'p__pipeline-1__nan_imputer__verbose',
'p__pipeline-1__xna_imputer__add_indicator', 'p__pipeline-1__xna_imputer__copy',
'p__pipeline-1__xna_imputer__fill_value',
'p__pipeline-1__xna_imputer__missing_values',
'p__pipeline-1__xna_imputer__strategy', 'p__pipeline-1__xna_imputer__verbose',
'p__pipeline-1__encoder__categories', 'p__pipeline-1__encoder__dtype',
'p__pipeline-1__encoder__handle_unknown',
'p__pipeline-1__encoder__unknown_value', 'p__pipeline-2__memory',
'p__pipeline-2__steps', 'p__pipeline-2__verbose', 'p__pipeline-2__imputer',
'p__pipeline-2__imputer__add_indicator', 'p__pipeline-2__imputer__copy',
'p__pipeline-2__imputer__fill_value', 'p__pipeline-2__imputer__missing_values',
'p__pipeline-2__imputer__strategy', 'p__pipeline-2__imputer__verbose',
'p__pipeline-3__memory', 'p__pipeline-3__steps', 'p__pipeline-3__verbose',
'p__pipeline-3__nan_imputer', 'p__pipeline-3__xna_imputer',
'p__pipeline-3__formatter', 'p__pipeline-3__encoder',
'p__pipeline-3__nan_imputer__add_indicator', 'p__pipeline-3__nan_imputer__copy',
'p__pipeline-3__nan_imputer__fill_value',
'p__pipeline-3__nan_imputer__missing_values',
'p__pipeline-3__nan_imputer__strategy', 'p__pipeline-3__nan_imputer__verbose',
'p__pipeline-3__xna_imputer__add_indicator', 'p__pipeline-3__xna_imputer__copy',
'p__pipeline-3__xna_imputer__fill_value',
'p__pipeline-3__xna_imputer__missing_values',
'p__pipeline-3__xna_imputer__strategy', 'p__pipeline-3__xna_imputer__verbose',
'p__pipeline-3__formatter__accept_sparse',
'p__pipeline-3__formatter__check_inverse', 'p__pipeline-3__formatter__func',
'p__pipeline-3__formatter__inv_kw_args',
'p__pipeline-3__formatter__inverse_func', 'p__pipeline-3__formatter__kw_args',
'p__pipeline-3__formatter__validate', 'p__pipeline-3__encoder__categories',
'p__pipeline-3__encoder__drop', 'p__pipeline-3__encoder__dtype',
'p__pipeline-3__encoder__handle_unknown', 'p__pipeline-3__encoder__sparse',
'm__boosting_type', 'm__class_weight', 'm__colsample_bytree',
'm__importance_type', 'm__learning_rate', 'm__max_depth',
'm__min_child_samples', 'm__min_child_weight', 'm__min_split_gain',
'm__n_estimators', 'm__n_jobs', 'm__num_leaves', 'm__objective',
'm__random_state', 'm__reg_alpha', 'm__reg_lambda', 'm__silent', 'm__subsample',
'm__subsample_for_bin', 'm__subsample_freq'])
```

[ ]:
```
np.linspace(50, 1000, 20)
```

[ ]:
```
array([  50.,  100.,  150.,  200.,  250.,  300.,  350.,  400.,  450.,
        500.,  550.,  600.,  650.,  700.,  750.,  800.,  850.,  900.,
        950., 1000.])
```

[ ]:
```
# hyper optimisation (randomized search / hyperopt?)
# (lien vers hyperopt : https://www.kaggle.com/shishu1421/
 ↪lightgbm-using-hyperopt)
# calcul seuil de décision basé sur coût crédit
```

```
# Commencer la partie Flask
# Streamlit (pour la partie dashboard web [https://streamlit.io/])
```

9 2021-10-04 : LightGBM - Optimisation des hyper-paramètres

[ ]:
```
# Importations
import sys
sys.path.append('..')

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from preprocessing import preprocessor
from sklearn.model_selection import train_test_split
from imblearn.under_sampling import RandomUnderSampler
from imblearn.pipeline import Pipeline
from lightgbm import LGBMClassifier
from modelling_funcs import model_eval
from sklearn.metrics import recall_score, precision_score

from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
```

[ ]:
```
# Initialisation
train = pd.read_csv('../02_data/application_train.csv', index_col=0)
#test = pd.read_csv('../02_data/application_test.csv')

print('Training set dimensions :', train.shape)
df = train.copy()

cls_size = df.TARGET.value_counts()
cls_freq = df.TARGET.value_counts(normalize=True)
print(pd.DataFrame({'size': cls_size,
                    'freq': cls_freq.apply(lambda x: '%.2f' % x)}))
```

```
Training set dimensions : (307511, 121)
     size  freq
0  282686  0.92
1   24825  0.08
```

[ ]:
```
# Définition du modèle de base, à optimiser
r = 42
undersampler = RandomUnderSampler(random_state=r)

baseline_model = Pipeline([('u', undersampler),
                           ('p', preprocessor),
```

```
                              ('light_gbm', LGBMClassifier(random_state=r))])
```

[ ]:
```
# Séparation du jeu de données entre entraînement et évaluation

X_train, X_test, y_train, y_test = train_test_split(df.iloc[:,1:], df.iloc[:,0],
                                                    test_size=.2,
                                                    random_state=r)
```

[ ]:
```
model_eval(baseline_model.fit(X_train, y_train), X_test, y_test)
```

```
[[39135 17419]
 [ 1568  3381]]
              precision    recall  f1-score   support

           0       0.96      0.69      0.80     56554
           1       0.16      0.68      0.26      4949

    accuracy                           0.69     61503
   macro avg       0.56      0.69      0.53     61503
weighted avg       0.90      0.69      0.76     61503

'model_eval': successfully processed in 0h00m01.730331s.
```

Objectif : une précision de 50 % et un recall de 70 % pour la classe 1 après une 1ère optimisation des paramètres Une fois l'objectif atteint, optimisation du seuil précision/recall pour maximiser les profits de l'organisme de crédit

[ ]:
```
from scipy.stats import uniform as sp_uniform

params = {'light_gbm__n_estimators': np.linspace(200, 500, 20, dtype=int),
          'light_gbm__num_leaves': np.linspace(10, 20, 10, dtype=int),
          'light_gbm__min_child_samples': np.linspace(80, 200, 50, dtype=int),
          'light_gbm__min_child_weight': np.logspace(2, 3, 10),
          'light_gbm__subsample': [sp_uniform.rvs(loc=0.2, scale=0.8)],
          'light_gbm__colsample_bytree': [sp_uniform.rvs(loc=0.4, scale=0.6)],
          'light_gbm__reg_alpha': np.logspace(1, 3, 10, dtype=int),
          'light_gbm__reg_lambda': np.logspace(1, 4, 10, dtype=int)}

n_iter = 100
param_dims = []
for param in params.values():
    param_dims.append(len(param))
print(n_iter, 'combinations to test out of', np.product(param_dims),\
      'possibilities.')
```

```
100 combinations to test out of 10000000 possibilities.
```

[ ]:
```
random_search = RandomizedSearchCV(baseline_model, params, n_iter=n_iter,
                                   scoring='recall', cv=5, verbose=True)
random_search.fit(X_train, y_train)
print(random_search.best_params_)
```

