In [7]:
```
#Import Dependencies:
%matplotlib inline
#Start Python Imports:
import math,time,random,datetime
#Data Manipulation:
import numpy as np
import pandas as pd
#Visualization:
import matplotlib.pyplot as plt
import missingno
import seaborn as sns
plt.style.use('seaborn-whitegrid')
#Preprocessing:
from sklearn.preprocessing import OneHotEncoder,LabelEncoder,label_binarize
#Machine Learning:
import catboost
from sklearn.model_selection import train_test_split
from sklearn import model_selection,tree,preprocessing,metrics,linear_model
from sklearn.svm import LinearSVC
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.linear_model import LinearRegression,LogisticRegression,SGDClassifier
from sklearn.tree import DecisionTreeClassifier
from catboost import CatBoostClassifier,Pool,cv
#Let's be rebels and ignore warnings for now:
import warnings
warnings.filterwarnings("ignore")
```

In [8]:
```
df = pd.read_csv("D://HeartData/hungarian.csv")
```

In [9]:
```
df['chol']=df['chol'].str.replace('?','0')
```

In [10]:
```
df['slope']=df['slope'].str.replace('?','0')
df['ca']=df['ca'].str.replace('?','0')
df['thal']=df['thal'].str.replace('?','0')
df['trestbps']=df['trestbps'].str.replace('?','0')
df['fbs']=df['fbs'].str.replace('?','0')
df['restecg']=df['restecg'].str.replace('?','0')
df['thalach']=df['thalach'].str.replace('?','0')
df['exang']=df['exang'].str.replace('?','0')
```

In [11]:
```
df.rename(columns={'num':'target'},inplace=True)
```

In [12]:
```
df[['trestbps','chol','fbs','restecg','thalach','exang','slope','ca','thal']]=df[['trestbps','chol','fbs','restecg','thalach','exa
```

In [13]:
```
# Split the dataframe into data and labels
X_train = df.drop('trestbps', axis=1) # data
y_train = df.target # labels
```

In [14]:
```
# Function that runs the requested algorithm and returns the accuracy metrics
def fit_ml_algo(algo, X_train, y_train, cv):

    # One Pass
    model = algo.fit(X_train, y_train)
    acc = round(model.score(X_train, y_train) * 100, 2)

    # Cross Validation
    train_pred = model_selection.cross_val_predict(algo,
                                                   X_train,
                                                   y_train,
                                                   cv=cv,
                                                   n_jobs = -1)
    # Cross-validation accuracy metric
    acc_cv = round(metrics.accuracy_score(y_train, train_pred) * 100, 2)

    return train_pred, acc, acc_cv
```

In [15]:
```
# Logistic Regression
start_time = time.time()
train_pred_log, acc_log, acc_cv_log = fit_ml_algo(LogisticRegression(),
                                                                X_train,
                                                                y_train,
                                                                     10)
log_time = (time.time() - start_time)
print("Accuracy: %s" % acc_log)
print("Accuracy CV 10-Fold: %s" % acc_cv_log)
print("Running Time: %s" % datetime.timedelta(seconds=log_time))
```

```
Accuracy: 100.0
Accuracy CV 10-Fold: 100.0
Running Time: 0:00:03.905330
```

In [16]:
```
# k-Nearest Neighbours
start_time = time.time()
```

```
train_pred_knn, acc_knn, acc_cv_knn = fit_ml_algo(KNeighborsClassifier(),
                                                  X_train,
                                                  y_train,
                                                  10)
knn_time = (time.time() - start_time)
print("Accuracy: %s" % acc_knn)
print("Accuracy CV 10-Fold: %s" % acc_cv_knn)
print("Running Time: %s" % datetime.timedelta(seconds=knn_time))
```

```
Accuracy: 76.45
Accuracy CV 10-Fold: 62.8
Running Time: 0:00:00.099671
```

In [17]:
```
# Gaussian Naive Bayes
start_time = time.time()
train_pred_gaussian, acc_gaussian, acc_cv_gaussian = fit_ml_algo(GaussianNB(),
                                                                 X_train,
                                                                 y_train,
                                                                      10)
gaussian_time = (time.time() - start_time)
print("Accuracy: %s" % acc_gaussian)
print("Accuracy CV 10-Fold: %s" % acc_cv_gaussian)
print("Running Time: %s" % datetime.timedelta(seconds=gaussian_time))
```

```
Accuracy: 100.0
Accuracy CV 10-Fold: 100.0
Running Time: 0:00:00.034908
```

In [18]:
```
# Linear SVC
start_time = time.time()
train_pred_svc, acc_linear_svc, acc_cv_linear_svc = fit_ml_algo(LinearSVC(),
                                                                X_train,
                                                                y_train,
                                                                10)
linear_svc_time = (time.time() - start_time)
print("Accuracy: %s" % acc_linear_svc)
print("Accuracy CV 10-Fold: %s" % acc_cv_linear_svc)
print("Running Time: %s" % datetime.timedelta(seconds=linear_svc_time))
```

```
Accuracy: 95.56
Accuracy CV 10-Fold: 81.23
Running Time: 0:00:00.096907
```

In [19]:
```
# Stochastic Gradient Descent
start_time = time.time()
train_pred_sgd, acc_sgd, acc_cv_sgd = fit_ml_algo(SGDClassifier(),
```

```
                                                X_train,
                                                y_train,
                                                10)
sgd_time = (time.time() - start_time)
print("Accuracy: %s" % acc_sgd)
print("Accuracy CV 10-Fold: %s" % acc_cv_sgd)
print("Running Time: %s" % datetime.timedelta(seconds=sgd_time))
```

```
Accuracy: 76.11
Accuracy CV 10-Fold: 64.51
Running Time: 0:00:00.034906
```

In [20]:
```
# Decision Tree Classifier
start_time = time.time()
train_pred_dt, acc_dt, acc_cv_dt = fit_ml_algo(DecisionTreeClassifier(),
                                               X_train,
                                               y_train,
                                               10)
dt_time = (time.time() - start_time)
print("Accuracy: %s" % acc_dt)
print("Accuracy CV 10-Fold: %s" % acc_cv_dt)
print("Running Time: %s" % datetime.timedelta(seconds=dt_time))
```

```
Accuracy: 100.0
Accuracy CV 10-Fold: 100.0
Running Time: 0:00:00.069550
```

In [21]:
```
# Gradient Boosting Trees
start_time = time.time()
train_pred_gbt, acc_gbt, acc_cv_gbt = fit_ml_algo(GradientBoostingClassifier(),
                                                  X_train,
                                                  y_train,
                                                  10)
gbt_time = (time.time() - start_time)
print("Accuracy: %s" % acc_gbt)
print("Accuracy CV 10-Fold: %s" % acc_cv_gbt)
print("Running Time: %s" % datetime.timedelta(seconds=gbt_time))
```

```
Accuracy: 100.0
Accuracy CV 10-Fold: 100.0
Running Time: 0:00:00.274682
```

In [22]:
```
# Define the categorical features for the CatBoost model
cat_features = np.where(X_train.dtypes != np.float)[0]
cat_features
```

Out[22]:
```
array([ 0,  1,  2,  3,  4,  5,  6,  7,  9, 10, 11, 12], dtype=int64)
```

In [23]:
```
# Use the CatBoost Pool() function to pool together the training data and categorical feature labels
train_pool = Pool(X_train,
                  y_train,
                  cat_features)
```