```
Fitting 5 folds for each of 10 candidates, totalling 50 fits
{'light_gbm__subsample': 0.6887496542742017, 'light_gbm__reg_lambda': 100,
'light_gbm__reg_alpha': 50, 'light_gbm__num_leaves': 15,
'light_gbm__min_child_weight': 599.4842503189421,
'light_gbm__min_child_samples': 108, 'light_gbm__colsample_bytree':
0.8903545495686556}
```

[ ]:
```
print(random_search.param_distributions)
```

```
{'light_gbm__num_leaves': array([ 5, 10, 15, 20, 25, 30]),
'light_gbm__min_child_samples': array([100, 104, 108, 112, 116, 120, 124, 128,
132, 136, 140, 144, 148,
       152, 156, 160, 164, 168, 172, 176, 180, 184, 188, 192, 196, 201,
       205, 209, 213, 217, 221, 225, 229, 233, 237, 241, 245, 249, 253,
       257, 261, 265, 269, 273, 277, 281, 285, 289, 293, 297, 302, 306,
       310, 314, 318, 322, 326, 330, 334, 338, 342, 346, 350, 354, 358,
       362, 366, 370, 374, 378, 382, 386, 390, 394, 398, 403, 407, 411,
       415, 419, 423, 427, 431, 435, 439, 443, 447, 451, 455, 459, 463,
       467, 471, 475, 479, 483, 487, 491, 495, 500]),
'light_gbm__min_child_weight': array([1.00000000e-05, 1.29154967e-04,
1.66810054e-03, 2.15443469e-02,
       2.78255940e-01, 3.59381366e+00, 4.64158883e+01, 5.99484250e+02,
       7.74263683e+03, 1.00000000e+05]), 'light_gbm__subsample':
[0.6887496542742017], 'light_gbm__colsample_bytree': [0.8903545495686556],
'light_gbm__reg_alpha': [0, 0.1, 1, 2, 5, 7, 10, 50, 100],
'light_gbm__reg_lambda': [0, 0.1, 1, 5, 10, 20, 50, 100]}
```

[ ]:
```
random_search = RandomizedSearchCV(baseline_model, params, n_iter=n_iter,
                                   scoring='recall', cv=5, verbose=10)
random_search.fit(X_train, y_train)
print(random_search.best_params_)
```

```
Fitting 5 folds for each of 100 candidates, totalling 500 fits
[CV 1/5; 1/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 1/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=  20.2s
```

```
[CV 2/5; 1/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 1/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   6.3s
[CV 3/5; 1/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 1/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   6.7s
[CV 4/5; 1/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 1/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.694 total time=   6.3s
[CV 5/5; 1/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 1/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=124,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=452,
light_gbm__num_leaves=12, light_gbm__reg_alpha=46, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.670 total time=   6.2s
[CV 1/5; 2/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 2/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
```

```
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.689 total time=   6.7s
[CV 2/5; 2/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 2/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   6.7s
[CV 3/5; 2/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 2/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   6.9s
[CV 4/5; 2/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 2/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   6.8s
[CV 5/5; 2/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 2/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=389,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.672 total time=   6.8s
[CV 1/5; 3/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 1/5; 3/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
```

```
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   5.8s
[CV 2/5; 3/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 3/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   5.8s
[CV 3/5; 3/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 3/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.678 total time=   5.9s
[CV 4/5; 3/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 3/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.686 total time=   5.4s
[CV 5/5; 3/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 3/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   5.8s
[CV 1/5; 4/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 4/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
```

```
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   5.8s
[CV 2/5; 4/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 4/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.4s
[CV 3/5; 4/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 4/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.669 total time=   5.8s
[CV 4/5; 4/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 4/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.664 total time=   5.8s
[CV 5/5; 4/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 4/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=359, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.659 total time=   5.4s
[CV 1/5; 5/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487
[CV 1/5; 5/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
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light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   6.3s
[CV 2/5; 5/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487
[CV 2/5; 5/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   6.4s
[CV 3/5; 5/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487
[CV 3/5; 5/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487;, score=0.675
total time=   6.2s
[CV 4/5; 5/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487
[CV 4/5; 5/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   6.1s
[CV 5/5; 5/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487
[CV 5/5; 5/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=389, light_gbm__num_leaves=20, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=215, light_gbm__subsample=0.7981160065359487;, score=0.673
total time=   6.1s
[CV 1/5; 6/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 1/5; 6/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=  24.7s
[CV 2/5; 6/100] START light_gbm__colsample_bytree=0.8736655622105718,
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light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 2/5; 6/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   6.1s
[CV 3/5; 6/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 3/5; 6/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   6.0s
[CV 4/5; 6/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 4/5; 6/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   6.0s
[CV 5/5; 6/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 5/5; 6/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.670 total time=   6.1s
[CV 1/5; 7/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 7/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.3s
[CV 2/5; 7/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
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light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 7/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   5.5s
[CV 3/5; 7/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 7/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   5.5s
[CV 4/5; 7/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 7/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.4s
[CV 5/5; 7/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 7/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=231,
light_gbm__num_leaves=14, light_gbm__reg_alpha=129, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.665 total time=   5.5s
[CV 1/5; 8/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 8/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   5.2s
[CV 2/5; 8/100] START light_gbm__colsample_bytree=0.8736655622105718,
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light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 8/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.654 total time=   5.1s
[CV 3/5; 8/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 8/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.629 total time=   5.1s
[CV 4/5; 8/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 8/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.671 total time=   5.1s
[CV 5/5; 8/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 8/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=160, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=11,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.623 total time=   5.1s
[CV 1/5; 9/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 1/5; 9/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   6.0s
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[CV 2/5; 9/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 2/5; 9/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   6.3s
[CV 3/5; 9/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 3/5; 9/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.678
total time=   6.1s
[CV 4/5; 9/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 4/5; 9/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.688
total time=   6.3s
[CV 5/5; 9/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 5/5; 9/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.672
total time=   6.3s
[CV 1/5; 10/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 10/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   6.4s
[CV 2/5; 10/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
```

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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 10/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   6.3s
[CV 3/5; 10/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 10/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   6.0s
[CV 4/5; 10/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 10/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.691 total time=   6.4s
[CV 5/5; 10/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 10/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=294,
light_gbm__num_leaves=17, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   6.0s
[CV 1/5; 11/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 11/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   5.0s
[CV 2/5; 11/100] START light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 11/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   5.1s
[CV 3/5; 11/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 11/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.671
total time=   5.0s
[CV 4/5; 11/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 11/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.670
total time=   5.1s
[CV 5/5; 11/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 11/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.649
total time=   5.0s
[CV 1/5; 12/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 12/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.693
total time=   5.8s
[CV 2/5; 12/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
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[CV 2/5; 12/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   6.0s
[CV 3/5; 12/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 12/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.678
total time=   5.8s
[CV 4/5; 12/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 12/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.692
total time=   6.0s
[CV 5/5; 12/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 12/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=468, light_gbm__num_leaves=20, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.672
total time=   5.8s
[CV 1/5; 13/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 1/5; 13/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   6.5s
[CV 2/5; 13/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 2/5; 13/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
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light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   6.9s
[CV 3/5; 13/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 3/5; 13/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   6.5s
[CV 4/5; 13/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 4/5; 13/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   6.4s
[CV 5/5; 13/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 5/5; 13/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=373, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.680
total time=   6.3s
[CV 1/5; 14/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 14/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   5.4s
[CV 2/5; 14/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 14/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.705
total time=   5.2s
[CV 3/5; 14/100] START light_gbm__colsample_bytree=0.8736655622105718,
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light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 14/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   5.2s
[CV 4/5; 14/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 14/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.667
total time=   5.2s
[CV 5/5; 14/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 14/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.695
total time=   5.2s
[CV 1/5; 15/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 1/5; 15/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.689
total time=   5.4s
[CV 2/5; 15/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 2/5; 15/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.685
total time=   5.4s
[CV 3/5; 15/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
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[CV 3/5; 15/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   5.4s
[CV 4/5; 15/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 4/5; 15/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   5.4s
[CV 5/5; 15/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 5/5; 15/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=200, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.675
total time=   5.4s
[CV 1/5; 16/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 1/5; 16/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   6.0s
[CV 2/5; 16/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 2/5; 16/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   5.7s
[CV 3/5; 16/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 3/5; 16/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
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light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.8s
[CV 4/5; 16/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 4/5; 16/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   5.9s
[CV 5/5; 16/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 5/5; 16/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=389, light_gbm__num_leaves=18, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   5.7s
[CV 1/5; 17/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 17/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   5.2s
[CV 2/5; 17/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 17/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.680 total time=   5.2s
[CV 3/5; 17/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 17/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
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light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.671 total time=   5.2s
[CV 4/5; 17/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 17/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.3s
[CV 5/5; 17/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 17/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=231,
light_gbm__num_leaves=18, light_gbm__reg_alpha=215, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.661 total time=   5.2s
[CV 1/5; 18/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 18/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.686 total time=   5.8s
[CV 2/5; 18/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 18/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.7s
[CV 3/5; 18/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 18/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.8s
[CV 4/5; 18/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 18/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.693 total time=   5.8s
[CV 5/5; 18/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 18/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=247,
light_gbm__num_leaves=10, light_gbm__reg_alpha=16, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   5.8s
[CV 1/5; 19/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 19/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.672
total time=   5.2s
[CV 2/5; 19/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 19/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   5.2s
[CV 3/5; 19/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 19/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
```

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light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.665
total time=   5.1s
[CV 4/5; 19/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 19/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.667
total time=   5.1s
[CV 5/5; 19/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 19/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.655
total time=   5.1s
[CV 1/5; 20/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 1/5; 20/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   6.6s
[CV 2/5; 20/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 20/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.681 total time=   7.1s
[CV 3/5; 20/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 20/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.680 total time=   6.8s
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[CV 4/5; 20/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 20/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.688 total time=   7.2s
[CV 5/5; 20/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 20/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.672 total time=   7.2s
[CV 1/5; 21/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 21/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.678 total time=   6.4s
[CV 2/5; 21/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 21/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.677 total time=   6.1s
[CV 3/5; 21/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 21/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.670 total time=   6.0s
[CV 4/5; 21/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
```

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light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 21/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.677 total time=   6.3s
[CV 5/5; 21/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 21/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=20, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.662 total time=   6.4s
[CV 1/5; 22/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 22/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.673
total time=   5.2s
[CV 2/5; 22/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 22/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.672
total time=   5.2s
[CV 3/5; 22/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 22/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.668
total time=   5.3s
[CV 4/5; 22/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 22/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
```

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light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.665
total time=   5.1s
[CV 5/5; 22/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 22/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=294, light_gbm__num_leaves=10, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.657
total time=   5.1s
[CV 1/5; 23/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 23/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   5.4s
[CV 2/5; 23/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 23/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   5.4s
[CV 3/5; 23/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 23/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   5.4s
[CV 4/5; 23/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 23/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   5.4s
```

```
[CV 5/5; 23/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 23/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=278, light_gbm__num_leaves=11, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   5.4s
[CV 1/5; 24/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 24/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   5.2s
[CV 2/5; 24/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 24/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   5.2s
[CV 3/5; 24/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 24/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   5.1s
[CV 4/5; 24/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 24/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.1s
[CV 5/5; 24/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
```

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light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 24/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=104, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=215, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.662
total time=   5.2s
[CV 1/5; 25/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 25/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.677 total time=   5.7s
[CV 2/5; 25/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 25/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.681 total time=   5.6s
[CV 3/5; 25/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 25/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   5.5s
[CV 4/5; 25/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 25/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.679 total time=   5.7s
[CV 5/5; 25/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 25/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=100.0,
```

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light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.663 total time=   5.6s
[CV 1/5; 26/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 26/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   6.2s
[CV 2/5; 26/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 26/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   6.1s
[CV 3/5; 26/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 26/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   6.3s
[CV 4/5; 26/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 26/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   6.1s
[CV 5/5; 26/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
```

```
[CV 5/5; 26/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=10, light_gbm__reg_alpha=77, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.662 total time=   6.1s
[CV 1/5; 27/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 27/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.659 total time=   5.3s
[CV 2/5; 27/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 27/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.615 total time=   5.3s
[CV 3/5; 27/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 27/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.611 total time=   5.3s
[CV 4/5; 27/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 27/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.583 total time=   5.2s
[CV 5/5; 27/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
```

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light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 27/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.656 total time=   5.3s
[CV 1/5; 28/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 28/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.688 total time=   5.1s
[CV 2/5; 28/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 28/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.687 total time=   5.2s
[CV 3/5; 28/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 28/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.627 total time=   5.0s
[CV 4/5; 28/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 28/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.646 total time=   5.1s
[CV 5/5; 28/100] START light_gbm__colsample_bytree=0.8736655622105718,
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light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 28/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=200, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.658 total time=   5.1s
[CV 1/5; 29/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 29/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.687 total time=   6.1s
[CV 2/5; 29/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 29/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   6.3s
[CV 3/5; 29/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 29/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   6.2s
[CV 4/5; 29/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 29/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
```

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light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   6.4s
[CV 5/5; 29/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 29/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=14, light_gbm__reg_alpha=16, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.662 total time=   6.5s
[CV 1/5; 30/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 30/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.692
total time=   6.4s
[CV 2/5; 30/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 30/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   6.5s
[CV 3/5; 30/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 30/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   6.2s
[CV 4/5; 30/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 30/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   6.4s
[CV 5/5; 30/100] START light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 30/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=185, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   6.4s
[CV 1/5; 31/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 31/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.671 total time=   5.3s
[CV 2/5; 31/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 31/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.691 total time=   5.4s
[CV 3/5; 31/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 31/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.662 total time=   5.3s
[CV 4/5; 31/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 31/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.665 total time=   5.4s
```

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[CV 5/5; 31/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 31/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=468,
light_gbm__num_leaves=20, light_gbm__reg_alpha=599, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.653 total time=   5.3s
[CV 1/5; 32/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 32/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.688 total time=   6.2s
[CV 2/5; 32/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 32/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   6.3s
[CV 3/5; 32/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 32/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.679 total time=   6.2s
[CV 4/5; 32/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 32/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
```