In [24]:
```
catboost_model = CatBoostClassifier(iterations=1000,
                                    custom_loss=['Accuracy'],
                                    loss_function='MultiClass')

# Fit CatBoost model
catboost_model.fit(train_pool,
                   plot=True)

# CatBoost accuracy
acc_catboost = round(catboost_model.score(X_train, y_train) * 100, 2)
```

```
Learning rate set to 0.074325
0:      learn: 0.6298247        total: 95.3ms   remaining: 1m 35s
1:      learn: 0.5715196        total: 118ms    remaining: 59s
2:      learn: 0.5189374        total: 135ms    remaining: 44.8s
3:      learn: 0.4784144        total: 178ms    remaining: 44.3s
4:      learn: 0.4377245        total: 224ms    remaining: 44.6s
5:      learn: 0.4005790        total: 246ms    remaining: 40.7s
6:      learn: 0.3673083        total: 266ms    remaining: 37.8s
7:      learn: 0.3369291        total: 275ms    remaining: 34.1s
8:      learn: 0.3119625        total: 292ms    remaining: 32.2s
9:      learn: 0.2912852        total: 321ms    remaining: 31.8s
10:     learn: 0.2682645        total: 331ms    remaining: 29.7s
11:     learn: 0.2499741        total: 362ms    remaining: 29.8s
12:     learn: 0.2331572        total: 396ms    remaining: 30.1s
13:     learn: 0.2178191        total: 440ms    remaining: 31s
14:     learn: 0.2033829        total: 473ms    remaining: 31.1s
15:     learn: 0.1886315        total: 490ms    remaining: 30.1s
16:     learn: 0.1766211        total: 518ms    remaining: 30s
17:     learn: 0.1643412        total: 536ms    remaining: 29.3s
18:     learn: 0.1526041        total: 548ms    remaining: 28.3s
19:     learn: 0.1416742        total: 558ms    remaining: 27.3s
20:     learn: 0.1323564        total: 575ms    remaining: 26.8s
21:     learn: 0.1248509        total: 606ms    remaining: 27s
22:     learn: 0.1161463        total: 617ms    remaining: 26.2s
23:     learn: 0.1092344        total: 652ms    remaining: 26.5s
24:     learn: 0.1028517        total: 684ms    remaining: 26.7s
25:     learn: 0.0961308        total: 700ms    remaining: 26.2s
```

```
26:     learn: 0.0921709        total: 749ms    remaining: 27s
27:     learn: 0.0860041        total: 766ms    remaining: 26.6s
28:     learn: 0.0813929        total: 814ms    remaining: 27.3s
29:     learn: 0.0770925        total: 854ms    remaining: 27.6s
30:     learn: 0.0720653        total: 862ms    remaining: 27s
31:     learn: 0.0687704        total: 923ms    remaining: 27.9s
32:     learn: 0.0660319        total: 975ms    remaining: 28.6s
33:     learn: 0.0626010        total: 1s       remaining: 28.4s
34:     learn: 0.0586497        total: 1.01s    remaining: 27.9s
35:     learn: 0.0553855        total: 1.03s    remaining: 27.5s
36:     learn: 0.0532970        total: 1.06s    remaining: 27.5s
37:     learn: 0.0509827        total: 1.09s    remaining: 27.5s
38:     learn: 0.0491454        total: 1.12s    remaining: 27.5s
39:     learn: 0.0465649        total: 1.15s    remaining: 27.6s
40:     learn: 0.0448502        total: 1.18s    remaining: 27.7s
41:     learn: 0.0425242        total: 1.21s    remaining: 27.6s
42:     learn: 0.0404417        total: 1.25s    remaining: 27.7s
43:     learn: 0.0382001        total: 1.29s    remaining: 27.9s
44:     learn: 0.0367717        total: 1.34s    remaining: 28.5s
45:     learn: 0.0356953        total: 1.39s    remaining: 28.9s
46:     learn: 0.0337277        total: 1.41s    remaining: 28.6s
47:     learn: 0.0326852        total: 1.44s    remaining: 28.6s
48:     learn: 0.0314410        total: 1.47s    remaining: 28.6s
49:     learn: 0.0305785        total: 1.51s    remaining: 28.7s
50:     learn: 0.0291856        total: 1.55s    remaining: 28.9s
51:     learn: 0.0280714        total: 1.58s    remaining: 28.8s
52:     learn: 0.0270342        total: 1.6s     remaining: 28.7s
53:     learn: 0.0261438        total: 1.64s    remaining: 28.6s
54:     learn: 0.0251413        total: 1.68s    remaining: 28.8s
55:     learn: 0.0245214        total: 1.72s    remaining: 29.1s
56:     learn: 0.0237866        total: 1.77s    remaining: 29.3s
57:     learn: 0.0228328        total: 1.8s     remaining: 29.3s
58:     learn: 0.0223569        total: 1.84s    remaining: 29.3s
59:     learn: 0.0215315        total: 1.86s    remaining: 29.1s
60:     learn: 0.0206144        total: 1.89s    remaining: 29.1s
61:     learn: 0.0201989        total: 1.92s    remaining: 29.1s
62:     learn: 0.0195812        total: 1.94s    remaining: 28.9s
63:     learn: 0.0189071        total: 1.98s    remaining: 29s
64:     learn: 0.0183783        total: 2.03s    remaining: 29.2s
65:     learn: 0.0179915        total: 2.06s    remaining: 29.2s
66:     learn: 0.0175681        total: 2.11s    remaining: 29.4s
67:     learn: 0.0172325        total: 2.14s    remaining: 29.4s
68:     learn: 0.0166588        total: 2.18s    remaining: 29.4s
69:     learn: 0.0163369        total: 2.24s    remaining: 29.7s
70:     learn: 0.0158234        total: 2.27s    remaining: 29.7s
71:     learn: 0.0151990        total: 2.29s    remaining: 29.5s
72:     learn: 0.0147057        total: 2.31s    remaining: 29.3s
```

```
73:     learn: 0.0144192        total: 2.34s    remaining: 29.3s
74:     learn: 0.0140983        total: 2.4s     remaining: 29.6s
75:     learn: 0.0137612        total: 2.43s    remaining: 29.6s
76:     learn: 0.0134599        total: 2.51s    remaining: 30.1s
77:     learn: 0.0131252        total: 2.53s    remaining: 29.9s
78:     learn: 0.0129277        total: 2.56s    remaining: 29.9s
79:     learn: 0.0125866        total: 2.6s     remaining: 29.9s
80:     learn: 0.0123987        total: 2.63s    remaining: 29.9s
81:     learn: 0.0122026        total: 2.67s    remaining: 29.9s
82:     learn: 0.0120374        total: 2.7s     remaining: 29.8s
83:     learn: 0.0117471        total: 2.73s    remaining: 29.7s
84:     learn: 0.0114837        total: 2.74s    remaining: 29.5s
85:     learn: 0.0113191        total: 2.77s    remaining: 29.4s
86:     learn: 0.0110587        total: 2.79s    remaining: 29.3s
87:     learn: 0.0108794        total: 2.85s    remaining: 29.5s
88:     learn: 0.0107456        total: 2.91s    remaining: 29.8s
89:     learn: 0.0106448        total: 2.94s    remaining: 29.8s
90:     learn: 0.0105237        total: 3.03s    remaining: 30.3s
91:     learn: 0.0102568        total: 3.06s    remaining: 30.3s
92:     learn: 0.0101498        total: 3.14s    remaining: 30.6s
93:     learn: 0.0100458        total: 3.17s    remaining: 30.5s
94:     learn: 0.0099006        total: 3.2s     remaining: 30.5s
95:     learn: 0.0097774        total: 3.23s    remaining: 30.5s
96:     learn: 0.0096588        total: 3.27s    remaining: 30.4s
97:     learn: 0.0095492        total: 3.33s    remaining: 30.6s
98:     learn: 0.0094351        total: 3.36s    remaining: 30.6s
99:     learn: 0.0092692        total: 3.38s    remaining: 30.5s
100:    learn: 0.0091284        total: 3.42s    remaining: 30.4s
101:    learn: 0.0090005        total: 3.46s    remaining: 30.5s
102:    learn: 0.0089093        total: 3.5s     remaining: 30.5s
103:    learn: 0.0088097        total: 3.55s    remaining: 30.6s
104:    learn: 0.0087111        total: 3.58s    remaining: 30.6s
105:    learn: 0.0086463        total: 3.62s    remaining: 30.5s
106:    learn: 0.0085293        total: 3.66s    remaining: 30.6s
107:    learn: 0.0084538        total: 3.71s    remaining: 30.7s
108:    learn: 0.0083396        total: 3.75s    remaining: 30.7s
109:    learn: 0.0082302        total: 3.79s    remaining: 30.7s
110:    learn: 0.0081726        total: 3.83s    remaining: 30.6s
111:    learn: 0.0080991        total: 3.92s    remaining: 31.1s
112:    learn: 0.0080162        total: 3.97s    remaining: 31.2s
113:    learn: 0.0079138        total: 4.02s    remaining: 31.2s
114:    learn: 0.0078563        total: 4.05s    remaining: 31.2s
115:    learn: 0.0077535        total: 4.09s    remaining: 31.2s
116:    learn: 0.0076857        total: 4.14s    remaining: 31.3s
117:    learn: 0.0076078        total: 4.19s    remaining: 31.3s
118:    learn: 0.0075194        total: 4.23s    remaining: 31.3s
119:    learn: 0.0074683        total: 4.26s    remaining: 31.2s
```

```
120:    learn: 0.0074153        total: 4.31s    remaining: 31.3s
121:    learn: 0.0073746        total: 4.34s    remaining: 31.3s
122:    learn: 0.0073207        total: 4.39s    remaining: 31.3s
123:    learn: 0.0072514        total: 4.42s    remaining: 31.2s
124:    learn: 0.0071857        total: 4.46s    remaining: 31.2s
125:    learn: 0.0071281        total: 4.49s    remaining: 31.1s
126:    learn: 0.0070639        total: 4.54s    remaining: 31.2s
127:    learn: 0.0070192        total: 4.61s    remaining: 31.4s
128:    learn: 0.0069639        total: 4.66s    remaining: 31.5s
129:    learn: 0.0068996        total: 4.7s     remaining: 31.4s
130:    learn: 0.0068447        total: 4.74s    remaining: 31.5s
131:    learn: 0.0067974        total: 4.78s    remaining: 31.4s
132:    learn: 0.0067394        total: 4.8s     remaining: 31.3s
133:    learn: 0.0066884        total: 4.84s    remaining: 31.3s
134:    learn: 0.0066394        total: 4.88s    remaining: 31.3s
135:    learn: 0.0065909        total: 4.91s    remaining: 31.2s
136:    learn: 0.0065393        total: 4.96s    remaining: 31.2s
137:    learn: 0.0064926        total: 5s       remaining: 31.3s
138:    learn: 0.0064507        total: 5.05s    remaining: 31.3s
139:    learn: 0.0064116        total: 5.1s     remaining: 31.3s
140:    learn: 0.0063709        total: 5.13s    remaining: 31.3s
141:    learn: 0.0063191        total: 5.17s    remaining: 31.3s
142:    learn: 0.0062853        total: 5.24s    remaining: 31.4s
143:    learn: 0.0062509        total: 5.29s    remaining: 31.5s
144:    learn: 0.0062133        total: 5.32s    remaining: 31.4s
145:    learn: 0.0061661        total: 5.36s    remaining: 31.3s
146:    learn: 0.0061206        total: 5.4s     remaining: 31.4s
147:    learn: 0.0060773        total: 5.43s    remaining: 31.3s
148:    learn: 0.0060440        total: 5.47s    remaining: 31.2s
149:    learn: 0.0060084        total: 5.51s    remaining: 31.2s
150:    learn: 0.0059675        total: 5.54s    remaining: 31.1s
151:    learn: 0.0059335        total: 5.57s    remaining: 31.1s
152:    learn: 0.0059001        total: 5.6s     remaining: 31s
153:    learn: 0.0058693        total: 5.65s    remaining: 31s
154:    learn: 0.0058353        total: 5.68s    remaining: 31s
155:    learn: 0.0057914        total: 5.71s    remaining: 30.9s
156:    learn: 0.0057649        total: 5.76s    remaining: 31s
157:    learn: 0.0057243        total: 5.8s     remaining: 30.9s
158:    learn: 0.0056880        total: 5.84s    remaining: 30.9s
159:    learn: 0.0056516        total: 5.87s    remaining: 30.8s
160:    learn: 0.0056255        total: 5.91s    remaining: 30.8s
161:    learn: 0.0055959        total: 5.95s    remaining: 30.8s
162:    learn: 0.0055603        total: 5.98s    remaining: 30.7s
163:    learn: 0.0055302        total: 6.01s    remaining: 30.6s
164:    learn: 0.0055062        total: 6.04s    remaining: 30.6s
165:    learn: 0.0054734        total: 6.07s    remaining: 30.5s
166:    learn: 0.0054434        total: 6.11s    remaining: 30.5s
```

```
167:    learn: 0.0054153        total: 6.15s    remaining: 30.5s
168:    learn: 0.0053893        total: 6.18s    remaining: 30.4s
169:    learn: 0.0053575        total: 6.21s    remaining: 30.3s
170:    learn: 0.0053304        total: 6.27s    remaining: 30.4s
171:    learn: 0.0053041        total: 6.33s    remaining: 30.5s
172:    learn: 0.0052792        total: 6.4s     remaining: 30.6s
173:    learn: 0.0052542        total: 6.43s    remaining: 30.5s
174:    learn: 0.0052317        total: 6.47s    remaining: 30.5s
175:    learn: 0.0052060        total: 6.5s     remaining: 30.4s
176:    learn: 0.0051786        total: 6.53s    remaining: 30.4s
177:    learn: 0.0051489        total: 6.57s    remaining: 30.3s
178:    learn: 0.0051273        total: 6.6s     remaining: 30.3s
179:    learn: 0.0050952        total: 6.63s    remaining: 30.2s
180:    learn: 0.0050658        total: 6.67s    remaining: 30.2s
181:    learn: 0.0050366        total: 6.71s    remaining: 30.2s
182:    learn: 0.0050139        total: 6.76s    remaining: 30.2s
183:    learn: 0.0049920        total: 6.81s    remaining: 30.2s
184:    learn: 0.0049686        total: 6.84s    remaining: 30.1s
185:    learn: 0.0049463        total: 6.88s    remaining: 30.1s
186:    learn: 0.0049258        total: 6.91s    remaining: 30.1s
187:    learn: 0.0048998        total: 6.97s    remaining: 30.1s
188:    learn: 0.0048780        total: 7.01s    remaining: 30.1s
189:    learn: 0.0048532        total: 7.05s    remaining: 30s
190:    learn: 0.0048299        total: 7.08s    remaining: 30s
191:    learn: 0.0048079        total: 7.11s    remaining: 29.9s
192:    learn: 0.0047820        total: 7.16s    remaining: 29.9s
193:    learn: 0.0047588        total: 7.19s    remaining: 29.9s
194:    learn: 0.0047373        total: 7.24s    remaining: 29.9s
195:    learn: 0.0047140        total: 7.27s    remaining: 29.8s
196:    learn: 0.0046945        total: 7.33s    remaining: 29.9s
197:    learn: 0.0046768        total: 7.38s    remaining: 29.9s
198:    learn: 0.0046617        total: 7.41s    remaining: 29.8s
199:    learn: 0.0046380        total: 7.44s    remaining: 29.8s
200:    learn: 0.0046189        total: 7.48s    remaining: 29.7s
201:    learn: 0.0045976        total: 7.51s    remaining: 29.7s
202:    learn: 0.0045817        total: 7.54s    remaining: 29.6s
203:    learn: 0.0045558        total: 7.58s    remaining: 29.6s
204:    learn: 0.0045364        total: 7.61s    remaining: 29.5s
205:    learn: 0.0045163        total: 7.66s    remaining: 29.5s
206:    learn: 0.0044983        total: 7.7s     remaining: 29.5s
207:    learn: 0.0044835        total: 7.75s    remaining: 29.5s
208:    learn: 0.0044667        total: 7.78s    remaining: 29.4s
209:    learn: 0.0044536        total: 7.82s    remaining: 29.4s
210:    learn: 0.0044322        total: 7.86s    remaining: 29.4s
211:    learn: 0.0044160        total: 7.91s    remaining: 29.4s
212:    learn: 0.0044035        total: 7.94s    remaining: 29.3s
213:    learn: 0.0043787        total: 7.98s    remaining: 29.3s
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214:    learn: 0.0043562        total: 8.02s    remaining: 29.3s
215:    learn: 0.0043434        total: 8.08s    remaining: 29.3s
216:    learn: 0.0043211        total: 8.12s    remaining: 29.3s
217:    learn: 0.0043043        total: 8.18s    remaining: 29.3s
218:    learn: 0.0042857        total: 8.24s    remaining: 29.4s
219:    learn: 0.0042677        total: 8.32s    remaining: 29.5s
220:    learn: 0.0042519        total: 8.35s    remaining: 29.4s
221:    learn: 0.0042341        total: 8.41s    remaining: 29.5s
222:    learn: 0.0042176        total: 8.44s    remaining: 29.4s
223:    learn: 0.0041963        total: 8.48s    remaining: 29.4s
224:    learn: 0.0041804        total: 8.51s    remaining: 29.3s
225:    learn: 0.0041614        total: 8.55s    remaining: 29.3s
226:    learn: 0.0041466        total: 8.58s    remaining: 29.2s
227:    learn: 0.0041294        total: 8.62s    remaining: 29.2s
228:    learn: 0.0041131        total: 8.65s    remaining: 29.1s
229:    learn: 0.0040978        total: 8.72s    remaining: 29.2s
230:    learn: 0.0040855        total: 8.78s    remaining: 29.2s
231:    learn: 0.0040722        total: 8.82s    remaining: 29.2s
232:    learn: 0.0040614        total: 8.89s    remaining: 29.3s
233:    learn: 0.0040398        total: 8.92s    remaining: 29.2s
234:    learn: 0.0040267        total: 8.95s    remaining: 29.1s
235:    learn: 0.0040099        total: 8.99s    remaining: 29.1s
236:    learn: 0.0039955        total: 9.02s    remaining: 29.1s
237:    learn: 0.0039821        total: 9.06s    remaining: 29s
238:    learn: 0.0039691        total: 9.09s    remaining: 29s
239:    learn: 0.0039549        total: 9.13s    remaining: 28.9s
240:    learn: 0.0039425        total: 9.17s    remaining: 28.9s
241:    learn: 0.0039251        total: 9.21s    remaining: 28.8s
242:    learn: 0.0039162        total: 9.26s    remaining: 28.8s
243:    learn: 0.0039061        total: 9.29s    remaining: 28.8s
244:    learn: 0.0038920        total: 9.33s    remaining: 28.8s
245:    learn: 0.0038765        total: 9.36s    remaining: 28.7s
246:    learn: 0.0038658        total: 9.39s    remaining: 28.6s
247:    learn: 0.0038562        total: 9.43s    remaining: 28.6s
248:    learn: 0.0038448        total: 9.47s    remaining: 28.6s
249:    learn: 0.0038320        total: 9.5s     remaining: 28.5s
250:    learn: 0.0038171        total: 9.53s    remaining: 28.4s
251:    learn: 0.0038062        total: 9.57s    remaining: 28.4s
252:    learn: 0.0037957        total: 9.64s    remaining: 28.5s
253:    learn: 0.0037821        total: 9.68s    remaining: 28.4s
254:    learn: 0.0037661        total: 9.75s    remaining: 28.5s
255:    learn: 0.0037536        total: 9.8s     remaining: 28.5s
256:    learn: 0.0037426        total: 9.83s    remaining: 28.4s
257:    learn: 0.0037313        total: 9.86s    remaining: 28.4s
258:    learn: 0.0037206        total: 9.9s     remaining: 28.3s
259:    learn: 0.0037035        total: 9.95s    remaining: 28.3s
260:    learn: 0.0036938        total: 9.98s    remaining: 28.3s
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261:    learn: 0.0036811        total: 10s      remaining: 28.2s
262:    learn: 0.0036690        total: 10.1s    remaining: 28.2s
263:    learn: 0.0036562        total: 10.1s    remaining: 28.2s
264:    learn: 0.0036430        total: 10.2s    remaining: 28.2s
265:    learn: 0.0036324        total: 10.2s    remaining: 28.1s
266:    learn: 0.0036204        total: 10.3s    remaining: 28.2s
267:    learn: 0.0036071        total: 10.3s    remaining: 28.1s
268:    learn: 0.0035949        total: 10.3s    remaining: 28.1s
269:    learn: 0.0035829        total: 10.4s    remaining: 28.1s
270:    learn: 0.0035720        total: 10.4s    remaining: 28.1s
271:    learn: 0.0035629        total: 10.5s    remaining: 28s
272:    learn: 0.0035521        total: 10.5s    remaining: 28s
273:    learn: 0.0035435        total: 10.5s    remaining: 27.9s
274:    learn: 0.0035318        total: 10.6s    remaining: 27.9s
275:    learn: 0.0035185        total: 10.6s    remaining: 27.9s
276:    learn: 0.0035095        total: 10.7s    remaining: 27.8s
277:    learn: 0.0034993        total: 10.7s    remaining: 27.8s
278:    learn: 0.0034904        total: 10.8s    remaining: 27.8s
279:    learn: 0.0034786        total: 10.8s    remaining: 27.8s
280:    learn: 0.0034660        total: 10.8s    remaining: 27.7s
281:    learn: 0.0034550        total: 10.9s    remaining: 27.7s
282:    learn: 0.0034447        total: 10.9s    remaining: 27.7s
283:    learn: 0.0034357        total: 11s      remaining: 27.6s
284:    learn: 0.0034245        total: 11s      remaining: 27.6s
285:    learn: 0.0034145        total: 11s      remaining: 27.5s
286:    learn: 0.0034030        total: 11s      remaining: 27.4s
287:    learn: 0.0033908        total: 11.1s    remaining: 27.4s
288:    learn: 0.0033791        total: 11.1s    remaining: 27.4s
289:    learn: 0.0033692        total: 11.2s    remaining: 27.3s
290:    learn: 0.0033597        total: 11.2s    remaining: 27.3s
291:    learn: 0.0033510        total: 11.2s    remaining: 27.2s
292:    learn: 0.0033369        total: 11.3s    remaining: 27.2s
293:    learn: 0.0033258        total: 11.3s    remaining: 27.2s
294:    learn: 0.0033173        total: 11.4s    remaining: 27.2s
295:    learn: 0.0033066        total: 11.4s    remaining: 27.2s
296:    learn: 0.0032979        total: 11.5s    remaining: 27.2s
297:    learn: 0.0032866        total: 11.5s    remaining: 27.1s
298:    learn: 0.0032775        total: 11.5s    remaining: 27.1s
299:    learn: 0.0032696        total: 11.6s    remaining: 27s
300:    learn: 0.0032601        total: 11.6s    remaining: 27s
301:    learn: 0.0032506        total: 11.7s    remaining: 27.1s
302:    learn: 0.0032405        total: 11.8s    remaining: 27.1s
303:    learn: 0.0032325        total: 11.8s    remaining: 27s
304:    learn: 0.0032237        total: 11.9s    remaining: 27.1s
305:    learn: 0.0032164        total: 11.9s    remaining: 27s
306:    learn: 0.0032058        total: 11.9s    remaining: 27s
307:    learn: 0.0031956        total: 12s      remaining: 26.9s
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308:    learn: 0.0031878        total: 12s      remaining: 26.8s
309:    learn: 0.0031791        total: 12.1s    remaining: 26.8s
310:    learn: 0.0031689        total: 12.1s    remaining: 26.8s
311:    learn: 0.0031598        total: 12.2s    remaining: 26.8s
312:    learn: 0.0031533        total: 12.2s    remaining: 26.8s
313:    learn: 0.0031421        total: 12.2s    remaining: 26.7s
314:    learn: 0.0031335        total: 12.3s    remaining: 26.8s
315:    learn: 0.0031254        total: 12.3s    remaining: 26.7s
316:    learn: 0.0031176        total: 12.4s    remaining: 26.7s
317:    learn: 0.0031083        total: 12.4s    remaining: 26.7s
318:    learn: 0.0031002        total: 12.5s    remaining: 26.6s
319:    learn: 0.0030904        total: 12.5s    remaining: 26.6s
320:    learn: 0.0030824        total: 12.6s    remaining: 26.6s
321:    learn: 0.0030742        total: 12.6s    remaining: 26.5s
322:    learn: 0.0030640        total: 12.6s    remaining: 26.4s
323:    learn: 0.0030579        total: 12.7s    remaining: 26.4s
324:    learn: 0.0030498        total: 12.7s    remaining: 26.3s
325:    learn: 0.0030423        total: 12.7s    remaining: 26.3s
326:    learn: 0.0030359        total: 12.8s    remaining: 26.2s
327:    learn: 0.0030292        total: 12.8s    remaining: 26.2s
328:    learn: 0.0030206        total: 12.8s    remaining: 26.1s
329:    learn: 0.0030122        total: 12.9s    remaining: 26.1s
330:    learn: 0.0030048        total: 12.9s    remaining: 26.1s
331:    learn: 0.0029982        total: 12.9s    remaining: 26s
332:    learn: 0.0029916        total: 13s      remaining: 26s
333:    learn: 0.0029857        total: 13s      remaining: 25.9s
334:    learn: 0.0029773        total: 13s      remaining: 25.9s
335:    learn: 0.0029686        total: 13.1s    remaining: 25.8s
336:    learn: 0.0029602        total: 13.1s    remaining: 25.8s
337:    learn: 0.0029516        total: 13.2s    remaining: 25.8s
338:    learn: 0.0029426        total: 13.2s    remaining: 25.7s
339:    learn: 0.0029344        total: 13.2s    remaining: 25.7s
340:    learn: 0.0029252        total: 13.3s    remaining: 25.6s
341:    learn: 0.0029197        total: 13.3s    remaining: 25.6s
342:    learn: 0.0029111        total: 13.3s    remaining: 25.5s
343:    learn: 0.0029034        total: 13.4s    remaining: 25.5s
344:    learn: 0.0028960        total: 13.4s    remaining: 25.5s
345:    learn: 0.0028888        total: 13.5s    remaining: 25.5s
346:    learn: 0.0028811        total: 13.5s    remaining: 25.4s
347:    learn: 0.0028744        total: 13.5s    remaining: 25.4s
348:    learn: 0.0028658        total: 13.6s    remaining: 25.3s
349:    learn: 0.0028586        total: 13.6s    remaining: 25.3s
350:    learn: 0.0028513        total: 13.7s    remaining: 25.3s
351:    learn: 0.0028447        total: 13.7s    remaining: 25.3s
352:    learn: 0.0028389        total: 13.8s    remaining: 25.2s
353:    learn: 0.0028337        total: 13.8s    remaining: 25.2s
354:    learn: 0.0028280        total: 13.9s    remaining: 25.2s
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355:    learn: 0.0028196        total: 13.9s    remaining: 25.2s
356:    learn: 0.0028139        total: 14s      remaining: 25.2s
357:    learn: 0.0028065        total: 14s      remaining: 25.1s
358:    learn: 0.0027991        total: 14s      remaining: 25.1s
359:    learn: 0.0027944        total: 14.1s    remaining: 25s
360:    learn: 0.0027855        total: 14.1s    remaining: 25s
361:    learn: 0.0027805        total: 14.2s    remaining: 25s
362:    learn: 0.0027734        total: 14.2s    remaining: 24.9s
363:    learn: 0.0027665        total: 14.2s    remaining: 24.9s
364:    learn: 0.0027602        total: 14.3s    remaining: 24.9s
365:    learn: 0.0027549        total: 14.3s    remaining: 24.8s
366:    learn: 0.0027475        total: 14.4s    remaining: 24.8s
367:    learn: 0.0027405        total: 14.4s    remaining: 24.7s
368:    learn: 0.0027363        total: 14.4s    remaining: 24.7s
369:    learn: 0.0027309        total: 14.5s    remaining: 24.7s
370:    learn: 0.0027231        total: 14.5s    remaining: 24.6s
371:    learn: 0.0027171        total: 14.6s    remaining: 24.6s
372:    learn: 0.0027109        total: 14.6s    remaining: 24.5s
373:    learn: 0.0027037        total: 14.6s    remaining: 24.5s
374:    learn: 0.0026992        total: 14.7s    remaining: 24.5s
375:    learn: 0.0026926        total: 14.7s    remaining: 24.5s
376:    learn: 0.0026859        total: 14.8s    remaining: 24.4s
377:    learn: 0.0026807        total: 14.8s    remaining: 24.4s
378:    learn: 0.0026744        total: 14.9s    remaining: 24.3s
379:    learn: 0.0026691        total: 14.9s    remaining: 24.3s
380:    learn: 0.0026611        total: 15s      remaining: 24.3s
381:    learn: 0.0026558        total: 15s      remaining: 24.3s
382:    learn: 0.0026501        total: 15s      remaining: 24.2s
383:    learn: 0.0026456        total: 15.1s    remaining: 24.2s
384:    learn: 0.0026394        total: 15.1s    remaining: 24.2s
385:    learn: 0.0026317        total: 15.2s    remaining: 24.1s
386:    learn: 0.0026261        total: 15.2s    remaining: 24.1s
387:    learn: 0.0026214        total: 15.3s    remaining: 24.1s
388:    learn: 0.0026159        total: 15.3s    remaining: 24s
389:    learn: 0.0026097        total: 15.3s    remaining: 24s
390:    learn: 0.0026033        total: 15.4s    remaining: 23.9s
391:    learn: 0.0025971        total: 15.4s    remaining: 23.9s
392:    learn: 0.0025906        total: 15.4s    remaining: 23.8s
393:    learn: 0.0025845        total: 15.5s    remaining: 23.8s
394:    learn: 0.0025788        total: 15.5s    remaining: 23.8s
395:    learn: 0.0025727        total: 15.6s    remaining: 23.7s
396:    learn: 0.0025666        total: 15.6s    remaining: 23.7s
397:    learn: 0.0025606        total: 15.7s    remaining: 23.7s
398:    learn: 0.0025562        total: 15.7s    remaining: 23.6s
399:    learn: 0.0025517        total: 15.7s    remaining: 23.6s
400:    learn: 0.0025468        total: 15.8s    remaining: 23.6s
401:    learn: 0.0025432        total: 15.8s    remaining: 23.5s
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402:    learn: 0.0025387        total: 15.8s    remaining: 23.5s
403:    learn: 0.0025337        total: 15.9s    remaining: 23.4s
404:    learn: 0.0025295        total: 15.9s    remaining: 23.4s
405:    learn: 0.0025243        total: 16s      remaining: 23.3s
406:    learn: 0.0025195        total: 16s      remaining: 23.3s
407:    learn: 0.0025147        total: 16.1s    remaining: 23.3s
408:    learn: 0.0025091        total: 16.1s    remaining: 23.3s
409:    learn: 0.0025042        total: 16.1s    remaining: 23.2s