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light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.689 total time=   6.2s
[CV 5/5; 32/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 32/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=357,
light_gbm__num_leaves=14, light_gbm__reg_alpha=27, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.671 total time=   6.5s
[CV 1/5; 33/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 33/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   6.2s
[CV 2/5; 33/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 33/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   6.2s
[CV 3/5; 33/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 33/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   6.7s
[CV 4/5; 33/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 33/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   6.6s
[CV 5/5; 33/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 33/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=484,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.663 total time=   6.3s
[CV 1/5; 34/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 34/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.692 total time=   6.2s
[CV 2/5; 34/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 34/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   6.3s
[CV 3/5; 34/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 34/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   5.9s
[CV 4/5; 34/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
```

```
light_gbm__subsample=0.7981160065359487
[CV 4/5; 34/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.692 total time=   6.3s
[CV 5/5; 34/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 34/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=116,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=373,
light_gbm__num_leaves=15, light_gbm__reg_alpha=46, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   6.0s
[CV 1/5; 35/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 35/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.668 total time=   5.3s
[CV 2/5; 35/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 35/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   5.3s
[CV 3/5; 35/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 35/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.670 total time=   5.2s
[CV 4/5; 35/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
```

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light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 35/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   5.1s
[CV 5/5; 35/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 35/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=357,
light_gbm__num_leaves=12, light_gbm__reg_alpha=599, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.651 total time=   5.2s
[CV 1/5; 36/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 36/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.668
total time=   5.0s
[CV 2/5; 36/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 36/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   5.2s
[CV 3/5; 36/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 36/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.670
total time=   5.1s
[CV 4/5; 36/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
```

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light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 36/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.669
total time=   5.1s
[CV 5/5; 36/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 36/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=231, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.669
total time=   5.1s
[CV 1/5; 37/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 37/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   6.0s
[CV 2/5; 37/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 37/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   5.9s
[CV 3/5; 37/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 37/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   6.0s
[CV 4/5; 37/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 37/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
```

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light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   6.0s
[CV 5/5; 37/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 37/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=158, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.672 total time=   5.9s
[CV 1/5; 38/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 38/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.688
total time=   6.4s
[CV 2/5; 38/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 38/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   6.3s
[CV 3/5; 38/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 38/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.680
total time=   6.4s
[CV 4/5; 38/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 38/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   6.4s
```

```
[CV 5/5; 38/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 38/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=80, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=357, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   6.3s
[CV 1/5; 39/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 1/5; 39/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   5.9s
[CV 2/5; 39/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 39/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.686 total time=   6.0s
[CV 3/5; 39/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 39/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.681 total time=   6.2s
[CV 4/5; 39/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 39/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   6.2s
[CV 5/5; 39/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
```

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light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 39/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.676 total time=   6.4s
[CV 1/5; 40/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 40/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.695
total time=   6.2s
[CV 2/5; 40/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 40/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   6.1s
[CV 3/5; 40/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 40/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   6.1s
[CV 4/5; 40/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 40/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   6.3s
[CV 5/5; 40/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 40/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=774.263682681127,
```

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light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.675
total time=   6.3s
[CV 1/5; 41/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 41/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   5.7s
[CV 2/5; 41/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 41/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   5.9s
[CV 3/5; 41/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 41/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   5.6s
[CV 4/5; 41/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 41/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.692
total time=   5.6s
[CV 5/5; 41/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 41/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=94, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.673
total time=   5.9s
```

```
[CV 1/5; 42/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 1/5; 42/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.669 total time=   5.0s
[CV 2/5; 42/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 2/5; 42/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.675 total time=   5.3s
[CV 3/5; 42/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 3/5; 42/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.657 total time=   5.2s
[CV 4/5; 42/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 4/5; 42/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.654 total time=   5.2s
[CV 5/5; 42/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 5/5; 42/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=263, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.648 total time=   5.0s
[CV 1/5; 43/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
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light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 43/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   5.9s
[CV 2/5; 43/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 43/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.680 total time=   6.0s
[CV 3/5; 43/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 43/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.677 total time=   6.4s
[CV 4/5; 43/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 43/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.688 total time=   5.8s
[CV 5/5; 43/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 43/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=92, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.666 total time=   5.9s
[CV 1/5; 44/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 44/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   5.5s
[CV 2/5; 44/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 44/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   5.6s
[CV 3/5; 44/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 44/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.673 total time=   5.6s
[CV 4/5; 44/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 44/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.673 total time=   5.5s
[CV 5/5; 44/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 44/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=170,
light_gbm__min_child_weight=359.38136638046257, light_gbm__n_estimators=500,
light_gbm__num_leaves=18, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.666 total time=   5.4s
[CV 1/5; 45/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
```

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light_gbm__subsample=0.7981160065359487
[CV 1/5; 45/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.722 total time=   5.0s
[CV 2/5; 45/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 45/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.715 total time=   5.0s
[CV 3/5; 45/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 45/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   4.9s
[CV 4/5; 45/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 45/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.663 total time=   4.9s
[CV 5/5; 45/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 45/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=200, light_gbm__num_leaves=10,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.607 total time=   5.0s
[CV 1/5; 46/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
```

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light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 46/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.676 total time=   5.2s
[CV 2/5; 46/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 46/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.1s
[CV 3/5; 46/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 46/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   5.0s
[CV 4/5; 46/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 46/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   5.0s
[CV 5/5; 46/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 46/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=263,
light_gbm__num_leaves=14, light_gbm__reg_alpha=359, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.669 total time=   5.1s
```

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[CV 1/5; 47/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 1/5; 47/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=   6.1s
[CV 2/5; 47/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 47/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.686 total time=   5.9s
[CV 3/5; 47/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 47/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.680 total time=   6.1s
[CV 4/5; 47/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 47/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   6.0s
[CV 5/5; 47/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 47/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=326, light_gbm__num_leaves=14, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.667 total time=   6.1s
[CV 1/5; 48/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
```

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light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 1/5; 48/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   5.6s
[CV 2/5; 48/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 48/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   5.6s
[CV 3/5; 48/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 48/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.679 total time=   5.7s
[CV 4/5; 48/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 48/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   5.6s
[CV 5/5; 48/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 48/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=359.38136638046257,
light_gbm__n_estimators=294, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.668 total time=   5.0s
[CV 1/5; 49/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 49/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   4.5s
[CV 2/5; 49/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 49/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.680 total time=   4.5s
[CV 3/5; 49/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 49/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   4.5s
[CV 4/5; 49/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 49/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   4.5s
[CV 5/5; 49/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 49/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=215,
light_gbm__num_leaves=10, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   4.4s
[CV 1/5; 50/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
```