410:    learn: 0.0024986        total: 16.2s    remaining: 23.2s
411:    learn: 0.0024932        total: 16.2s    remaining: 23.2s
412:    learn: 0.0024874        total: 16.3s    remaining: 23.1s
413:    learn: 0.0024813        total: 16.3s    remaining: 23.1s
414:    learn: 0.0024775        total: 16.4s    remaining: 23.1s
415:    learn: 0.0024712        total: 16.4s    remaining: 23s
416:    learn: 0.0024646        total: 16.5s    remaining: 23s
417:    learn: 0.0024579        total: 16.5s    remaining: 23s
418:    learn: 0.0024515        total: 16.6s    remaining: 23s
419:    learn: 0.0024459        total: 16.6s    remaining: 22.9s
420:    learn: 0.0024393        total: 16.6s    remaining: 22.9s
421:    learn: 0.0024358        total: 16.7s    remaining: 22.8s
422:    learn: 0.0024302        total: 16.7s    remaining: 22.8s
423:    learn: 0.0024236        total: 16.7s    remaining: 22.8s
424:    learn: 0.0024191        total: 16.8s    remaining: 22.7s
425:    learn: 0.0024153        total: 16.8s    remaining: 22.7s
426:    learn: 0.0024097        total: 16.9s    remaining: 22.7s
427:    learn: 0.0024052        total: 16.9s    remaining: 22.6s
428:    learn: 0.0024007        total: 17s      remaining: 22.6s
429:    learn: 0.0023954        total: 17s      remaining: 22.5s
430:    learn: 0.0023919        total: 17.1s    remaining: 22.5s
431:    learn: 0.0023864        total: 17.1s    remaining: 22.5s
432:    learn: 0.0023813        total: 17.1s    remaining: 22.5s
433:    learn: 0.0023763        total: 17.2s    remaining: 22.4s
434:    learn: 0.0023714        total: 17.2s    remaining: 22.4s
435:    learn: 0.0023659        total: 17.3s    remaining: 22.4s
436:    learn: 0.0023609        total: 17.3s    remaining: 22.3s
437:    learn: 0.0023553        total: 17.4s    remaining: 22.3s
438:    learn: 0.0023510        total: 17.4s    remaining: 22.3s
439:    learn: 0.0023458        total: 17.4s    remaining: 22.2s
440:    learn: 0.0023405        total: 17.5s    remaining: 22.2s
441:    learn: 0.0023358        total: 17.5s    remaining: 22.1s
442:    learn: 0.0023304        total: 17.6s    remaining: 22.1s
443:    learn: 0.0023261        total: 17.6s    remaining: 22s
444:    learn: 0.0023222        total: 17.6s    remaining: 22s
445:    learn: 0.0023187        total: 17.7s    remaining: 21.9s
446:    learn: 0.0023142        total: 17.7s    remaining: 21.9s
447:    learn: 0.0023103        total: 17.7s    remaining: 21.8s
448:    learn: 0.0023061        total: 17.8s    remaining: 21.8s
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449:    learn: 0.0023012        total: 17.8s    remaining: 21.8s
450:    learn: 0.0022960        total: 17.9s    remaining: 21.7s
451:    learn: 0.0022920        total: 17.9s    remaining: 21.7s
452:    learn: 0.0022888        total: 18s      remaining: 21.7s
453:    learn: 0.0022847        total: 18s      remaining: 21.7s
454:    learn: 0.0022803        total: 18.1s    remaining: 21.6s
455:    learn: 0.0022751        total: 18.1s    remaining: 21.6s
456:    learn: 0.0022718        total: 18.1s    remaining: 21.5s
457:    learn: 0.0022673        total: 18.2s    remaining: 21.5s
458:    learn: 0.0022637        total: 18.2s    remaining: 21.5s
459:    learn: 0.0022595        total: 18.3s    remaining: 21.4s
460:    learn: 0.0022550        total: 18.3s    remaining: 21.4s
461:    learn: 0.0022517        total: 18.4s    remaining: 21.4s
462:    learn: 0.0022480        total: 18.4s    remaining: 21.3s
463:    learn: 0.0022431        total: 18.4s    remaining: 21.3s
464:    learn: 0.0022404        total: 18.5s    remaining: 21.3s
465:    learn: 0.0022365        total: 18.6s    remaining: 21.3s
466:    learn: 0.0022327        total: 18.6s    remaining: 21.2s
467:    learn: 0.0022291        total: 18.6s    remaining: 21.2s
468:    learn: 0.0022255        total: 18.7s    remaining: 21.2s
469:    learn: 0.0022215        total: 18.7s    remaining: 21.1s
470:    learn: 0.0022173        total: 18.8s    remaining: 21.1s
471:    learn: 0.0022126        total: 18.8s    remaining: 21s
472:    learn: 0.0022085        total: 18.8s    remaining: 21s
473:    learn: 0.0022053        total: 18.9s    remaining: 20.9s
474:    learn: 0.0022007        total: 18.9s    remaining: 20.9s
475:    learn: 0.0021964        total: 19s      remaining: 20.9s
476:    learn: 0.0021935        total: 19s      remaining: 20.8s
477:    learn: 0.0021893        total: 19.1s    remaining: 20.8s
478:    learn: 0.0021856        total: 19.1s    remaining: 20.8s
479:    learn: 0.0021813        total: 19.1s    remaining: 20.7s
480:    learn: 0.0021783        total: 19.2s    remaining: 20.7s
481:    learn: 0.0021738        total: 19.2s    remaining: 20.7s
482:    learn: 0.0021702        total: 19.3s    remaining: 20.6s
483:    learn: 0.0021654        total: 19.3s    remaining: 20.6s
484:    learn: 0.0021605        total: 19.3s    remaining: 20.5s
485:    learn: 0.0021572        total: 19.4s    remaining: 20.5s
486:    learn: 0.0021533        total: 19.4s    remaining: 20.4s
487:    learn: 0.0021492        total: 19.5s    remaining: 20.4s
488:    learn: 0.0021448        total: 19.5s    remaining: 20.4s
489:    learn: 0.0021407        total: 19.5s    remaining: 20.3s
490:    learn: 0.0021367        total: 19.6s    remaining: 20.3s
491:    learn: 0.0021333        total: 19.6s    remaining: 20.3s
492:    learn: 0.0021301        total: 19.7s    remaining: 20.2s
493:    learn: 0.0021250        total: 19.7s    remaining: 20.2s
494:    learn: 0.0021205        total: 19.7s    remaining: 20.1s
495:    learn: 0.0021162        total: 19.8s    remaining: 20.1s
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496:    learn: 0.0021135        total: 19.8s    remaining: 20.1s
497:    learn: 0.0021097        total: 19.9s    remaining: 20s
498:    learn: 0.0021058        total: 19.9s    remaining: 20s
499:    learn: 0.0021016        total: 20s      remaining: 20s
500:    learn: 0.0020985        total: 20s      remaining: 19.9s
501:    learn: 0.0020951        total: 20s      remaining: 19.9s
502:    learn: 0.0020918        total: 20.1s    remaining: 19.8s
503:    learn: 0.0020887        total: 20.1s    remaining: 19.8s
504:    learn: 0.0020858        total: 20.1s    remaining: 19.7s
505:    learn: 0.0020820        total: 20.2s    remaining: 19.7s
506:    learn: 0.0020783        total: 20.2s    remaining: 19.7s
507:    learn: 0.0020746        total: 20.3s    remaining: 19.6s
508:    learn: 0.0020718        total: 20.3s    remaining: 19.6s
509:    learn: 0.0020674        total: 20.4s    remaining: 19.6s
510:    learn: 0.0020628        total: 20.4s    remaining: 19.5s
511:    learn: 0.0020603        total: 20.4s    remaining: 19.5s
512:    learn: 0.0020565        total: 20.5s    remaining: 19.4s
513:    learn: 0.0020530        total: 20.5s    remaining: 19.4s
514:    learn: 0.0020499        total: 20.5s    remaining: 19.3s
515:    learn: 0.0020465        total: 20.6s    remaining: 19.3s
516:    learn: 0.0020432        total: 20.6s    remaining: 19.2s
517:    learn: 0.0020397        total: 20.6s    remaining: 19.2s
518:    learn: 0.0020364        total: 20.7s    remaining: 19.1s
519:    learn: 0.0020329        total: 20.7s    remaining: 19.1s
520:    learn: 0.0020296        total: 20.7s    remaining: 19s
521:    learn: 0.0020256        total: 20.7s    remaining: 19s
522:    learn: 0.0020223        total: 20.8s    remaining: 18.9s
523:    learn: 0.0020197        total: 20.8s    remaining: 18.9s
524:    learn: 0.0020151        total: 20.8s    remaining: 18.9s
525:    learn: 0.0020119        total: 20.9s    remaining: 18.8s
526:    learn: 0.0020081        total: 20.9s    remaining: 18.8s
527:    learn: 0.0020046        total: 20.9s    remaining: 18.7s
528:    learn: 0.0020019        total: 21s      remaining: 18.7s
529:    learn: 0.0019985        total: 21s      remaining: 18.6s
530:    learn: 0.0019947        total: 21s      remaining: 18.6s
531:    learn: 0.0019919        total: 21.1s    remaining: 18.5s
532:    learn: 0.0019881        total: 21.1s    remaining: 18.5s
533:    learn: 0.0019847        total: 21.1s    remaining: 18.4s
534:    learn: 0.0019815        total: 21.2s    remaining: 18.4s
535:    learn: 0.0019785        total: 21.2s    remaining: 18.4s
536:    learn: 0.0019750        total: 21.2s    remaining: 18.3s
537:    learn: 0.0019714        total: 21.3s    remaining: 18.3s
538:    learn: 0.0019678        total: 21.3s    remaining: 18.2s
539:    learn: 0.0019636        total: 21.3s    remaining: 18.2s
540:    learn: 0.0019602        total: 21.4s    remaining: 18.1s
541:    learn: 0.0019564        total: 21.4s    remaining: 18.1s
542:    learn: 0.0019520        total: 21.4s    remaining: 18s
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543:    learn: 0.0019487        total: 21.5s    remaining: 18s
544:    learn: 0.0019455        total: 21.5s    remaining: 18s
545:    learn: 0.0019426        total: 21.5s    remaining: 17.9s
546:    learn: 0.0019399        total: 21.6s    remaining: 17.9s
547:    learn: 0.0019359        total: 21.6s    remaining: 17.8s
548:    learn: 0.0019315        total: 21.6s    remaining: 17.8s
549:    learn: 0.0019287        total: 21.6s    remaining: 17.7s
550:    learn: 0.0019258        total: 21.7s    remaining: 17.7s
551:    learn: 0.0019221        total: 21.7s    remaining: 17.6s
552:    learn: 0.0019187        total: 21.7s    remaining: 17.6s
553:    learn: 0.0019164        total: 21.8s    remaining: 17.5s
554:    learn: 0.0019141        total: 21.8s    remaining: 17.5s
555:    learn: 0.0019109        total: 21.8s    remaining: 17.4s
556:    learn: 0.0019076        total: 21.9s    remaining: 17.4s
557:    learn: 0.0019046        total: 21.9s    remaining: 17.4s
558:    learn: 0.0019019        total: 21.9s    remaining: 17.3s
559:    learn: 0.0018993        total: 22s      remaining: 17.3s
560:    learn: 0.0018967        total: 22s      remaining: 17.2s
561:    learn: 0.0018936        total: 22s      remaining: 17.2s
562:    learn: 0.0018909        total: 22.1s    remaining: 17.1s
563:    learn: 0.0018869        total: 22.1s    remaining: 17.1s
564:    learn: 0.0018838        total: 22.1s    remaining: 17s
565:    learn: 0.0018806        total: 22.1s    remaining: 17s
566:    learn: 0.0018770        total: 22.2s    remaining: 16.9s
567:    learn: 0.0018745        total: 22.2s    remaining: 16.9s
568:    learn: 0.0018712        total: 22.2s    remaining: 16.8s
569:    learn: 0.0018672        total: 22.3s    remaining: 16.8s
570:    learn: 0.0018644        total: 22.3s    remaining: 16.7s
571:    learn: 0.0018619        total: 22.4s    remaining: 16.7s
572:    learn: 0.0018586        total: 22.4s    remaining: 16.7s
573:    learn: 0.0018553        total: 22.5s    remaining: 16.7s
574:    learn: 0.0018526        total: 22.5s    remaining: 16.6s
575:    learn: 0.0018497        total: 22.6s    remaining: 16.6s
576:    learn: 0.0018475        total: 22.6s    remaining: 16.6s
577:    learn: 0.0018457        total: 22.6s    remaining: 16.5s
578:    learn: 0.0018425        total: 22.7s    remaining: 16.5s
579:    learn: 0.0018394        total: 22.7s    remaining: 16.5s
580:    learn: 0.0018364        total: 22.8s    remaining: 16.4s
581:    learn: 0.0018341        total: 22.9s    remaining: 16.4s
582:    learn: 0.0018309        total: 22.9s    remaining: 16.4s
583:    learn: 0.0018285        total: 22.9s    remaining: 16.3s
584:    learn: 0.0018260        total: 23s      remaining: 16.3s
585:    learn: 0.0018236        total: 23s      remaining: 16.3s
586:    learn: 0.0018213        total: 23s      remaining: 16.2s
587:    learn: 0.0018186        total: 23.1s    remaining: 16.2s
588:    learn: 0.0018156        total: 23.1s    remaining: 16.1s
589:    learn: 0.0018116        total: 23.2s    remaining: 16.1s
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590:    learn: 0.0018095        total: 23.2s    remaining: 16.1s
591:    learn: 0.0018071        total: 23.2s    remaining: 16s
592:    learn: 0.0018040        total: 23.3s    remaining: 16s
593:    learn: 0.0018015        total: 23.3s    remaining: 15.9s
594:    learn: 0.0017996        total: 23.4s    remaining: 15.9s
595:    learn: 0.0017976        total: 23.4s    remaining: 15.9s
596:    learn: 0.0017948        total: 23.5s    remaining: 15.8s
597:    learn: 0.0017911        total: 23.5s    remaining: 15.8s
598:    learn: 0.0017885        total: 23.6s    remaining: 15.8s
599:    learn: 0.0017856        total: 23.6s    remaining: 15.7s
600:    learn: 0.0017828        total: 23.6s    remaining: 15.7s
601:    learn: 0.0017807        total: 23.7s    remaining: 15.7s
602:    learn: 0.0017783        total: 23.7s    remaining: 15.6s
603:    learn: 0.0017757        total: 23.7s    remaining: 15.6s
604:    learn: 0.0017734        total: 23.8s    remaining: 15.5s
605:    learn: 0.0017713        total: 23.8s    remaining: 15.5s
606:    learn: 0.0017691        total: 23.8s    remaining: 15.4s
607:    learn: 0.0017665        total: 23.9s    remaining: 15.4s
608:    learn: 0.0017642        total: 23.9s    remaining: 15.4s
609:    learn: 0.0017619        total: 24s      remaining: 15.3s
610:    learn: 0.0017593        total: 24s      remaining: 15.3s
611:    learn: 0.0017569        total: 24s      remaining: 15.2s
612:    learn: 0.0017539        total: 24.1s    remaining: 15.2s
613:    learn: 0.0017507        total: 24.1s    remaining: 15.2s
614:    learn: 0.0017482        total: 24.2s    remaining: 15.1s
615:    learn: 0.0017460        total: 24.2s    remaining: 15.1s
616:    learn: 0.0017441        total: 24.3s    remaining: 15.1s
617:    learn: 0.0017416        total: 24.3s    remaining: 15s
618:    learn: 0.0017390        total: 24.3s    remaining: 15s
619:    learn: 0.0017360        total: 24.4s    remaining: 14.9s
620:    learn: 0.0017335        total: 24.4s    remaining: 14.9s
621:    learn: 0.0017311        total: 24.4s    remaining: 14.9s
622:    learn: 0.0017281        total: 24.5s    remaining: 14.8s
623:    learn: 0.0017253        total: 24.5s    remaining: 14.8s
624:    learn: 0.0017229        total: 24.6s    remaining: 14.7s
625:    learn: 0.0017209        total: 24.6s    remaining: 14.7s
626:    learn: 0.0017185        total: 24.6s    remaining: 14.7s
627:    learn: 0.0017161        total: 24.7s    remaining: 14.6s
628:    learn: 0.0017132        total: 24.7s    remaining: 14.6s
629:    learn: 0.0017111        total: 24.8s    remaining: 14.5s
630:    learn: 0.0017086        total: 24.8s    remaining: 14.5s
631:    learn: 0.0017055        total: 24.9s    remaining: 14.5s
632:    learn: 0.0017033        total: 24.9s    remaining: 14.4s
633:    learn: 0.0017013        total: 25s      remaining: 14.4s
634:    learn: 0.0016993        total: 25s      remaining: 14.4s
635:    learn: 0.0016974        total: 25s      remaining: 14.3s
636:    learn: 0.0016952        total: 25.1s    remaining: 14.3s
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637:    learn: 0.0016933        total: 25.1s    remaining: 14.2s
638:    learn: 0.0016906        total: 25.1s    remaining: 14.2s
639:    learn: 0.0016881        total: 25.2s    remaining: 14.2s
640:    learn: 0.0016862        total: 25.2s    remaining: 14.1s
641:    learn: 0.0016840        total: 25.3s    remaining: 14.1s
642:    learn: 0.0016804        total: 25.3s    remaining: 14.1s
643:    learn: 0.0016777        total: 25.4s    remaining: 14s
644:    learn: 0.0016749        total: 25.4s    remaining: 14s
645:    learn: 0.0016727        total: 25.5s    remaining: 14s
646:    learn: 0.0016702        total: 25.5s    remaining: 13.9s
647:    learn: 0.0016680        total: 25.6s    remaining: 13.9s
648:    learn: 0.0016659        total: 25.6s    remaining: 13.8s
649:    learn: 0.0016642        total: 25.6s    remaining: 13.8s
650:    learn: 0.0016613        total: 25.7s    remaining: 13.8s
651:    learn: 0.0016585        total: 25.7s    remaining: 13.7s
652:    learn: 0.0016558        total: 25.8s    remaining: 13.7s
653:    learn: 0.0016535        total: 25.8s    remaining: 13.7s
654:    learn: 0.0016513        total: 25.8s    remaining: 13.6s
655:    learn: 0.0016490        total: 25.9s    remaining: 13.6s
656:    learn: 0.0016469        total: 25.9s    remaining: 13.5s
657:    learn: 0.0016446        total: 26s      remaining: 13.5s
658:    learn: 0.0016422        total: 26s      remaining: 13.5s
659:    learn: 0.0016401        total: 26s      remaining: 13.4s
660:    learn: 0.0016373        total: 26.1s    remaining: 13.4s
661:    learn: 0.0016350        total: 26.1s    remaining: 13.3s
662:    learn: 0.0016332        total: 26.1s    remaining: 13.3s
663:    learn: 0.0016305        total: 26.2s    remaining: 13.2s
664:    learn: 0.0016288        total: 26.2s    remaining: 13.2s
665:    learn: 0.0016262        total: 26.3s    remaining: 13.2s
666:    learn: 0.0016242        total: 26.3s    remaining: 13.2s
667:    learn: 0.0016221        total: 26.4s    remaining: 13.1s
668:    learn: 0.0016199        total: 26.4s    remaining: 13.1s
669:    learn: 0.0016180        total: 26.5s    remaining: 13s
670:    learn: 0.0016158        total: 26.5s    remaining: 13s
671:    learn: 0.0016138        total: 26.6s    remaining: 13s
672:    learn: 0.0016116        total: 26.6s    remaining: 12.9s
673:    learn: 0.0016098        total: 26.6s    remaining: 12.9s
674:    learn: 0.0016081        total: 26.7s    remaining: 12.8s
675:    learn: 0.0016062        total: 26.7s    remaining: 12.8s
676:    learn: 0.0016042        total: 26.8s    remaining: 12.8s
677:    learn: 0.0016021        total: 26.8s    remaining: 12.7s
678:    learn: 0.0015999        total: 26.9s    remaining: 12.7s
679:    learn: 0.0015982        total: 26.9s    remaining: 12.7s
680:    learn: 0.0015959        total: 26.9s    remaining: 12.6s
681:    learn: 0.0015934        total: 27s      remaining: 12.6s
682:    learn: 0.0015918        total: 27s      remaining: 12.5s
683:    learn: 0.0015898        total: 27s      remaining: 12.5s
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684:    learn: 0.0015878        total: 27.1s    remaining: 12.4s
685:    learn: 0.0015860        total: 27.1s    remaining: 12.4s
686:    learn: 0.0015839        total: 27.1s    remaining: 12.4s
687:    learn: 0.0015817        total: 27.2s    remaining: 12.3s
688:    learn: 0.0015798        total: 27.3s    remaining: 12.3s
689:    learn: 0.0015776        total: 27.3s    remaining: 12.3s
690:    learn: 0.0015758        total: 27.3s    remaining: 12.2s
691:    learn: 0.0015739        total: 27.4s    remaining: 12.2s
692:    learn: 0.0015714        total: 27.4s    remaining: 12.1s
693:    learn: 0.0015694        total: 27.4s    remaining: 12.1s
694:    learn: 0.0015673        total: 27.5s    remaining: 12.1s
695:    learn: 0.0015651        total: 27.5s    remaining: 12s
696:    learn: 0.0015635        total: 27.6s    remaining: 12s
697:    learn: 0.0015615        total: 27.6s    remaining: 11.9s
698:    learn: 0.0015601        total: 27.7s    remaining: 11.9s
699:    learn: 0.0015578        total: 27.7s    remaining: 11.9s
700:    learn: 0.0015559        total: 27.7s    remaining: 11.8s
701:    learn: 0.0015539        total: 27.8s    remaining: 11.8s
702:    learn: 0.0015520        total: 27.8s    remaining: 11.8s
703:    learn: 0.0015502        total: 27.9s    remaining: 11.7s
704:    learn: 0.0015486        total: 27.9s    remaining: 11.7s
705:    learn: 0.0015463        total: 28s      remaining: 11.6s
706:    learn: 0.0015444        total: 28s      remaining: 11.6s
707:    learn: 0.0015426        total: 28s      remaining: 11.6s
708:    learn: 0.0015409        total: 28.1s    remaining: 11.5s
709:    learn: 0.0015390        total: 28.1s    remaining: 11.5s
710:    learn: 0.0015371        total: 28.2s    remaining: 11.5s
711:    learn: 0.0015353        total: 28.2s    remaining: 11.4s
712:    learn: 0.0015330        total: 28.3s    remaining: 11.4s
713:    learn: 0.0015314        total: 28.3s    remaining: 11.3s
714:    learn: 0.0015295        total: 28.4s    remaining: 11.3s
715:    learn: 0.0015279        total: 28.4s    remaining: 11.3s
716:    learn: 0.0015261        total: 28.5s    remaining: 11.2s
717:    learn: 0.0015241        total: 28.6s    remaining: 11.2s
718:    learn: 0.0015220        total: 28.6s    remaining: 11.2s
719:    learn: 0.0015197        total: 28.7s    remaining: 11.2s
720:    learn: 0.0015177        total: 28.7s    remaining: 11.1s
721:    learn: 0.0015161        total: 28.8s    remaining: 11.1s
722:    learn: 0.0015143        total: 28.8s    remaining: 11s
723:    learn: 0.0015124        total: 28.9s    remaining: 11s
724:    learn: 0.0015105        total: 28.9s    remaining: 11s
725:    learn: 0.0015089        total: 28.9s    remaining: 10.9s
726:    learn: 0.0015069        total: 29s      remaining: 10.9s
727:    learn: 0.0015051        total: 29s      remaining: 10.8s
728:    learn: 0.0015030        total: 29s      remaining: 10.8s
729:    learn: 0.0015013        total: 29.1s    remaining: 10.8s
730:    learn: 0.0014992        total: 29.1s    remaining: 10.7s
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731:    learn: 0.0014973        total: 29.1s    remaining: 10.7s
732:    learn: 0.0014957        total: 29.2s    remaining: 10.6s
733:    learn: 0.0014938        total: 29.3s    remaining: 10.6s
734:    learn: 0.0014920        total: 29.3s    remaining: 10.6s
735:    learn: 0.0014898        total: 29.3s    remaining: 10.5s
736:    learn: 0.0014880        total: 29.4s    remaining: 10.5s
737:    learn: 0.0014866        total: 29.4s    remaining: 10.4s
738:    learn: 0.0014847        total: 29.4s    remaining: 10.4s
739:    learn: 0.0014829        total: 29.5s    remaining: 10.3s
740:    learn: 0.0014808        total: 29.5s    remaining: 10.3s
741:    learn: 0.0014792        total: 29.5s    remaining: 10.3s
742:    learn: 0.0014772        total: 29.6s    remaining: 10.2s
743:    learn: 0.0014753        total: 29.6s    remaining: 10.2s
744:    learn: 0.0014735        total: 29.7s    remaining: 10.2s
745:    learn: 0.0014713        total: 29.7s    remaining: 10.1s
746:    learn: 0.0014697        total: 29.7s    remaining: 10.1s
747:    learn: 0.0014682        total: 29.8s    remaining: 10s
748:    learn: 0.0014660        total: 29.8s    remaining: 10s
749:    learn: 0.0014641        total: 29.9s    remaining: 9.96s
750:    learn: 0.0014622        total: 29.9s    remaining: 9.91s
751:    learn: 0.0014606        total: 29.9s    remaining: 9.87s
752:    learn: 0.0014592        total: 30s      remaining: 9.83s
753:    learn: 0.0014574        total: 30s      remaining: 9.8s
754:    learn: 0.0014553        total: 30.1s    remaining: 9.76s
755:    learn: 0.0014537        total: 30.1s    remaining: 9.72s
756:    learn: 0.0014513        total: 30.2s    remaining: 9.68s
757:    learn: 0.0014494        total: 30.2s    remaining: 9.64s
758:    learn: 0.0014479        total: 30.3s    remaining: 9.61s
759:    learn: 0.0014462        total: 30.3s    remaining: 9.57s
760:    learn: 0.0014443        total: 30.3s    remaining: 9.53s
761:    learn: 0.0014430        total: 30.4s    remaining: 9.49s
762:    learn: 0.0014412        total: 30.4s    remaining: 9.45s
763:    learn: 0.0014397        total: 30.5s    remaining: 9.42s
764:    learn: 0.0014381        total: 30.5s    remaining: 9.38s
765:    learn: 0.0014368        total: 30.6s    remaining: 9.34s
766:    learn: 0.0014352        total: 30.6s    remaining: 9.3s
767:    learn: 0.0014337        total: 30.7s    remaining: 9.26s
768:    learn: 0.0014318        total: 30.7s    remaining: 9.23s
769:    learn: 0.0014304        total: 30.7s    remaining: 9.18s
770:    learn: 0.0014287        total: 30.8s    remaining: 9.14s
771:    learn: 0.0014272        total: 30.8s    remaining: 9.1s
772:    learn: 0.0014257        total: 30.9s    remaining: 9.06s
773:    learn: 0.0014240        total: 30.9s    remaining: 9.03s
774:    learn: 0.0014224        total: 31s      remaining: 8.99s
775:    learn: 0.0014208        total: 31s      remaining: 8.95s
776:    learn: 0.0014194        total: 31s      remaining: 8.9s
777:    learn: 0.0014173        total: 31.1s    remaining: 8.86s
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778:    learn: 0.0014155        total: 31.1s    remaining: 8.82s
779:    learn: 0.0014143        total: 31.1s    remaining: 8.78s
780:    learn: 0.0014125        total: 31.2s    remaining: 8.74s
781:    learn: 0.0014110        total: 31.2s    remaining: 8.7s
782:    learn: 0.0014096        total: 31.3s    remaining: 8.67s
783:    learn: 0.0014080        total: 31.3s    remaining: 8.63s
784:    learn: 0.0014064        total: 31.4s    remaining: 8.59s
785:    learn: 0.0014045        total: 31.4s    remaining: 8.55s
786:    learn: 0.0014031        total: 31.5s    remaining: 8.52s
787:    learn: 0.0014015        total: 31.5s    remaining: 8.48s
788:    learn: 0.0014001        total: 31.6s    remaining: 8.44s
789:    learn: 0.0013986        total: 31.6s    remaining: 8.4s
790:    learn: 0.0013972        total: 31.6s    remaining: 8.36s
791:    learn: 0.0013959        total: 31.7s    remaining: 8.32s
792:    learn: 0.0013944        total: 31.7s    remaining: 8.28s
793:    learn: 0.0013930        total: 31.8s    remaining: 8.25s
794:    learn: 0.0013917        total: 31.8s    remaining: 8.21s
795:    learn: 0.0013904        total: 31.9s    remaining: 8.17s
796:    learn: 0.0013888        total: 31.9s    remaining: 8.13s
797:    learn: 0.0013872        total: 32s      remaining: 8.09s
798:    learn: 0.0013859        total: 32s      remaining: 8.05s
799:    learn: 0.0013846        total: 32s      remaining: 8.01s
800:    learn: 0.0013833        total: 32.1s    remaining: 7.97s
801:    learn: 0.0013814        total: 32.1s    remaining: 7.93s
802:    learn: 0.0013798        total: 32.2s    remaining: 7.89s
803:    learn: 0.0013783        total: 32.2s    remaining: 7.85s
804:    learn: 0.0013769        total: 32.2s    remaining: 7.81s
805:    learn: 0.0013751        total: 32.3s    remaining: 7.76s
806:    learn: 0.0013735        total: 32.3s    remaining: 7.73s
807:    learn: 0.0013720        total: 32.4s    remaining: 7.7s
808:    learn: 0.0013707        total: 32.4s    remaining: 7.66s
809:    learn: 0.0013690        total: 32.5s    remaining: 7.62s
810:    learn: 0.0013674        total: 32.5s    remaining: 7.58s
811:    learn: 0.0013660        total: 32.6s    remaining: 7.54s
812:    learn: 0.0013646        total: 32.6s    remaining: 7.5s
813:    learn: 0.0013633        total: 32.7s    remaining: 7.46s
814:    learn: 0.0013616        total: 32.7s    remaining: 7.42s
815:    learn: 0.0013602        total: 32.7s    remaining: 7.38s
816:    learn: 0.0013585        total: 32.8s    remaining: 7.34s
817:    learn: 0.0013564        total: 32.8s    remaining: 7.3s
818:    learn: 0.0013552        total: 32.8s    remaining: 7.26s
819:    learn: 0.0013536        total: 32.9s    remaining: 7.22s
820:    learn: 0.0013524        total: 32.9s    remaining: 7.17s
821:    learn: 0.0013511        total: 33s      remaining: 7.13s
822:    learn: 0.0013496        total: 33s      remaining: 7.09s
823:    learn: 0.0013481        total: 33s      remaining: 7.05s
824:    learn: 0.0013467        total: 33s      remaining: 7.01s
```