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[CV 1/5; 50/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=   4.9s
[CV 2/5; 50/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 2/5; 50/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.688 total time=   5.0s
[CV 3/5; 50/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 3/5; 50/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.679 total time=   5.0s
[CV 4/5; 50/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 4/5; 50/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.688 total time=   5.1s
[CV 5/5; 50/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487
[CV 5/5; 50/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=99, light_gbm__min_child_weight=215.44346900318845,
light_gbm__n_estimators=373, light_gbm__num_leaves=10, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=4641, light_gbm__subsample=0.7981160065359487;,
score=0.669 total time=   5.1s
[CV 1/5; 51/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 51/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.648 total time=   4.3s
[CV 2/5; 51/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 51/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.655 total time=   4.3s
[CV 3/5; 51/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 51/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.630 total time=   4.2s
[CV 4/5; 51/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 51/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.625 total time=   4.3s
[CV 5/5; 51/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 51/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=310,
light_gbm__num_leaves=15, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.627 total time=   4.4s
[CV 1/5; 52/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
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[CV 1/5; 52/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   4.5s
[CV 2/5; 52/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 52/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.5s
[CV 3/5; 52/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 52/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   4.5s
[CV 4/5; 52/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 52/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.687 total time=   4.5s
[CV 5/5; 52/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 52/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=389,
light_gbm__num_leaves=10, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.665 total time=   4.4s
[CV 1/5; 53/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
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light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 53/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   4.1s
[CV 2/5; 53/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 53/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   4.2s
[CV 3/5; 53/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 53/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.671
total time=   4.2s
[CV 4/5; 53/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 53/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   4.1s
[CV 5/5; 53/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 53/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=231, light_gbm__num_leaves=16, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.651
total time=   4.1s
[CV 1/5; 54/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 54/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
```

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light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   4.5s
[CV 2/5; 54/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 54/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.680
total time=   4.5s
[CV 3/5; 54/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 54/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   4.5s
[CV 4/5; 54/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 54/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   4.5s
[CV 5/5; 54/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 54/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=263, light_gbm__num_leaves=12, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   4.6s
[CV 1/5; 55/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 55/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
```

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light_gbm__subsample=0.7981160065359487;, score=0.695 total time=   5.0s
[CV 2/5; 55/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 55/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.0s
[CV 3/5; 55/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 55/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   5.4s
[CV 4/5; 55/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 55/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.692 total time=   5.1s
[CV 5/5; 55/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 55/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=143,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=326,
light_gbm__num_leaves=15, light_gbm__reg_alpha=10, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   5.1s
[CV 1/5; 56/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 56/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
```

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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   4.4s
[CV 2/5; 56/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 56/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   4.4s
[CV 3/5; 56/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 56/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.669 total time=   4.4s
[CV 4/5; 56/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 56/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   4.4s
[CV 5/5; 56/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 56/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=14, light_gbm__reg_alpha=215, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.669 total time=   4.4s
[CV 1/5; 57/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
```

```
[CV 1/5; 57/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.692 total time=   4.8s
[CV 2/5; 57/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 57/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.8s
[CV 3/5; 57/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 57/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   4.8s
[CV 4/5; 57/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 57/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   4.9s
[CV 5/5; 57/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 57/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=278,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.672 total time=   4.9s
[CV 1/5; 58/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
```

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light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 58/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   5.8s
[CV 2/5; 58/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 58/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   6.3s
[CV 3/5; 58/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 58/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.680 total time=   5.9s
[CV 4/5; 58/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 58/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   5.9s
[CV 5/5; 58/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 58/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=484, light_gbm__num_leaves=17, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   5.9s
[CV 1/5; 59/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 1/5; 59/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
```

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light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.687
total time=   4.6s
[CV 2/5; 59/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 2/5; 59/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   4.6s
[CV 3/5; 59/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 3/5; 59/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   4.5s
[CV 4/5; 59/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 4/5; 59/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.686
total time=   4.5s
[CV 5/5; 59/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 5/5; 59/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=84, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=500, light_gbm__num_leaves=14, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.670
total time=   4.7s
[CV 1/5; 60/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 60/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.686 total time=   4.5s
```

```
[CV 2/5; 60/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 60/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   4.6s
[CV 3/5; 60/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 60/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.677 total time=   4.6s
[CV 4/5; 60/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 60/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=   4.6s
[CV 5/5; 60/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 60/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=106, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=215, light_gbm__num_leaves=10, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.670 total time=   4.5s
[CV 1/5; 61/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 61/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.680
total time=   4.2s
[CV 2/5; 61/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
```

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light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 61/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   4.2s
[CV 3/5; 61/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 61/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.3s
[CV 4/5; 61/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 61/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.678
total time=   4.3s
[CV 5/5; 61/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 61/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=278, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.668
total time=   4.2s
[CV 1/5; 62/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 1/5; 62/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   5.2s
[CV 2/5; 62/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 2/5; 62/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
```

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light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.3s
[CV 3/5; 62/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 3/5; 62/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   5.7s
[CV 4/5; 62/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 4/5; 62/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   5.8s
[CV 5/5; 62/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 5/5; 62/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=109, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=373, light_gbm__num_leaves=18, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.5s
[CV 1/5; 63/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 63/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   4.6s
[CV 2/5; 63/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 63/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
```

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light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.4s
[CV 3/5; 63/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 63/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   4.5s
[CV 4/5; 63/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 63/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   4.6s
[CV 5/5; 63/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 63/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=151,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=278,
light_gbm__num_leaves=18, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.661 total time=   4.4s
[CV 1/5; 64/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 64/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.2s
[CV 2/5; 64/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 64/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.4s
[CV 3/5; 64/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 64/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   5.3s
[CV 4/5; 64/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 64/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.691 total time=   5.3s
[CV 5/5; 64/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 64/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=326,
light_gbm__num_leaves=16, light_gbm__reg_alpha=27, light_gbm__reg_lambda=21,
light_gbm__subsample=0.7981160065359487;, score=0.679 total time=   5.4s
[CV 1/5; 65/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 1/5; 65/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.676 total time=   4.6s
[CV 2/5; 65/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 2/5; 65/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

```
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   4.4s
[CV 3/5; 65/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 3/5; 65/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.674 total time=   4.5s
[CV 4/5; 65/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 4/5; 65/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.671 total time=   4.6s
[CV 5/5; 65/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 5/5; 65/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=153, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=16, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.666 total time=   4.4s
[CV 1/5; 66/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 66/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.688 total time=   5.1s
[CV 2/5; 66/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 66/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
```

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light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.2s
[CV 3/5; 66/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 66/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.678 total time=   5.2s
[CV 4/5; 66/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 66/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.688 total time=   5.1s
[CV 5/5; 66/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 66/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=102,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=310,
light_gbm__num_leaves=14, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   5.1s
[CV 1/5; 67/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 67/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   5.4s
[CV 2/5; 67/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
```

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[CV 2/5; 67/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.7s
[CV 3/5; 67/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 67/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   5.7s
[CV 4/5; 67/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 67/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.688 total time=   5.7s
[CV 5/5; 67/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 67/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=119,
light_gbm__min_child_weight=166.81005372000593, light_gbm__n_estimators=500,
light_gbm__num_leaves=11, light_gbm__reg_alpha=77, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   5.4s
[CV 1/5; 68/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 68/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.686
total time=   4.6s
[CV 2/5; 68/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
```

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[CV 2/5; 68/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.685
total time=   4.6s
[CV 3/5; 68/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 68/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.5s
[CV 4/5; 68/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 68/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   4.5s
[CV 5/5; 68/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 68/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=166.81005372000593,
light_gbm__n_estimators=342, light_gbm__num_leaves=15, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.668
total time=   4.6s
[CV 1/5; 69/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 69/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   4.3s
[CV 2/5; 69/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 69/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
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light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.685
total time=   4.3s
[CV 3/5; 69/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 69/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   4.3s
[CV 4/5; 69/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 69/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.688
total time=   4.3s
[CV 5/5; 69/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 69/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=247, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.670
total time=   4.3s
[CV 1/5; 70/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 70/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   4.6s
[CV 2/5; 70/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 70/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
```

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light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.6s
[CV 3/5; 70/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 70/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   4.5s
[CV 4/5; 70/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 70/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   4.7s
[CV 5/5; 70/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 70/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=436,
light_gbm__num_leaves=13, light_gbm__reg_alpha=129, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.659 total time=   4.6s
[CV 1/5; 71/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 71/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.689 total time=   4.6s
[CV 2/5; 71/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 71/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
```

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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   4.6s
[CV 3/5; 71/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 71/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.686 total time=   4.6s
[CV 4/5; 71/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 71/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.691 total time=   4.6s
[CV 5/5; 71/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 71/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=155,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=200,
light_gbm__num_leaves=12, light_gbm__reg_alpha=10, light_gbm__reg_lambda=10,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   4.6s
[CV 1/5; 72/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 72/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   4.6s
[CV 2/5; 72/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 72/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
```

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light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   4.7s
[CV 3/5; 72/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 72/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.678 total time=   4.7s
[CV 4/5; 72/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 72/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   4.7s
[CV 5/5; 72/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 72/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=421, light_gbm__num_leaves=17, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   4.7s
[CV 1/5; 73/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 73/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.693
total time=   4.7s
[CV 2/5; 73/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 73/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   4.9s
```

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[CV 3/5; 73/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 73/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.9s
[CV 4/5; 73/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 73/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   4.7s
[CV 5/5; 73/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 73/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=131, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=357, light_gbm__num_leaves=11, light_gbm__reg_alpha=46,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.674
total time=   4.8s
[CV 1/5; 74/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 74/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.685 total time=   4.5s
[CV 2/5; 74/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 74/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   4.6s
[CV 3/5; 74/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
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light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 74/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   4.5s
[CV 4/5; 74/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 74/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.682 total time=   4.5s
[CV 5/5; 74/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 74/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=310, light_gbm__num_leaves=11, light_gbm__reg_alpha=129,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.666 total time=   4.5s
[CV 1/5; 75/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 75/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   4.5s
[CV 2/5; 75/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 75/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.688
total time=   4.5s
[CV 3/5; 75/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 75/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
```

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light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.5s
[CV 4/5; 75/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 75/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.684
total time=   4.5s
[CV 5/5; 75/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 75/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=97, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=484, light_gbm__num_leaves=12, light_gbm__reg_alpha=215,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.668
total time=   4.5s
[CV 1/5; 76/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 76/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.692 total time=   5.3s
[CV 2/5; 76/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 76/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.4s
[CV 3/5; 76/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 76/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
```

```
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.2s
[CV 4/5; 76/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 76/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.691 total time=   5.4s
[CV 5/5; 76/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 76/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=405,
light_gbm__num_leaves=11, light_gbm__reg_alpha=27, light_gbm__reg_lambda=46,
light_gbm__subsample=0.7981160065359487;, score=0.676 total time=   5.4s
[CV 1/5; 77/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 77/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   6.0s
[CV 2/5; 77/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 77/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.678
total time=   6.0s
[CV 3/5; 77/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 77/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
```

```
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   5.8s
[CV 4/5; 77/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 77/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.695
total time=   6.0s
[CV 5/5; 77/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 77/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=190, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=452, light_gbm__num_leaves=15, light_gbm__reg_alpha=10,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   5.9s
[CV 1/5; 78/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 1/5; 78/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.688
total time=   4.9s
[CV 2/5; 78/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 2/5; 78/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.9s
[CV 3/5; 78/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 3/5; 78/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.9s
[CV 4/5; 78/100] START light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 4/5; 78/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.693
total time=   4.7s
[CV 5/5; 78/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487
[CV 5/5; 78/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=247, light_gbm__num_leaves=15, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=46, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   4.9s
[CV 1/5; 79/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 1/5; 79/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.694 total time=   5.0s
[CV 2/5; 79/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 2/5; 79/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   5.0s
[CV 3/5; 79/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 3/5; 79/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.680 total time=   4.9s
[CV 4/5; 79/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
```

```
[CV 4/5; 79/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.694 total time=   5.0s
[CV 5/5; 79/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 5/5; 79/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=82, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=389, light_gbm__num_leaves=10, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.668 total time=   5.0s
[CV 1/5; 80/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 80/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=   4.3s
[CV 2/5; 80/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 80/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.692 total time=   4.3s
[CV 3/5; 80/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 80/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   4.2s
[CV 4/5; 80/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 80/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
```

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light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.689 total time=   4.2s
[CV 5/5; 80/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 80/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=231, light_gbm__num_leaves=15, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.670 total time=   4.3s
[CV 1/5; 81/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 81/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.680 total time=   4.6s
[CV 2/5; 81/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 81/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.6s
[CV 3/5; 81/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 81/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   4.5s
[CV 4/5; 81/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 81/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
```

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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.686 total time=   4.6s
[CV 5/5; 81/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 81/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=357,
light_gbm__num_leaves=15, light_gbm__reg_alpha=129, light_gbm__reg_lambda=1000,
light_gbm__subsample=0.7981160065359487;, score=0.659 total time=   4.6s
[CV 1/5; 82/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 82/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   5.0s
[CV 2/5; 82/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 82/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.2s
[CV 3/5; 82/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 82/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   5.2s
[CV 4/5; 82/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 82/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.691
```

```
total time=   5.1s
[CV 5/5; 82/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 82/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=148, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=405, light_gbm__num_leaves=14, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.675
total time=   5.0s
[CV 1/5; 83/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 83/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   5.4s
[CV 2/5; 83/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 83/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.677 total time=   5.4s
[CV 3/5; 83/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 83/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.679 total time=   5.6s
[CV 4/5; 83/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 83/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
```

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light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.687 total time=   5.6s
[CV 5/5; 83/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 83/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=436,
light_gbm__num_leaves=16, light_gbm__reg_alpha=10, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.679 total time=   5.6s
[CV 1/5; 84/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 1/5; 84/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.687
total time=   5.3s
[CV 2/5; 84/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 2/5; 84/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   5.3s
[CV 3/5; 84/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 3/5; 84/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.678
total time=   5.3s
[CV 4/5; 84/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 4/5; 84/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.689
total time=   5.3s
```

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[CV 5/5; 84/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487
[CV 5/5; 84/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=89, light_gbm__min_child_weight=129.1549665014884,
light_gbm__n_estimators=326, light_gbm__num_leaves=18, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=21, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   5.5s
[CV 1/5; 85/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 85/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.667
total time=   4.4s
[CV 2/5; 85/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 85/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   4.5s
[CV 3/5; 85/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 85/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   4.5s
[CV 4/5; 85/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 85/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.659
total time=   4.4s
[CV 5/5; 85/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
```

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light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 85/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=774.263682681127,
light_gbm__n_estimators=452, light_gbm__num_leaves=17, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.645
total time=   4.5s
[CV 1/5; 86/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 86/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.659 total time=   4.1s
[CV 2/5; 86/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 86/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   4.2s
[CV 3/5; 86/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 86/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.672 total time=   4.1s
[CV 4/5; 86/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 86/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.674 total time=   4.1s
[CV 5/5; 86/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
```