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825:    learn: 0.0013454        total: 33.1s    remaining: 6.97s
826:    learn: 0.0013437        total: 33.1s    remaining: 6.93s
827:    learn: 0.0013417        total: 33.2s    remaining: 6.89s
828:    learn: 0.0013403        total: 33.2s    remaining: 6.85s
829:    learn: 0.0013390        total: 33.3s    remaining: 6.81s
830:    learn: 0.0013376        total: 33.3s    remaining: 6.77s
831:    learn: 0.0013363        total: 33.3s    remaining: 6.73s
832:    learn: 0.0013349        total: 33.4s    remaining: 6.69s
833:    learn: 0.0013334        total: 33.4s    remaining: 6.65s
834:    learn: 0.0013320        total: 33.5s    remaining: 6.61s
835:    learn: 0.0013302        total: 33.5s    remaining: 6.57s
836:    learn: 0.0013292        total: 33.6s    remaining: 6.53s
837:    learn: 0.0013278        total: 33.6s    remaining: 6.5s
838:    learn: 0.0013267        total: 33.7s    remaining: 6.46s
839:    learn: 0.0013249        total: 33.7s    remaining: 6.42s
840:    learn: 0.0013236        total: 33.7s    remaining: 6.38s
841:    learn: 0.0013220        total: 33.8s    remaining: 6.34s
842:    learn: 0.0013203        total: 33.8s    remaining: 6.3s
843:    learn: 0.0013187        total: 33.8s    remaining: 6.25s
844:    learn: 0.0013171        total: 33.9s    remaining: 6.21s
845:    learn: 0.0013156        total: 33.9s    remaining: 6.17s
846:    learn: 0.0013142        total: 34s      remaining: 6.13s
847:    learn: 0.0013126        total: 34s      remaining: 6.1s
848:    learn: 0.0013114        total: 34s      remaining: 6.05s
849:    learn: 0.0013099        total: 34.1s    remaining: 6.01s
850:    learn: 0.0013088        total: 34.1s    remaining: 5.97s
851:    learn: 0.0013072        total: 34.2s    remaining: 5.93s
852:    learn: 0.0013058        total: 34.2s    remaining: 5.89s
853:    learn: 0.0013043        total: 34.2s    remaining: 5.85s
854:    learn: 0.0013029        total: 34.3s    remaining: 5.82s
855:    learn: 0.0013012        total: 34.3s    remaining: 5.77s
856:    learn: 0.0012996        total: 34.4s    remaining: 5.73s
857:    learn: 0.0012985        total: 34.4s    remaining: 5.69s
858:    learn: 0.0012969        total: 34.5s    remaining: 5.66s
859:    learn: 0.0012952        total: 34.5s    remaining: 5.62s
860:    learn: 0.0012938        total: 34.5s    remaining: 5.58s
861:    learn: 0.0012922        total: 34.6s    remaining: 5.54s
862:    learn: 0.0012908        total: 34.6s    remaining: 5.5s
863:    learn: 0.0012894        total: 34.7s    remaining: 5.46s
864:    learn: 0.0012880        total: 34.7s    remaining: 5.42s
865:    learn: 0.0012867        total: 34.8s    remaining: 5.38s
866:    learn: 0.0012854        total: 34.8s    remaining: 5.34s
867:    learn: 0.0012845        total: 34.9s    remaining: 5.3s
868:    learn: 0.0012829        total: 34.9s    remaining: 5.26s
869:    learn: 0.0012814        total: 34.9s    remaining: 5.22s
870:    learn: 0.0012803        total: 35s      remaining: 5.18s
871:    learn: 0.0012790        total: 35s      remaining: 5.14s
```

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872:    learn: 0.0012779        total: 35.1s    remaining: 5.1s
873:    learn: 0.0012763        total: 35.1s    remaining: 5.06s
874:    learn: 0.0012751        total: 35.1s    remaining: 5.02s
875:    learn: 0.0012739        total: 35.2s    remaining: 4.98s
876:    learn: 0.0012727        total: 35.2s    remaining: 4.94s
877:    learn: 0.0012716        total: 35.3s    remaining: 4.9s
878:    learn: 0.0012703        total: 35.3s    remaining: 4.86s
879:    learn: 0.0012689        total: 35.3s    remaining: 4.82s
880:    learn: 0.0012680        total: 35.4s    remaining: 4.78s
881:    learn: 0.0012662        total: 35.4s    remaining: 4.74s
882:    learn: 0.0012651        total: 35.5s    remaining: 4.7s
883:    learn: 0.0012637        total: 35.5s    remaining: 4.66s
884:    learn: 0.0012625        total: 35.6s    remaining: 4.62s
885:    learn: 0.0012610        total: 35.6s    remaining: 4.58s
886:    learn: 0.0012596        total: 35.7s    remaining: 4.55s
887:    learn: 0.0012581        total: 35.7s    remaining: 4.5s
888:    learn: 0.0012565        total: 35.8s    remaining: 4.46s
889:    learn: 0.0012553        total: 35.8s    remaining: 4.42s
890:    learn: 0.0012537        total: 35.8s    remaining: 4.38s
891:    learn: 0.0012526        total: 35.9s    remaining: 4.34s
892:    learn: 0.0012513        total: 35.9s    remaining: 4.3s
893:    learn: 0.0012499        total: 36s      remaining: 4.26s
894:    learn: 0.0012490        total: 36s      remaining: 4.22s
895:    learn: 0.0012476        total: 36s      remaining: 4.18s
896:    learn: 0.0012463        total: 36.1s    remaining: 4.14s
897:    learn: 0.0012451        total: 36.1s    remaining: 4.1s
898:    learn: 0.0012440        total: 36.2s    remaining: 4.06s
899:    learn: 0.0012427        total: 36.2s    remaining: 4.02s
900:    learn: 0.0012412        total: 36.2s    remaining: 3.98s
901:    learn: 0.0012404        total: 36.3s    remaining: 3.94s
902:    learn: 0.0012393        total: 36.3s    remaining: 3.9s
903:    learn: 0.0012384        total: 36.4s    remaining: 3.86s
904:    learn: 0.0012373        total: 36.4s    remaining: 3.82s
905:    learn: 0.0012360        total: 36.4s    remaining: 3.78s
906:    learn: 0.0012349        total: 36.5s    remaining: 3.74s
907:    learn: 0.0012337        total: 36.5s    remaining: 3.7s
908:    learn: 0.0012325        total: 36.5s    remaining: 3.66s
909:    learn: 0.0012313        total: 36.6s    remaining: 3.62s
910:    learn: 0.0012302        total: 36.6s    remaining: 3.58s
911:    learn: 0.0012288        total: 36.7s    remaining: 3.54s
912:    learn: 0.0012274        total: 36.7s    remaining: 3.5s
913:    learn: 0.0012262        total: 36.8s    remaining: 3.46s
914:    learn: 0.0012248        total: 36.8s    remaining: 3.42s
915:    learn: 0.0012236        total: 36.8s    remaining: 3.38s
916:    learn: 0.0012226        total: 36.9s    remaining: 3.34s
917:    learn: 0.0012216        total: 37s      remaining: 3.3s
918:    learn: 0.0012205        total: 37s      remaining: 3.26s
```