```
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 86/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=197,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=200,
light_gbm__num_leaves=13, light_gbm__reg_alpha=599, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.657 total time=   4.1s
[CV 1/5; 87/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 87/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.0s
[CV 2/5; 87/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 87/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   5.0s
[CV 3/5; 87/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 87/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.676 total time=   4.8s
[CV 4/5; 87/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 87/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   5.1s
```

```
[CV 5/5; 87/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 87/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=195,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=421,
light_gbm__num_leaves=17, light_gbm__reg_alpha=27, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.663 total time=   5.1s
[CV 1/5; 88/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 1/5; 88/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.696
total time=   4.5s
[CV 2/5; 88/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 2/5; 88/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   4.5s
[CV 3/5; 88/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 3/5; 88/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   4.4s
[CV 4/5; 88/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 4/5; 88/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   4.5s
[CV 5/5; 88/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
```

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light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487
[CV 5/5; 88/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=141, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=215, light_gbm__num_leaves=13, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=10, light_gbm__subsample=0.7981160065359487;, score=0.672
total time=   4.5s
[CV 1/5; 89/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 89/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.694
total time=   4.6s
[CV 2/5; 89/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 89/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   4.5s
[CV 3/5; 89/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 89/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.679
total time=   4.5s
[CV 4/5; 89/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 89/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.690
total time=   4.5s
[CV 5/5; 89/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 89/100] END light_gbm__colsample_bytree=0.8736655622105718,
```

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light_gbm__min_child_samples=177, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=310, light_gbm__num_leaves=18, light_gbm__reg_alpha=77,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.670
total time=   4.6s
[CV 1/5; 90/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 90/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   4.3s
[CV 2/5; 90/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 90/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.687 total time=   4.4s
[CV 3/5; 90/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 90/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.627 total time=   4.4s
[CV 4/5; 90/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 90/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.646 total time=   4.3s
[CV 5/5; 90/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
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light_gbm__subsample=0.7981160065359487
[CV 5/5; 90/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=87, light_gbm__min_child_weight=464.15888336127773,
light_gbm__n_estimators=357, light_gbm__num_leaves=12,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.633 total time=   4.4s
[CV 1/5; 91/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 91/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.690 total time=   5.0s
[CV 2/5; 91/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 91/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.686 total time=   5.0s
[CV 3/5; 91/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 91/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.678 total time=   5.1s
[CV 4/5; 91/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 91/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.692 total time=   5.2s
[CV 5/5; 91/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 91/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=182, light_gbm__min_child_weight=278.2559402207126,
```

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light_gbm__n_estimators=342, light_gbm__num_leaves=11, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=1000, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   5.1s
[CV 1/5; 92/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 1/5; 92/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   4.4s
[CV 2/5; 92/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 2/5; 92/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.686
total time=   4.5s
[CV 3/5; 92/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 3/5; 92/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.682
total time=   4.4s
[CV 4/5; 92/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 4/5; 92/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.667
total time=   4.3s
[CV 5/5; 92/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487
[CV 5/5; 92/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=192, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=436, light_gbm__num_leaves=14, light_gbm__reg_alpha=359,
light_gbm__reg_lambda=100, light_gbm__subsample=0.7981160065359487;, score=0.676
total time=   4.5s
```

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[CV 1/5; 93/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 93/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.722 total time=   4.5s
[CV 2/5; 93/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 93/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.694 total time=   4.4s
[CV 3/5; 93/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 93/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.610 total time=   4.5s
[CV 4/5; 93/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 93/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.664 total time=   4.4s
[CV 5/5; 93/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 93/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=133, light_gbm__min_child_weight=1000.0,
light_gbm__n_estimators=500, light_gbm__num_leaves=17,
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light_gbm__reg_alpha=1000, light_gbm__reg_lambda=464,
light_gbm__subsample=0.7981160065359487;, score=0.619 total time=   4.6s
[CV 1/5; 94/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 1/5; 94/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   4.8s
[CV 2/5; 94/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 2/5; 94/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.687 total time=   4.9s
[CV 3/5; 94/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 3/5; 94/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.673 total time=   5.1s
[CV 4/5; 94/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 4/5; 94/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.684 total time=   5.0s
[CV 5/5; 94/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487
[CV 5/5; 94/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=165, light_gbm__min_child_weight=599.4842503189409,
light_gbm__n_estimators=421, light_gbm__num_leaves=12, light_gbm__reg_alpha=16,
light_gbm__reg_lambda=10000, light_gbm__subsample=0.7981160065359487;,
score=0.668 total time=   5.1s
[CV 1/5; 95/100] START light_gbm__colsample_bytree=0.8736655622105718,
```

```
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 1/5; 95/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.670 total time=   4.5s
[CV 2/5; 95/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 2/5; 95/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.672 total time=   4.3s
[CV 3/5; 95/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 3/5; 95/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.660 total time=   4.3s
[CV 4/5; 95/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 4/5; 95/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.665 total time=   4.3s
[CV 5/5; 95/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487
[CV 5/5; 95/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=168, light_gbm__min_child_weight=100.0,
light_gbm__n_estimators=342, light_gbm__num_leaves=20, light_gbm__reg_alpha=599,
light_gbm__reg_lambda=2154, light_gbm__subsample=0.7981160065359487;,
score=0.644 total time=   4.3s
[CV 1/5; 96/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
```

```
light_gbm__subsample=0.7981160065359487
[CV 1/5; 96/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.4s
[CV 2/5; 96/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 96/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.2s
[CV 3/5; 96/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 96/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   5.2s
[CV 4/5; 96/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 96/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.684 total time=   5.4s
[CV 5/5; 96/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 96/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=187,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=468,
light_gbm__num_leaves=17, light_gbm__reg_alpha=129, light_gbm__reg_lambda=10000,
light_gbm__subsample=0.7981160065359487;, score=0.664 total time=   5.4s
[CV 1/5; 97/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
```

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light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 97/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.682 total time=   4.3s
[CV 2/5; 97/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 97/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.655 total time=   4.4s
[CV 3/5; 97/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 97/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.624 total time=   4.3s
[CV 4/5; 97/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 97/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.634 total time=   4.3s
[CV 5/5; 97/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 97/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=138,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=405,
light_gbm__num_leaves=12, light_gbm__reg_alpha=1000, light_gbm__reg_lambda=100,
light_gbm__subsample=0.7981160065359487;, score=0.652 total time=   4.4s
```

```
[CV 1/5; 98/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 98/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.675 total time=   4.4s
[CV 2/5; 98/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 98/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.683 total time=   4.4s
[CV 3/5; 98/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 98/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.670 total time=   4.3s
[CV 4/5; 98/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 98/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.672 total time=   4.5s
[CV 5/5; 98/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 98/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=146,
light_gbm__min_child_weight=215.44346900318845, light_gbm__n_estimators=278,
```

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light_gbm__num_leaves=17, light_gbm__reg_alpha=359, light_gbm__reg_lambda=4641,
light_gbm__subsample=0.7981160065359487;, score=0.667 total time=   4.4s
[CV 1/5; 99/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 1/5; 99/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.686
total time=   5.3s
[CV 2/5; 99/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 2/5; 99/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.683
total time=   5.6s
[CV 3/5; 99/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 3/5; 99/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.681
total time=   5.7s
[CV 4/5; 99/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 4/5; 99/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.691
total time=   5.7s
[CV 5/5; 99/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487
[CV 5/5; 99/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=111, light_gbm__min_child_weight=278.2559402207126,
light_gbm__n_estimators=484, light_gbm__num_leaves=18, light_gbm__reg_alpha=27,
light_gbm__reg_lambda=464, light_gbm__subsample=0.7981160065359487;, score=0.677
total time=   6.1s
[CV 1/5; 100/100] START light_gbm__colsample_bytree=0.8736655622105718,
```

```
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 1/5; 100/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.690 total time=   4.9s
[CV 2/5; 100/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 2/5; 100/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.681 total time=   5.0s
[CV 3/5; 100/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 3/5; 100/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.685 total time=   4.9s
[CV 4/5; 100/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 4/5; 100/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487;, score=0.694 total time=   4.9s
[CV 5/5; 100/100] START light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
light_gbm__subsample=0.7981160065359487
[CV 5/5; 100/100] END light_gbm__colsample_bytree=0.8736655622105718,
light_gbm__min_child_samples=175,
light_gbm__min_child_weight=464.15888336127773, light_gbm__n_estimators=310,
light_gbm__num_leaves=13, light_gbm__reg_alpha=16, light_gbm__reg_lambda=215,
```

```
light_gbm__subsample=0.7981160065359487;, score=0.676 total time=   5.0s
{'light_gbm__subsample': 0.7981160065359487, 'light_gbm__reg_lambda': 21,
'light_gbm__reg_alpha': 16, 'light_gbm__num_leaves': 12,
'light_gbm__n_estimators': 373, 'light_gbm__min_child_weight': 100.0,
'light_gbm__min_child_samples': 80, 'light_gbm__colsample_bytree':
0.8736655622105718}
```

[ ]:
```
best_model = random_search.best_estimator_
model_eval(best_model, X_test, y_test)
```

```
[[39385 17169]
 [ 1559  3390]]
              precision    recall  f1-score   support

           0       0.96      0.70      0.81     56554
           1       0.16      0.68      0.27      4949

    accuracy                           0.70     61503
   macro avg       0.56      0.69      0.54     61503
weighted avg       0.90      0.70      0.76     61503

'model_eval': successfully processed in 0h00m17.575815s.
```

[ ]:
```
best_model['light_gbm'].get_params()
```

[ ]:
```
{'boosting_type': 'gbdt',
 'class_weight': None,
 'colsample_bytree': 0.8736655622105718,
 'importance_type': 'split',
 'learning_rate': 0.1,
 'max_depth': -1,
 'min_child_samples': 80,
 'min_child_weight': 100.0,
 'min_split_gain': 0.0,
 'n_estimators': 373,
 'n_jobs': -1,
 'num_leaves': 12,
 'objective': None,
 'random_state': 42,
 'reg_alpha': 16,
 'reg_lambda': 21,
 'silent': True,
 'subsample': 0.7981160065359487,
 'subsample_for_bin': 200000,
 'subsample_freq': 0}
```

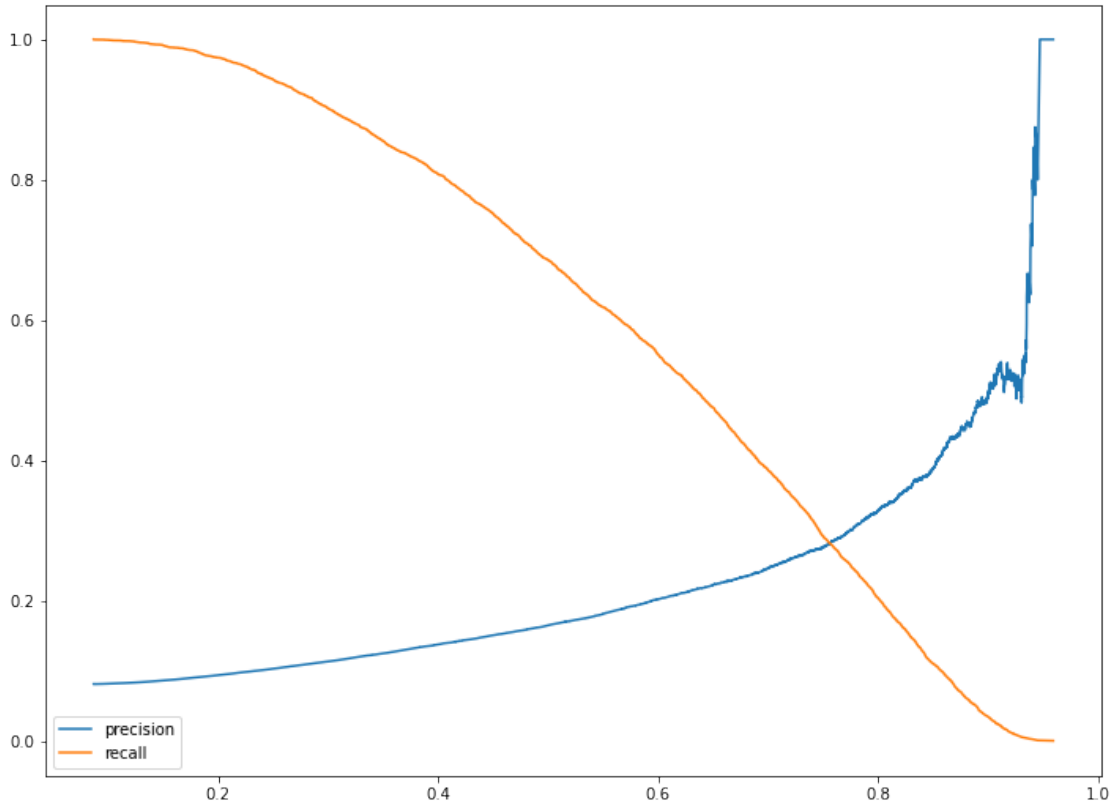
9.1 Courbe precision / recall

[ ]:
```
from sklearn.metrics import precision_recall_curve
from sklearn.metrics import roc_auc_score, average_precision_score

y_pred = best_model.predict(X_test)
y_pred_probas = best_model.predict_proba(X_test)
auc = roc_auc_score(y_test, y_pred)
print('ROC AUC score: {:.2f}'.format(auc))
print('AVG Precision: {:.2f}'.format(
    average_precision_score(y_test,y_pred_probas[:,1])))
precision, recall, threshold = precision_recall_curve(y_test,y_pred_probas[:,1])

fig, ax = plt.subplots(figsize=(12,9))
ax.plot(threshold, precision[:-1], label='precision')
ax.plot(threshold, recall[:-1], label='recall')
ax.legend()
plt.show()
```

```
ROC AUC score: 0.69
AVG Precision: 0.24
```



[ ]:
```
print(precision[np.argmin(np.abs(precision - recall))])
print(recall[np.argmin(np.abs(precision - recall))])
```

```
0.28187512628813904
0.28187512628813904
```