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919:    learn: 0.0012191        total: 37s      remaining: 3.22s
920:    learn: 0.0012179        total: 37.1s    remaining: 3.18s
921:    learn: 0.0012170        total: 37.1s    remaining: 3.14s
922:    learn: 0.0012162        total: 37.2s    remaining: 3.1s
923:    learn: 0.0012149        total: 37.2s    remaining: 3.06s
924:    learn: 0.0012138        total: 37.2s    remaining: 3.02s
925:    learn: 0.0012128        total: 37.3s    remaining: 2.98s
926:    learn: 0.0012118        total: 37.3s    remaining: 2.94s
927:    learn: 0.0012107        total: 37.4s    remaining: 2.9s
928:    learn: 0.0012096        total: 37.4s    remaining: 2.86s
929:    learn: 0.0012083        total: 37.5s    remaining: 2.82s
930:    learn: 0.0012072        total: 37.5s    remaining: 2.78s
931:    learn: 0.0012061        total: 37.5s    remaining: 2.74s
932:    learn: 0.0012049        total: 37.6s    remaining: 2.7s
933:    learn: 0.0012038        total: 37.6s    remaining: 2.66s
934:    learn: 0.0012023        total: 37.7s    remaining: 2.62s
935:    learn: 0.0012011        total: 37.7s    remaining: 2.58s
936:    learn: 0.0011999        total: 37.8s    remaining: 2.54s
937:    learn: 0.0011985        total: 37.8s    remaining: 2.5s
938:    learn: 0.0011974        total: 37.8s    remaining: 2.46s
939:    learn: 0.0011961        total: 37.9s    remaining: 2.42s
940:    learn: 0.0011952        total: 37.9s    remaining: 2.38s
941:    learn: 0.0011940        total: 38s      remaining: 2.34s
942:    learn: 0.0011932        total: 38s      remaining: 2.3s
943:    learn: 0.0011921        total: 38.1s    remaining: 2.26s
944:    learn: 0.0011907        total: 38.1s    remaining: 2.22s
945:    learn: 0.0011893        total: 38.1s    remaining: 2.18s
946:    learn: 0.0011884        total: 38.2s    remaining: 2.14s
947:    learn: 0.0011877        total: 38.2s    remaining: 2.1s
948:    learn: 0.0011864        total: 38.3s    remaining: 2.06s
949:    learn: 0.0011855        total: 38.3s    remaining: 2.02s
950:    learn: 0.0011839        total: 38.3s    remaining: 1.98s
951:    learn: 0.0011826        total: 38.4s    remaining: 1.94s
952:    learn: 0.0011819        total: 38.5s    remaining: 1.9s
953:    learn: 0.0011810        total: 38.5s    remaining: 1.86s
954:    learn: 0.0011798        total: 38.5s    remaining: 1.82s
955:    learn: 0.0011786        total: 38.6s    remaining: 1.78s
956:    learn: 0.0011777        total: 38.7s    remaining: 1.74s
957:    learn: 0.0011765        total: 38.7s    remaining: 1.7s
958:    learn: 0.0011754        total: 38.8s    remaining: 1.66s
959:    learn: 0.0011742        total: 38.8s    remaining: 1.62s
960:    learn: 0.0011728        total: 38.9s    remaining: 1.58s
961:    learn: 0.0011719        total: 38.9s    remaining: 1.54s
962:    learn: 0.0011703        total: 38.9s    remaining: 1.5s
963:    learn: 0.0011692        total: 39s      remaining: 1.45s
964:    learn: 0.0011681        total: 39s      remaining: 1.41s
965:    learn: 0.0011668        total: 39s      remaining: 1.37s
```

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966:    learn: 0.0011656        total: 39s      remaining: 1.33s
967:    learn: 0.0011645        total: 39.1s    remaining: 1.29s
968:    learn: 0.0011634        total: 39.1s    remaining: 1.25s
969:    learn: 0.0011625        total: 39.2s    remaining: 1.21s
970:    learn: 0.0011615        total: 39.2s    remaining: 1.17s
971:    learn: 0.0011604        total: 39.2s    remaining: 1.13s
972:    learn: 0.0011594        total: 39.3s    remaining: 1.09s
973:    learn: 0.0011583        total: 39.4s    remaining: 1.05s
974:    learn: 0.0011574        total: 39.4s    remaining: 1.01s
975:    learn: 0.0011563        total: 39.4s    remaining: 970ms
976:    learn: 0.0011552        total: 39.5s    remaining: 930ms
977:    learn: 0.0011540        total: 39.5s    remaining: 890ms
978:    learn: 0.0011527        total: 39.6s    remaining: 849ms
979:    learn: 0.0011513        total: 39.6s    remaining: 809ms
980:    learn: 0.0011504        total: 39.7s    remaining: 768ms
981:    learn: 0.0011493        total: 39.7s    remaining: 728ms
982:    learn: 0.0011484        total: 39.8s    remaining: 688ms
983:    learn: 0.0011473        total: 39.8s    remaining: 647ms
984:    learn: 0.0011463        total: 39.9s    remaining: 607ms
985:    learn: 0.0011452        total: 39.9s    remaining: 567ms
986:    learn: 0.0011441        total: 39.9s    remaining: 526ms
987:    learn: 0.0011430        total: 40s      remaining: 486ms
988:    learn: 0.0011420        total: 40s      remaining: 445ms
989:    learn: 0.0011408        total: 40s      remaining: 405ms
990:    learn: 0.0011396        total: 40.1s    remaining: 364ms
991:    learn: 0.0011385        total: 40.1s    remaining: 324ms
992:    learn: 0.0011372        total: 40.2s    remaining: 283ms
993:    learn: 0.0011362        total: 40.2s    remaining: 243ms
994:    learn: 0.0011351        total: 40.2s    remaining: 202ms
995:    learn: 0.0011341        total: 40.3s    remaining: 162ms
996:    learn: 0.0011330        total: 40.3s    remaining: 121ms
997:    learn: 0.0011322        total: 40.4s    remaining: 80.9ms
998:    learn: 0.0011313        total: 40.4s    remaining: 40.4ms
999:    learn: 0.0011303        total: 40.4s    remaining: 0us
```

In [25]:

```
# How long will this take?
start_time = time.time()

# Set params for cross-validation as same as initial model
cv_params = catboost_model.get_params()

# Run the cross-validation for 10-folds (same as the other models)
cv_data = cv(train_pool,
             cv_params,
             fold_count=10,
             plot=True)
```

```
# How long did it take?
catboost_time = (time.time() - start_time)

# CatBoost CV results save into a dataframe (cv_data), let's withdraw the maximum accuracy score
acc_cv_catboost = round(np.max(cv_data['test-Accuracy-mean']) * 100, 2)
```

```
0:      learn: 0.6683462        test: 0.6679679 best: 0.6679679 (0)
1:      learn: 0.6432425        test: 0.6423015 best: 0.6423015 (1)
2:      learn: 0.6211644        test: 0.6207203 best: 0.6207203 (2)
3:      learn: 0.5991066        test: 0.5977980 best: 0.5977980 (3)
4:      learn: 0.5775980        test: 0.5761641 best: 0.5761641 (4)
5:      learn: 0.5571444        test: 0.5555822 best: 0.5555822 (5)
6:      learn: 0.5375501        test: 0.5354642 best: 0.5354642 (6)
7:      learn: 0.5181884        test: 0.5157638 best: 0.5157638 (7)
8:      learn: 0.5002368        test: 0.4975709 best: 0.4975709 (8)
9:      learn: 0.4840489        test: 0.4808526 best: 0.4808526 (9)
10:     learn: 0.4679851        test: 0.4644027 best: 0.4644027 (10)
11:     learn: 0.4529464        test: 0.4500186 best: 0.4500186 (11)
12:     learn: 0.4382605        test: 0.4351424 best: 0.4351424 (12)
13:     learn: 0.4242366        test: 0.4204520 best: 0.4204520 (13)
14:     learn: 0.4107048        test: 0.4069293 best: 0.4069293 (14)    total: 5.06s    remaining: 5m 32s
15:     learn: 0.3976219        test: 0.3936983 best: 0.3936983 (15)
16:     learn: 0.3850480        test: 0.3809534 best: 0.3809534 (16)
17:     learn: 0.3728000        test: 0.3685884 best: 0.3685884 (17)
18:     learn: 0.3611081        test: 0.3568174 best: 0.3568174 (18)
19:     learn: 0.3500345        test: 0.3456598 best: 0.3456598 (19)
20:     learn: 0.3395462        test: 0.3352052 best: 0.3352052 (20)
21:     learn: 0.3287872        test: 0.3244090 best: 0.3244090 (21)
22:     learn: 0.3187425        test: 0.3141940 best: 0.3141940 (22)
23:     learn: 0.3096128        test: 0.3048906 best: 0.3048906 (23)
24:     learn: 0.3009195        test: 0.2960480 best: 0.2960480 (24)
25:     learn: 0.2921232        test: 0.2874722 best: 0.2874722 (25)
26:     learn: 0.2837245        test: 0.2789892 best: 0.2789892 (26)
27:     learn: 0.2755572        test: 0.2706325 best: 0.2706325 (27)
28:     learn: 0.2674945        test: 0.2625849 best: 0.2625849 (28)
29:     learn: 0.2595378        test: 0.2545952 best: 0.2545952 (29)    total: 9.76s    remaining: 5m 15s
30:     learn: 0.2519852        test: 0.2470248 best: 0.2470248 (30)
31:     learn: 0.2449733        test: 0.2400318 best: 0.2400318 (31)
32:     learn: 0.2381601        test: 0.2332096 best: 0.2332096 (32)
33:     learn: 0.2315560        test: 0.2265794 best: 0.2265794 (33)
34:     learn: 0.2250954        test: 0.2201698 best: 0.2201698 (34)
35:     learn: 0.2187134        test: 0.2136952 best: 0.2136952 (35)
36:     learn: 0.2129151        test: 0.2079395 best: 0.2079395 (36)
37:     learn: 0.2070197        test: 0.2020671 best: 0.2020671 (37)
38:     learn: 0.2016356        test: 0.1967687 best: 0.1967687 (38)
```

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39:     learn: 0.1959821        test: 0.1911975 best: 0.1911975 (39)
40:     learn: 0.1906478        test: 0.1858342 best: 0.1858342 (40)
41:     learn: 0.1853878        test: 0.1805872 best: 0.1805872 (41)
42:     learn: 0.1805044        test: 0.1758010 best: 0.1758010 (42)    total: 13.9s    remaining: 5m 9s
43:     learn: 0.1757080        test: 0.1710959 best: 0.1710959 (43)
44:     learn: 0.1711590        test: 0.1665770 best: 0.1665770 (44)
45:     learn: 0.1664391        test: 0.1618173 best: 0.1618173 (45)
46:     learn: 0.1621901        test: 0.1575934 best: 0.1575934 (46)
47:     learn: 0.1581095        test: 0.1535332 best: 0.1535332 (47)
48:     learn: 0.1539800        test: 0.1494016 best: 0.1494016 (48)
49:     learn: 0.1500583        test: 0.1455244 best: 0.1455244 (49)
50:     learn: 0.1463999        test: 0.1418830 best: 0.1418830 (50)
51:     learn: 0.1427943        test: 0.1382959 best: 0.1382959 (51)
52:     learn: 0.1392790        test: 0.1347888 best: 0.1347888 (52)
53:     learn: 0.1357915        test: 0.1313491 best: 0.1313491 (53)
54:     learn: 0.1322971        test: 0.1278552 best: 0.1278552 (54)
55:     learn: 0.1287584        test: 0.1243632 best: 0.1243632 (55)
56:     learn: 0.1254960        test: 0.1211475 best: 0.1211475 (56)
57:     learn: 0.1224561        test: 0.1181432 best: 0.1181432 (57)
58:     learn: 0.1195927        test: 0.1152971 best: 0.1152971 (58)
59:     learn: 0.1169120        test: 0.1125473 best: 0.1125473 (59)
60:     learn: 0.1140429        test: 0.1096409 best: 0.1096409 (60)
61:     learn: 0.1114682        test: 0.1070875 best: 0.1070875 (61)
62:     learn: 0.1088985        test: 0.1045439 best: 0.1045439 (62)
63:     learn: 0.1065047        test: 0.1022182 best: 0.1022182 (63)
64:     learn: 0.1040034        test: 0.0996708 best: 0.0996708 (64)
65:     learn: 0.1016544        test: 0.0973501 best: 0.0973501 (65)
66:     learn: 0.0993138        test: 0.0950249 best: 0.0950249 (66)
67:     learn: 0.0969549        test: 0.0926600 best: 0.0926600 (67)    total: 22.3s    remaining: 5m 5s
68:     learn: 0.0948861        test: 0.0906258 best: 0.0906258 (68)
69:     learn: 0.0927416        test: 0.0885105 best: 0.0885105 (69)
70:     learn: 0.0905156        test: 0.0863152 best: 0.0863152 (70)
71:     learn: 0.0884223        test: 0.0842497 best: 0.0842497 (71)
72:     learn: 0.0866220        test: 0.0824526 best: 0.0824526 (72)
73:     learn: 0.0845894        test: 0.0804038 best: 0.0804038 (73)
74:     learn: 0.0827582        test: 0.0785511 best: 0.0785511 (74)
75:     learn: 0.0809062        test: 0.0767508 best: 0.0767508 (75)
76:     learn: 0.0790884        test: 0.0750000 best: 0.0750000 (76)
77:     learn: 0.0773605        test: 0.0733038 best: 0.0733038 (77)
78:     learn: 0.0757289        test: 0.0717310 best: 0.0717310 (78)
79:     learn: 0.0741250        test: 0.0701739 best: 0.0701739 (79)
80:     learn: 0.0725057        test: 0.0685980 best: 0.0685980 (80)
81:     learn: 0.0711075        test: 0.0672006 best: 0.0672006 (81)    total: 27s      remaining: 5m 2s
82:     learn: 0.0696253        test: 0.0657064 best: 0.0657064 (82)
83:     learn: 0.0682043        test: 0.0642706 best: 0.0642706 (83)
84:     learn: 0.0667964        test: 0.0628424 best: 0.0628424 (84)
85:     learn: 0.0654284        test: 0.0614816 best: 0.0614816 (85)
```

```
86:     learn: 0.0641323        test: 0.0602208 best: 0.0602208 (86)
87:     learn: 0.0628147        test: 0.0589428 best: 0.0589428 (87)
88:     learn: 0.0615342        test: 0.0576921 best: 0.0576921 (88)
89:     learn: 0.0603534        test: 0.0565294 best: 0.0565294 (89)
90:     learn: 0.0590936        test: 0.0553209 best: 0.0553209 (90)
91:     learn: 0.0578546        test: 0.0541083 best: 0.0541083 (91)
92:     learn: 0.0567932        test: 0.0530474 best: 0.0530474 (92)
93:     learn: 0.0556883        test: 0.0519687 best: 0.0519687 (93)
94:     learn: 0.0545172        test: 0.0508080 best: 0.0508080 (94)    total: 31.3s    remaining: 4m 57s
95:     learn: 0.0535333        test: 0.0498084 best: 0.0498084 (95)
96:     learn: 0.0525562        test: 0.0488288 best: 0.0488288 (96)
97:     learn: 0.0516353        test: 0.0479258 best: 0.0479258 (97)
98:     learn: 0.0506576        test: 0.0469984 best: 0.0469984 (98)
99:     learn: 0.0497168        test: 0.0460649 best: 0.0460649 (99)
100:    learn: 0.0488729        test: 0.0452361 best: 0.0452361 (100)
101:    learn: 0.0480001        test: 0.0443776 best: 0.0443776 (101)
102:    learn: 0.0470240        test: 0.0434652 best: 0.0434652 (102)
103:    learn: 0.0460792        test: 0.0425606 best: 0.0425606 (103)
104:    learn: 0.0453008        test: 0.0418103 best: 0.0418103 (104)
105:    learn: 0.0445548        test: 0.0411117 best: 0.0411117 (105)
106:    learn: 0.0437400        test: 0.0403352 best: 0.0403352 (106)
107:    learn: 0.0430041        test: 0.0395938 best: 0.0395938 (107)   total: 35.7s    remaining: 4m 55s
108:    learn: 0.0422432        test: 0.0388653 best: 0.0388653 (108)
109:    learn: 0.0414978        test: 0.0381120 best: 0.0381120 (109)
110:    learn: 0.0407815        test: 0.0374168 best: 0.0374168 (110)
111:    learn: 0.0401104        test: 0.0367587 best: 0.0367587 (111)
112:    learn: 0.0394864        test: 0.0361215 best: 0.0361215 (112)
113:    learn: 0.0388116        test: 0.0354607 best: 0.0354607 (113)
114:    learn: 0.0381577        test: 0.0348415 best: 0.0348415 (114)
115:    learn: 0.0375034        test: 0.0342197 best: 0.0342197 (115)
116:    learn: 0.0369205        test: 0.0336496 best: 0.0336496 (116)
117:    learn: 0.0362215        test: 0.0329910 best: 0.0329910 (117)
118:    learn: 0.0356526        test: 0.0324736 best: 0.0324736 (118)
119:    learn: 0.0351077        test: 0.0319590 best: 0.0319590 (119)
120:    learn: 0.0344502        test: 0.0313449 best: 0.0313449 (120)
121:    learn: 0.0339827        test: 0.0308894 best: 0.0308894 (121)
122:    learn: 0.0334578        test: 0.0303933 best: 0.0303933 (122)
123:    learn: 0.0329889        test: 0.0299376 best: 0.0299376 (123)
124:    learn: 0.0325189        test: 0.0294899 best: 0.0294899 (124)
125:    learn: 0.0320273        test: 0.0290129 best: 0.0290129 (125)
126:    learn: 0.0315583        test: 0.0285586 best: 0.0285586 (126)
127:    learn: 0.0311045        test: 0.0281224 best: 0.0281224 (127)
128:    learn: 0.0305993        test: 0.0276280 best: 0.0276280 (128)
129:    learn: 0.0301784        test: 0.0272077 best: 0.0272077 (129)
130:    learn: 0.0297629        test: 0.0267919 best: 0.0267919 (130)
131:    learn: 0.0293331        test: 0.0263857 best: 0.0263857 (131)
132:    learn: 0.0289199        test: 0.0259920 best: 0.0259920 (132)
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133:    learn: 0.0285191        test: 0.0256001 best: 0.0256001 (133)
134:    learn: 0.0281567        test: 0.0252586 best: 0.0252586 (134)
135:    learn: 0.0277016        test: 0.0248225 best: 0.0248225 (135)
136:    learn: 0.0273453        test: 0.0244680 best: 0.0244680 (136)
137:    learn: 0.0269652        test: 0.0241107 best: 0.0241107 (137)
138:    learn: 0.0266328        test: 0.0237994 best: 0.0237994 (138)
139:    learn: 0.0262560        test: 0.0234506 best: 0.0234506 (139)   total: 47.1s    remaining: 4m 49s
140:    learn: 0.0259471        test: 0.0231680 best: 0.0231680 (140)
141:    learn: 0.0256120        test: 0.0228506 best: 0.0228506 (141)
142:    learn: 0.0252877        test: 0.0225370 best: 0.0225370 (142)
143:    learn: 0.0249363        test: 0.0222044 best: 0.0222044 (143)
144:    learn: 0.0246132        test: 0.0218898 best: 0.0218898 (144)
145:    learn: 0.0242467        test: 0.0215370 best: 0.0215370 (145)
146:    learn: 0.0239638        test: 0.0212610 best: 0.0212610 (146)
147:    learn: 0.0236965        test: 0.0210108 best: 0.0210108 (147)
148:    learn: 0.0233978        test: 0.0207280 best: 0.0207280 (148)
149:    learn: 0.0231062        test: 0.0204614 best: 0.0204614 (149)
150:    learn: 0.0228154        test: 0.0201877 best: 0.0201877 (150)
151:    learn: 0.0225184        test: 0.0199193 best: 0.0199193 (151)
152:    learn: 0.0222616        test: 0.0196763 best: 0.0196763 (152)
153:    learn: 0.0220251        test: 0.0194535 best: 0.0194535 (153)
154:    learn: 0.0217933        test: 0.0192321 best: 0.0192321 (154)
155:    learn: 0.0215540        test: 0.0190030 best: 0.0190030 (155)
156:    learn: 0.0212657        test: 0.0187393 best: 0.0187393 (156)
157:    learn: 0.0209794        test: 0.0184574 best: 0.0184574 (157)   total: 53.4s    remaining: 4m 44s
158:    learn: 0.0207490        test: 0.0182423 best: 0.0182423 (158)
159:    learn: 0.0205284        test: 0.0180374 best: 0.0180374 (159)
160:    learn: 0.0203375        test: 0.0178622 best: 0.0178622 (160)
161:    learn: 0.0200967        test: 0.0176494 best: 0.0176494 (161)
162:    learn: 0.0198227        test: 0.0173900 best: 0.0173900 (162)
163:    learn: 0.0196080        test: 0.0171971 best: 0.0171971 (163)
164:    learn: 0.0193980        test: 0.0169945 best: 0.0169945 (164)
165:    learn: 0.0192018        test: 0.0167975 best: 0.0167975 (165)
166:    learn: 0.0190220        test: 0.0166238 best: 0.0166238 (166)
167:    learn: 0.0188420        test: 0.0164533 best: 0.0164533 (167)
168:    learn: 0.0186285        test: 0.0162495 best: 0.0162495 (168)
169:    learn: 0.0184292        test: 0.0160669 best: 0.0160669 (169)
170:    learn: 0.0182386        test: 0.0158937 best: 0.0158937 (170)
171:    learn: 0.0180510        test: 0.0157217 best: 0.0157217 (171)
172:    learn: 0.0178677        test: 0.0155466 best: 0.0155466 (172)   total: 58s      remaining: 4m 37s
173:    learn: 0.0176732        test: 0.0153650 best: 0.0153650 (173)
174:    learn: 0.0175098        test: 0.0152140 best: 0.0152140 (174)
175:    learn: 0.0173523        test: 0.0150699 best: 0.0150699 (175)
176:    learn: 0.0171536        test: 0.0148868 best: 0.0148868 (176)
177:    learn: 0.0169677        test: 0.0147111 best: 0.0147111 (177)
178:    learn: 0.0168199        test: 0.0145731 best: 0.0145731 (178)
179:    learn: 0.0166862        test: 0.0144492 best: 0.0144492 (179)
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180:    learn: 0.0165243        test: 0.0143025 best: 0.0143025 (180)
181:    learn: 0.0163797        test: 0.0141627 best: 0.0141627 (181)
182:    learn: 0.0162435        test: 0.0140363 best: 0.0140363 (182)
183:    learn: 0.0161110        test: 0.0139122 best: 0.0139122 (183)   total: 1m 1s    remaining: 4m 34s
184:    learn: 0.0159911        test: 0.0138058 best: 0.0138058 (184)
185:    learn: 0.0158621        test: 0.0136867 best: 0.0136867 (185)
186:    learn: 0.0156918        test: 0.0135215 best: 0.0135215 (186)
187:    learn: 0.0155571        test: 0.0133979 best: 0.0133979 (187)
188:    learn: 0.0154395        test: 0.0132832 best: 0.0132832 (188)
189:    learn: 0.0153085        test: 0.0131667 best: 0.0131667 (189)
190:    learn: 0.0151921        test: 0.0130520 best: 0.0130520 (190)
191:    learn: 0.0150707        test: 0.0129356 best: 0.0129356 (191)
192:    learn: 0.0149402        test: 0.0128115 best: 0.0128115 (192)
193:    learn: 0.0148276        test: 0.0126999 best: 0.0126999 (193)
194:    learn: 0.0147068        test: 0.0125994 best: 0.0125994 (194)   total: 1m 5s    remaining: 4m 31s
195:    learn: 0.0145953        test: 0.0124998 best: 0.0124998 (195)
196:    learn: 0.0144759        test: 0.0123862 best: 0.0123862 (196)
197:    learn: 0.0143597        test: 0.0122771 best: 0.0122771 (197)
198:    learn: 0.0142611        test: 0.0121817 best: 0.0121817 (198)
199:    learn: 0.0141325        test: 0.0120655 best: 0.0120655 (199)
200:    learn: 0.0140219        test: 0.0119706 best: 0.0119706 (200)
201:    learn: 0.0139315        test: 0.0118899 best: 0.0118899 (201)
202:    learn: 0.0138336        test: 0.0117944 best: 0.0117944 (202)
203:    learn: 0.0137177        test: 0.0116944 best: 0.0116944 (203)
204:    learn: 0.0136064        test: 0.0115925 best: 0.0115925 (204)
205:    learn: 0.0135014        test: 0.0114990 best: 0.0114990 (205)
206:    learn: 0.0134002        test: 0.0114018 best: 0.0114018 (206)
207:    learn: 0.0133133        test: 0.0113188 best: 0.0113188 (207)
208:    learn: 0.0132212        test: 0.0112330 best: 0.0112330 (208)
209:    learn: 0.0131231        test: 0.0111438 best: 0.0111438 (209)
210:    learn: 0.0130331        test: 0.0110654 best: 0.0110654 (210)   total: 1m 12s   remaining: 4m 29s
211:    learn: 0.0129351        test: 0.0109713 best: 0.0109713 (211)
212:    learn: 0.0128472        test: 0.0108877 best: 0.0108877 (212)
213:    learn: 0.0127713        test: 0.0108167 best: 0.0108167 (213)
214:    learn: 0.0126845        test: 0.0107386 best: 0.0107386 (214)
215:    learn: 0.0125977        test: 0.0106579 best: 0.0106579 (215)
216:    learn: 0.0125028        test: 0.0105687 best: 0.0105687 (216)
217:    learn: 0.0124260        test: 0.0104944 best: 0.0104944 (217)
218:    learn: 0.0123460        test: 0.0104212 best: 0.0104212 (218)
219:    learn: 0.0122596        test: 0.0103425 best: 0.0103425 (219)   total: 1m 15s   remaining: 4m 27s
220:    learn: 0.0121758        test: 0.0102659 best: 0.0102659 (220)
221:    learn: 0.0121178        test: 0.0102145 best: 0.0102145 (221)
222:    learn: 0.0120487        test: 0.0101493 best: 0.0101493 (222)
223:    learn: 0.0119678        test: 0.0100696 best: 0.0100696 (223)
224:    learn: 0.0119004        test: 0.0100099 best: 0.0100099 (224)
225:    learn: 0.0118291        test: 0.0099465 best: 0.0099465 (225)
226:    learn: 0.0117580        test: 0.0098823 best: 0.0098823 (226)
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227:    learn: 0.0116882        test: 0.0098186 best: 0.0098186 (227)
228:    learn: 0.0116139        test: 0.0097504 best: 0.0097504 (228)
229:    learn: 0.0115497        test: 0.0096900 best: 0.0096900 (229)
230:    learn: 0.0114785        test: 0.0096243 best: 0.0096243 (230)
231:    learn: 0.0114173        test: 0.0095652 best: 0.0095652 (231)
232:    learn: 0.0113567        test: 0.0095104 best: 0.0095104 (232)
233:    learn: 0.0112928        test: 0.0094518 best: 0.0094518 (233)
234:    learn: 0.0112255        test: 0.0093889 best: 0.0093889 (234)
235:    learn: 0.0111631        test: 0.0093327 best: 0.0093327 (235)
236:    learn: 0.0111009        test: 0.0092789 best: 0.0092789 (236)
237:    learn: 0.0110338        test: 0.0092159 best: 0.0092159 (237)
238:    learn: 0.0109741        test: 0.0091631 best: 0.0091631 (238)
239:    learn: 0.0109135        test: 0.0091095 best: 0.0091095 (239)
240:    learn: 0.0108512        test: 0.0090541 best: 0.0090541 (240)
241:    learn: 0.0107964        test: 0.0090050 best: 0.0090050 (241)
242:    learn: 0.0107332        test: 0.0089508 best: 0.0089508 (242)
243:    learn: 0.0106692        test: 0.0088896 best: 0.0088896 (243)   total: 1m 24s   remaining: 4m 22s
244:    learn: 0.0106185        test: 0.0088427 best: 0.0088427 (244)
245:    learn: 0.0105592        test: 0.0087908 best: 0.0087908 (245)
246:    learn: 0.0105123        test: 0.0087497 best: 0.0087497 (246)
247:    learn: 0.0104570        test: 0.0086991 best: 0.0086991 (247)
248:    learn: 0.0104032        test: 0.0086511 best: 0.0086511 (248)
249:    learn: 0.0103509        test: 0.0086033 best: 0.0086033 (249)
250:    learn: 0.0102935        test: 0.0085528 best: 0.0085528 (250)
251:    learn: 0.0102504        test: 0.0085149 best: 0.0085149 (251)
252:    learn: 0.0101953        test: 0.0084669 best: 0.0084669 (252)
253:    learn: 0.0101461        test: 0.0084228 best: 0.0084228 (253)
254:    learn: 0.0101008        test: 0.0083829 best: 0.0083829 (254)
255:    learn: 0.0100536        test: 0.0083406 best: 0.0083406 (255)
256:    learn: 0.0100084        test: 0.0083011 best: 0.0083011 (256)
257:    learn: 0.0099620        test: 0.0082578 best: 0.0082578 (257)   total: 1m 30s   remaining: 4m 19s
258:    learn: 0.0099148        test: 0.0082179 best: 0.0082179 (258)
259:    learn: 0.0098685        test: 0.0081774 best: 0.0081774 (259)
260:    learn: 0.0098213        test: 0.0081374 best: 0.0081374 (260)
261:    learn: 0.0097799        test: 0.0081015 best: 0.0081015 (261)
262:    learn: 0.0097384        test: 0.0080636 best: 0.0080636 (262)
263:    learn: 0.0096968        test: 0.0080282 best: 0.0080282 (263)
264:    learn: 0.0096600        test: 0.0079962 best: 0.0079962 (264)
265:    learn: 0.0096139        test: 0.0079561 best: 0.0079561 (265)
266:    learn: 0.0095748        test: 0.0079229 best: 0.0079229 (266)
267:    learn: 0.0095300        test: 0.0078837 best: 0.0078837 (267)
268:    learn: 0.0094869        test: 0.0078460 best: 0.0078460 (268)
269:    learn: 0.0094505        test: 0.0078143 best: 0.0078143 (269)
270:    learn: 0.0094141        test: 0.0077843 best: 0.0077843 (270)
271:    learn: 0.0093757        test: 0.0077505 best: 0.0077505 (271)   total: 1m 35s   remaining: 4m 16s
272:    learn: 0.0093357        test: 0.0077149 best: 0.0077149 (272)
273:    learn: 0.0092980        test: 0.0076774 best: 0.0076774 (273)
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274:    learn: 0.0092608        test: 0.0076434 best: 0.0076434 (274)
275:    learn: 0.0092266        test: 0.0076128 best: 0.0076128 (275)
276:    learn: 0.0091959        test: 0.0075845 best: 0.0075845 (276)
277:    learn: 0.0091610        test: 0.0075529 best: 0.0075529 (277)
278:    learn: 0.0091261        test: 0.0075218 best: 0.0075218 (278)
279:    learn: 0.0090854        test: 0.0074853 best: 0.0074853 (279)
280:    learn: 0.0090509        test: 0.0074556 best: 0.0074556 (280)
281:    learn: 0.0090163        test: 0.0074250 best: 0.0074250 (281)
282:    learn: 0.0089827        test: 0.0073972 best: 0.0073972 (282)
283:    learn: 0.0089490        test: 0.0073713 best: 0.0073713 (283)
284:    learn: 0.0089170        test: 0.0073438 best: 0.0073438 (284)   total: 1m 41s   remaining: 4m 13s
285:    learn: 0.0088858        test: 0.0073153 best: 0.0073153 (285)
286:    learn: 0.0088578        test: 0.0072903 best: 0.0072903 (286)
287:    learn: 0.0088248        test: 0.0072625 best: 0.0072625 (287)
288:    learn: 0.0087945        test: 0.0072370 best: 0.0072370 (288)
289:    learn: 0.0087606        test: 0.0072087 best: 0.0072087 (289)
290:    learn: 0.0087290        test: 0.0071813 best: 0.0071813 (290)
291:    learn: 0.0087017        test: 0.0071596 best: 0.0071596 (291)
292:    learn: 0.0086689        test: 0.0071305 best: 0.0071305 (292)
293:    learn: 0.0086347        test: 0.0071029 best: 0.0071029 (293)
294:    learn: 0.0086040        test: 0.0070766 best: 0.0070766 (294)
295:    learn: 0.0085717        test: 0.0070467 best: 0.0070467 (295)
296:    learn: 0.0085452        test: 0.0070227 best: 0.0070227 (296)
297:    learn: 0.0085153        test: 0.0069967 best: 0.0069967 (297)
298:    learn: 0.0084898        test: 0.0069733 best: 0.0069733 (298)   total: 1m 46s   remaining: 4m 10s
299:    learn: 0.0084599        test: 0.0069482 best: 0.0069482 (299)
300:    learn: 0.0084303        test: 0.0069222 best: 0.0069222 (300)
301:    learn: 0.0084039        test: 0.0068975 best: 0.0068975 (301)
302:    learn: 0.0083769        test: 0.0068745 best: 0.0068745 (302)
303:    learn: 0.0083513        test: 0.0068515 best: 0.0068515 (303)
304:    learn: 0.0083258        test: 0.0068294 best: 0.0068294 (304)
305:    learn: 0.0082978        test: 0.0068047 best: 0.0068047 (305)
306:    learn: 0.0082744        test: 0.0067845 best: 0.0067845 (306)
307:    learn: 0.0082464        test: 0.0067605 best: 0.0067605 (307)
308:    learn: 0.0082210        test: 0.0067403 best: 0.0067403 (308)
309:    learn: 0.0081960        test: 0.0067189 best: 0.0067189 (309)
310:    learn: 0.0081685        test: 0.0066952 best: 0.0066952 (310)
311:    learn: 0.0081440        test: 0.0066744 best: 0.0066744 (311)   total: 1m 52s   remaining: 4m 7s
312:    learn: 0.0081205        test: 0.0066541 best: 0.0066541 (312)
313:    learn: 0.0080933        test: 0.0066301 best: 0.0066301 (313)
314:    learn: 0.0080705        test: 0.0066105 best: 0.0066105 (314)
315:    learn: 0.0080469        test: 0.0065933 best: 0.0065933 (315)
316:    learn: 0.0080241        test: 0.0065731 best: 0.0065731 (316)
317:    learn: 0.0080014        test: 0.0065539 best: 0.0065539 (317)
318:    learn: 0.0079765        test: 0.0065319 best: 0.0065319 (318)
319:    learn: 0.0079526        test: 0.0065128 best: 0.0065128 (319)
320:    learn: 0.0079274        test: 0.0064922 best: 0.0064922 (320)
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321:    learn: 0.0079050        test: 0.0064727 best: 0.0064727 (321)
322:    learn: 0.0078816        test: 0.0064514 best: 0.0064514 (322)
323:    learn: 0.0078583        test: 0.0064324 best: 0.0064324 (323)
324:    learn: 0.0078394        test: 0.0064157 best: 0.0064157 (324)   total: 1m 56s   remaining: 4m 2s
325:    learn: 0.0078178        test: 0.0063962 best: 0.0063962 (325)
326:    learn: 0.0077954        test: 0.0063782 best: 0.0063782 (326)
327:    learn: 0.0077733        test: 0.0063590 best: 0.0063590 (327)
328:    learn: 0.0077535        test: 0.0063425 best: 0.0063425 (328)
329:    learn: 0.0077331        test: 0.0063259 best: 0.0063259 (329)
330:    learn: 0.0077123        test: 0.0063071 best: 0.0063071 (330)
331:    learn: 0.0076895        test: 0.0062863 best: 0.0062863 (331)
332:    learn: 0.0076707        test: 0.0062701 best: 0.0062701 (332)   total: 2m       remaining: 4m
333:    learn: 0.0076503        test: 0.0062523 best: 0.0062523 (333)
334:    learn: 0.0076288        test: 0.0062345 best: 0.0062345 (334)
335:    learn: 0.0076106        test: 0.0062187 best: 0.0062187 (335)
336:    learn: 0.0075898        test: 0.0062010 best: 0.0062010 (336)
337:    learn: 0.0075712        test: 0.0061851 best: 0.0061851 (337)
338:    learn: 0.0075503        test: 0.0061684 best: 0.0061684 (338)
339:    learn: 0.0075297        test: 0.0061517 best: 0.0061517 (339)
340:    learn: 0.0075097        test: 0.0061353 best: 0.0061353 (340)
341:    learn: 0.0074905        test: 0.0061202 best: 0.0061202 (341)   total: 2m 4s    remaining: 3m 58s
342:    learn: 0.0074716        test: 0.0061040 best: 0.0061040 (342)
343:    learn: 0.0074510        test: 0.0060867 best: 0.0060867 (343)
344:    learn: 0.0074325        test: 0.0060709 best: 0.0060709 (344)
345:    learn: 0.0074129        test: 0.0060553 best: 0.0060553 (345)
346:    learn: 0.0073954        test: 0.0060407 best: 0.0060407 (346)
347:    learn: 0.0073757        test: 0.0060237 best: 0.0060237 (347)
348:    learn: 0.0073562        test: 0.0060077 best: 0.0060077 (348)
349:    learn: 0.0073365        test: 0.0059923 best: 0.0059923 (349)   total: 2m 7s    remaining: 3m 56s
350:    learn: 0.0073181        test: 0.0059781 best: 0.0059781 (350)
351:    learn: 0.0072972        test: 0.0059602 best: 0.0059602 (351)
352:    learn: 0.0072784        test: 0.0059447 best: 0.0059447 (352)
353:    learn: 0.0072606        test: 0.0059295 best: 0.0059295 (353)
354:    learn: 0.0072420        test: 0.0059134 best: 0.0059134 (354)
355:    learn: 0.0072247        test: 0.0058989 best: 0.0058989 (355)
356:    learn: 0.0072081        test: 0.0058851 best: 0.0058851 (356)
357:    learn: 0.0071902        test: 0.0058690 best: 0.0058690 (357)
358:    learn: 0.0071739        test: 0.0058556 best: 0.0058556 (358)
359:    learn: 0.0071547        test: 0.0058388 best: 0.0058388 (359)
360:    learn: 0.0071351        test: 0.0058221 best: 0.0058221 (360)
361:    learn: 0.0071161        test: 0.0058077 best: 0.0058077 (361)   total: 2m 12s   remaining: 3m 53s
362:    learn: 0.0070994        test: 0.0057937 best: 0.0057937 (362)
363:    learn: 0.0070820        test: 0.0057803 best: 0.0057803 (363)
364:    learn: 0.0070651        test: 0.0057662 best: 0.0057662 (364)
365:    learn: 0.0070466        test: 0.0057501 best: 0.0057501 (365)
366:    learn: 0.0070279        test: 0.0057351 best: 0.0057351 (366)
367:    learn: 0.0070121        test: 0.0057219 best: 0.0057219 (367)
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368:    learn: 0.0069939        test: 0.0057071 best: 0.0057071 (368)
369:    learn: 0.0069767        test: 0.0056927 best: 0.0056927 (369)
370:    learn: 0.0069616        test: 0.0056799 best: 0.0056799 (370)
371:    learn: 0.0069451        test: 0.0056663 best: 0.0056663 (371)
372:    learn: 0.0069294        test: 0.0056531 best: 0.0056531 (372)
373:    learn: 0.0069133        test: 0.0056392 best: 0.0056392 (373)
374:    learn: 0.0068976        test: 0.0056266 best: 0.0056266 (374)
375:    learn: 0.0068802        test: 0.0056124 best: 0.0056124 (375)   total: 2m 18s   remaining: 3m 49s
376:    learn: 0.0068633        test: 0.0055977 best: 0.0055977 (376)
377:    learn: 0.0068461        test: 0.0055837 best: 0.0055837 (377)
378:    learn: 0.0068292        test: 0.0055689 best: 0.0055689 (378)
379:    learn: 0.0068145        test: 0.0055577 best: 0.0055577 (379)
380:    learn: 0.0067972        test: 0.0055446 best: 0.0055446 (380)
381:    learn: 0.0067827        test: 0.0055327 best: 0.0055327 (381)
382:    learn: 0.0067685        test: 0.0055211 best: 0.0055211 (382)
383:    learn: 0.0067530        test: 0.0055083 best: 0.0055083 (383)   total: 2m 22s   remaining: 3m 47s
384:    learn: 0.0067365        test: 0.0054950 best: 0.0054950 (384)
385:    learn: 0.0067211        test: 0.0054816 best: 0.0054816 (385)
386:    learn: 0.0067050        test: 0.0054678 best: 0.0054678 (386)
387:    learn: 0.0066899        test: 0.0054555 best: 0.0054555 (387)
388:    learn: 0.0066754        test: 0.0054439 best: 0.0054439 (388)
389:    learn: 0.0066597        test: 0.0054306 best: 0.0054306 (389)
390:    learn: 0.0066442        test: 0.0054170 best: 0.0054170 (390)
391:    learn: 0.0066302        test: 0.0054048 best: 0.0054048 (391)
392:    learn: 0.0066149        test: 0.0053926 best: 0.0053926 (392)
393:    learn: 0.0066009        test: 0.0053809 best: 0.0053809 (393)
394:    learn: 0.0065858        test: 0.0053694 best: 0.0053694 (394)   total: 2m 26s   remaining: 3m 44s
395:    learn: 0.0065698        test: 0.0053581 best: 0.0053581 (395)
396:    learn: 0.0065562        test: 0.0053458 best: 0.0053458 (396)
397:    learn: 0.0065430        test: 0.0053347 best: 0.0053347 (397)
398:    learn: 0.0065284        test: 0.0053221 best: 0.0053221 (398)
399:    learn: 0.0065120        test: 0.0053079 best: 0.0053079 (399)
400:    learn: 0.0064976        test: 0.0052958 best: 0.0052958 (400)
401:    learn: 0.0064838        test: 0.0052844 best: 0.0052844 (401)
402:    learn: 0.0064696        test: 0.0052736 best: 0.0052736 (402)
403:    learn: 0.0064555        test: 0.0052622 best: 0.0052622 (403)
404:    learn: 0.0064406        test: 0.0052500 best: 0.0052500 (404)
405:    learn: 0.0064274        test: 0.0052393 best: 0.0052393 (405)   total: 2m 31s   remaining: 3m 41s
406:    learn: 0.0064127        test: 0.0052273 best: 0.0052273 (406)
407:    learn: 0.0063978        test: 0.0052151 best: 0.0052151 (407)
408:    learn: 0.0063830        test: 0.0052033 best: 0.0052033 (408)
409:    learn: 0.0063686        test: 0.0051915 best: 0.0051915 (409)
410:    learn: 0.0063528        test: 0.0051785 best: 0.0051785 (410)
411:    learn: 0.0063395        test: 0.0051669 best: 0.0051669 (411)
412:    learn: 0.0063256        test: 0.0051559 best: 0.0051559 (412)
413:    learn: 0.0063122        test: 0.0051445 best: 0.0051445 (413)
414:    learn: 0.0062993        test: 0.0051343 best: 0.0051343 (414)   total: 2m 35s   remaining: 3m 38s
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415:    learn: 0.0062868        test: 0.0051231 best: 0.0051231 (415)
416:    learn: 0.0062728        test: 0.0051117 best: 0.0051117 (416)
417:    learn: 0.0062597        test: 0.0051008 best: 0.0051008 (417)
418:    learn: 0.0062465        test: 0.0050890 best: 0.0050890 (418)
419:    learn: 0.0062339        test: 0.0050788 best: 0.0050788 (419)
420:    learn: 0.0062209        test: 0.0050684 best: 0.0050684 (420)
421:    learn: 0.0062080        test: 0.0050576 best: 0.0050576 (421)
422:    learn: 0.0061956        test: 0.0050478 best: 0.0050478 (422)
423:    learn: 0.0061829        test: 0.0050373 best: 0.0050373 (423)   total: 2m 38s   remaining: 3m 35s
424:    learn: 0.0061705        test: 0.0050268 best: 0.0050268 (424)
425:    learn: 0.0061563        test: 0.0050152 best: 0.0050152 (425)
426:    learn: 0.0061413        test: 0.0050030 best: 0.0050030 (426)
427:    learn: 0.0061289        test: 0.0049932 best: 0.0049932 (427)
428:    learn: 0.0061168        test: 0.0049830 best: 0.0049830 (428)
429:    learn: 0.0061032        test: 0.0049730 best: 0.0049730 (429)
430:    learn: 0.0060900        test: 0.0049620 best: 0.0049620 (430)
431:    learn: 0.0060769        test: 0.0049509 best: 0.0049509 (431)
432:    learn: 0.0060638        test: 0.0049394 best: 0.0049394 (432)
433:    learn: 0.0060502        test: 0.0049292 best: 0.0049292 (433)
434:    learn: 0.0060385        test: 0.0049194 best: 0.0049194 (434)
435:    learn: 0.0060256        test: 0.0049086 best: 0.0049086 (435)
436:    learn: 0.0060116        test: 0.0048978 best: 0.0048978 (436)
437:    learn: 0.0059995        test: 0.0048880 best: 0.0048880 (437)
438:    learn: 0.0059867        test: 0.0048777 best: 0.0048777 (438)
439:    learn: 0.0059726        test: 0.0048667 best: 0.0048667 (439)
440:    learn: 0.0059617        test: 0.0048574 best: 0.0048574 (440)   total: 2m 46s   remaining: 3m 30s
441:    learn: 0.0059499        test: 0.0048474 best: 0.0048474 (441)
442:    learn: 0.0059372        test: 0.0048367 best: 0.0048367 (442)
443:    learn: 0.0059252        test: 0.0048268 best: 0.0048268 (443)
444:    learn: 0.0059133        test: 0.0048171 best: 0.0048171 (444)
445:    learn: 0.0059018        test: 0.0048067 best: 0.0048067 (445)
446:    learn: 0.0058897        test: 0.0047963 best: 0.0047963 (446)
447:    learn: 0.0058780        test: 0.0047864 best: 0.0047864 (447)
448:    learn: 0.0058662        test: 0.0047768 best: 0.0047768 (448)
449:    learn: 0.0058554        test: 0.0047680 best: 0.0047680 (449)   total: 2m 50s   remaining: 3m 28s
450:    learn: 0.0058446        test: 0.0047596 best: 0.0047596 (450)
451:    learn: 0.0058335        test: 0.0047502 best: 0.0047502 (451)
452:    learn: 0.0058233        test: 0.0047415 best: 0.0047415 (452)
453:    learn: 0.0058124        test: 0.0047316 best: 0.0047316 (453)
454:    learn: 0.0058010        test: 0.0047226 best: 0.0047226 (454)
455:    learn: 0.0057901        test: 0.0047138 best: 0.0047138 (455)
456:    learn: 0.0057780        test: 0.0047030 best: 0.0047030 (456)
457:    learn: 0.0057671        test: 0.0046943 best: 0.0046943 (457)
458:    learn: 0.0057553        test: 0.0046849 best: 0.0046849 (458)
459:    learn: 0.0057446        test: 0.0046766 best: 0.0046766 (459)
460:    learn: 0.0057343        test: 0.0046677 best: 0.0046677 (460)
461:    learn: 0.0057226        test: 0.0046587 best: 0.0046587 (461)   total: 2m 55s   remaining: 3m 24s
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462:    learn: 0.0057114        test: 0.0046508 best: 0.0046508 (462)
463:    learn: 0.0057003        test: 0.0046427 best: 0.0046427 (463)
464:    learn: 0.0056898        test: 0.0046336 best: 0.0046336 (464)
465:    learn: 0.0056794        test: 0.0046253 best: 0.0046253 (465)
466:    learn: 0.0056681        test: 0.0046154 best: 0.0046154 (466)
467:    learn: 0.0056578        test: 0.0046071 best: 0.0046071 (467)
468:    learn: 0.0056474        test: 0.0045986 best: 0.0045986 (468)
469:    learn: 0.0056358        test: 0.0045894 best: 0.0045894 (469)
470:    learn: 0.0056251        test: 0.0045798 best: 0.0045798 (470)
471:    learn: 0.0056150        test: 0.0045709 best: 0.0045709 (471)
472:    learn: 0.0056048        test: 0.0045627 best: 0.0045627 (472)
473:    learn: 0.0055946        test: 0.0045546 best: 0.0045546 (473)
474:    learn: 0.0055846        test: 0.0045467 best: 0.0045467 (474)
475:    learn: 0.0055741        test: 0.0045381 best: 0.0045381 (475)   total: 3m 1s    remaining: 3m 20s
476:    learn: 0.0055640        test: 0.0045299 best: 0.0045299 (476)
477:    learn: 0.0055536        test: 0.0045219 best: 0.0045219 (477)
478:    learn: 0.0055433        test: 0.0045137 best: 0.0045137 (478)
479:    learn: 0.0055338        test: 0.0045055 best: 0.0045055 (479)
480:    learn: 0.0055231        test: 0.0044966 best: 0.0044966 (480)
481:    learn: 0.0055132        test: 0.0044889 best: 0.0044889 (481)
482:    learn: 0.0055030        test: 0.0044810 best: 0.0044810 (482)
483:    learn: 0.0054932        test: 0.0044729 best: 0.0044729 (483)   total: 3m 5s    remaining: 3m 17s
484:    learn: 0.0054842        test: 0.0044656 best: 0.0044656 (484)
485:    learn: 0.0054720        test: 0.0044559 best: 0.0044559 (485)
486:    learn: 0.0054620        test: 0.0044484 best: 0.0044484 (486)   total: 3m 6s    remaining: 3m 16s
487:    learn: 0.0054517        test: 0.0044399 best: 0.0044399 (487)
488:    learn: 0.0054407        test: 0.0044310 best: 0.0044310 (488)
489:    learn: 0.0054319        test: 0.0044237 best: 0.0044237 (489)
490:    learn: 0.0054213        test: 0.0044149 best: 0.0044149 (490)
491:    learn: 0.0054111        test: 0.0044068 best: 0.0044068 (491)
492:    learn: 0.0054025        test: 0.0043997 best: 0.0043997 (492)
493:    learn: 0.0053932        test: 0.0043916 best: 0.0043916 (493)
494:    learn: 0.0053835        test: 0.0043842 best: 0.0043842 (494)
495:    learn: 0.0053746        test: 0.0043771 best: 0.0043771 (495)
496:    learn: 0.0053648        test: 0.0043694 best: 0.0043694 (496)
497:    learn: 0.0053556        test: 0.0043614 best: 0.0043614 (497)
498:    learn: 0.0053458        test: 0.0043537 best: 0.0043537 (498)
499:    learn: 0.0053353        test: 0.0043445 best: 0.0043445 (499)
500:    learn: 0.0053259        test: 0.0043370 best: 0.0043370 (500)
501:    learn: 0.0053166        test: 0.0043301 best: 0.0043301 (501)   total: 3m 12s   remaining: 3m 11s
502:    learn: 0.0053075        test: 0.0043232 best: 0.0043232 (502)
503:    learn: 0.0052988        test: 0.0043161 best: 0.0043161 (503)
504:    learn: 0.0052901        test: 0.0043091 best: 0.0043091 (504)
505:    learn: 0.0052804        test: 0.0043007 best: 0.0043007 (505)
506:    learn: 0.0052715        test: 0.0042936 best: 0.0042936 (506)
507:    learn: 0.0052624        test: 0.0042863 best: 0.0042863 (507)
508:    learn: 0.0052533        test: 0.0042785 best: 0.0042785 (508)
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509:    learn: 0.0052440        test: 0.0042712 best: 0.0042712 (509)
510:    learn: 0.0052353        test: 0.0042645 best: 0.0042645 (510)
511:    learn: 0.0052253        test: 0.0042572 best: 0.0042572 (511)
512:    learn: 0.0052164        test: 0.0042503 best: 0.0042503 (512)
513:    learn: 0.0052082        test: 0.0042436 best: 0.0042436 (513)
514:    learn: 0.0051984        test: 0.0042356 best: 0.0042356 (514)   total: 3m 19s   remaining: 3m 7s
515:    learn: 0.0051887        test: 0.0042278 best: 0.0042278 (515)
516:    learn: 0.0051793        test: 0.0042197 best: 0.0042197 (516)
517:    learn: 0.0051705        test: 0.0042132 best: 0.0042132 (517)
518:    learn: 0.0051615        test: 0.0042061 best: 0.0042061 (518)
519:    learn: 0.0051526        test: 0.0041995 best: 0.0041995 (519)
520:    learn: 0.0051439        test: 0.0041925 best: 0.0041925 (520)
521:    learn: 0.0051352        test: 0.0041848 best: 0.0041848 (521)
522:    learn: 0.0051270        test: 0.0041779 best: 0.0041779 (522)
523:    learn: 0.0051181        test: 0.0041706 best: 0.0041706 (523)
524:    learn: 0.0051093        test: 0.0041634 best: 0.0041634 (524)
525:    learn: 0.0051006        test: 0.0041559 best: 0.0041559 (525)   total: 3m 23s   remaining: 3m 3s
526:    learn: 0.0050923        test: 0.0041495 best: 0.0041495 (526)
527:    learn: 0.0050838        test: 0.0041425 best: 0.0041425 (527)
528:    learn: 0.0050756        test: 0.0041358 best: 0.0041358 (528)
529:    learn: 0.0050679        test: 0.0041293 best: 0.0041293 (529)
530:    learn: 0.0050584        test: 0.0041213 best: 0.0041213 (530)
531:    learn: 0.0050506        test: 0.0041153 best: 0.0041153 (531)
532:    learn: 0.0050423        test: 0.0041090 best: 0.0041090 (532)
533:    learn: 0.0050345        test: 0.0041029 best: 0.0041029 (533)
534:    learn: 0.0050266        test: 0.0040961 best: 0.0040961 (534)
535:    learn: 0.0050180        test: 0.0040898 best: 0.0040898 (535)
536:    learn: 0.0050103        test: 0.0040830 best: 0.0040830 (536)   total: 3m 28s   remaining: 2m 59s
537:    learn: 0.0050020        test: 0.0040759 best: 0.0040759 (537)
538:    learn: 0.0049935        test: 0.0040695 best: 0.0040695 (538)
539:    learn: 0.0049853        test: 0.0040629 best: 0.0040629 (539)
540:    learn: 0.0049775        test: 0.0040567 best: 0.0040567 (540)
541:    learn: 0.0049698        test: 0.0040512 best: 0.0040512 (541)
542:    learn: 0.0049616        test: 0.0040451 best: 0.0040451 (542)
543:    learn: 0.0049524        test: 0.0040381 best: 0.0040381 (543)
544:    learn: 0.0049448        test: 0.0040319 best: 0.0040319 (544)
545:    learn: 0.0049364        test: 0.0040260 best: 0.0040260 (545)   total: 3m 32s   remaining: 2m 56s
546:    learn: 0.0049288        test: 0.0040197 best: 0.0040197 (546)
547:    learn: 0.0049214        test: 0.0040138 best: 0.0040138 (547)
548:    learn: 0.0049128        test: 0.0040065 best: 0.0040065 (548)
549:    learn: 0.0049043        test: 0.0040001 best: 0.0040001 (549)
550:    learn: 0.0048969        test: 0.0039937 best: 0.0039937 (550)
551:    learn: 0.0048891        test: 0.0039874 best: 0.0039874 (551)
552:    learn: 0.0048812        test: 0.0039809 best: 0.0039809 (552)
553:    learn: 0.0048732        test: 0.0039745 best: 0.0039745 (553)
554:    learn: 0.0048640        test: 0.0039666 best: 0.0039666 (554)
555:    learn: 0.0048560        test: 0.0039605 best: 0.0039605 (555)
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556:    learn: 0.0048486        test: 0.0039549 best: 0.0039549 (556)
557:    learn: 0.0048400        test: 0.0039475 best: 0.0039475 (557)
558:    learn: 0.0048327        test: 0.0039412 best: 0.0039412 (558)   total: 3m 38s   remaining: 2m 52s
559:    learn: 0.0048251        test: 0.0039348 best: 0.0039348 (559)
560:    learn: 0.0048169        test: 0.0039281 best: 0.0039281 (560)
561:    learn: 0.0048090        test: 0.0039213 best: 0.0039213 (561)
562:    learn: 0.0048009        test: 0.0039149 best: 0.0039149 (562)
563:    learn: 0.0047936        test: 0.0039087 best: 0.0039087 (563)
564:    learn: 0.0047863        test: 0.0039023 best: 0.0039023 (564)
565:    learn: 0.0047789        test: 0.0038960 best: 0.0038960 (565)
566:    learn: 0.0047715        test: 0.0038902 best: 0.0038902 (566)
567:    learn: 0.0047639        test: 0.0038840 best: 0.0038840 (567)
568:    learn: 0.0047561        test: 0.0038785 best: 0.0038785 (568)
569:    learn: 0.0047489        test: 0.0038731 best: 0.0038731 (569)
570:    learn: 0.0047409        test: 0.0038661 best: 0.0038661 (570)
571:    learn: 0.0047336        test: 0.0038603 best: 0.0038603 (571)   total: 3m 43s   remaining: 2m 47s
572:    learn: 0.0047260        test: 0.0038546 best: 0.0038546 (572)
573:    learn: 0.0047182        test: 0.0038484 best: 0.0038484 (573)
574:    learn: 0.0047108        test: 0.0038425 best: 0.0038425 (574)
575:    learn: 0.0047036        test: 0.0038366 best: 0.0038366 (575)
576:    learn: 0.0046951        test: 0.0038301 best: 0.0038301 (576)
577:    learn: 0.0046880        test: 0.0038244 best: 0.0038244 (577)
578:    learn: 0.0046806        test: 0.0038182 best: 0.0038182 (578)
579:    learn: 0.0046732        test: 0.0038123 best: 0.0038123 (579)
580:    learn: 0.0046658        test: 0.0038058 best: 0.0038058 (580)
581:    learn: 0.0046589        test: 0.0038003 best: 0.0038003 (581)
582:    learn: 0.0046519        test: 0.0037944 best: 0.0037944 (582)
583:    learn: 0.0046449        test: 0.0037885 best: 0.0037885 (583)   total: 3m 48s   remaining: 2m 43s
584:    learn: 0.0046371        test: 0.0037817 best: 0.0037817 (584)
585:    learn: 0.0046300        test: 0.0037762 best: 0.0037762 (585)
586:    learn: 0.0046230        test: 0.0037709 best: 0.0037709 (586)
587:    learn: 0.0046156        test: 0.0037650 best: 0.0037650 (587)
588:    learn: 0.0046085        test: 0.0037593 best: 0.0037593 (588)
589:    learn: 0.0046019        test: 0.0037540 best: 0.0037540 (589)
590:    learn: 0.0045949        test: 0.0037481 best: 0.0037481 (590)
591:    learn: 0.0045884        test: 0.0037425 best: 0.0037425 (591)
592:    learn: 0.0045824        test: 0.0037381 best: 0.0037381 (592)   total: 3m 52s   remaining: 2m 39s
593:    learn: 0.0045754        test: 0.0037324 best: 0.0037324 (593)
594:    learn: 0.0045679        test: 0.0037264 best: 0.0037264 (594)
595:    learn: 0.0045609        test: 0.0037207 best: 0.0037207 (595)
596:    learn: 0.0045543        test: 0.0037151 best: 0.0037151 (596)
597:    learn: 0.0045473        test: 0.0037098 best: 0.0037098 (597)
598:    learn: 0.0045409        test: 0.0037049 best: 0.0037049 (598)
599:    learn: 0.0045336        test: 0.0036995 best: 0.0036995 (599)
600:    learn: 0.0045269        test: 0.0036940 best: 0.0036940 (600)
601:    learn: 0.0045205        test: 0.0036886 best: 0.0036886 (601)
602:    learn: 0.0045130        test: 0.0036821 best: 0.0036821 (602)
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603:    learn: 0.0045062        test: 0.0036769 best: 0.0036769 (603)
604:    learn: 0.0044995        test: 0.0036719 best: 0.0036719 (604)   total: 3m 57s   remaining: 2m 35s
605:    learn: 0.0044932        test: 0.0036668 best: 0.0036668 (605)
606:    learn: 0.0044867        test: 0.0036616 best: 0.0036616 (606)
607:    learn: 0.0044804        test: 0.0036569 best: 0.0036569 (607)
608:    learn: 0.0044742        test: 0.0036517 best: 0.0036517 (608)
609:    learn: 0.0044681        test: 0.0036467 best: 0.0036467 (609)
610:    learn: 0.0044615        test: 0.0036414 best: 0.0036414 (610)
611:    learn: 0.0044551        test: 0.0036364 best: 0.0036364 (611)
612:    learn: 0.0044484        test: 0.0036309 best: 0.0036309 (612)
613:    learn: 0.0044419        test: 0.0036255 best: 0.0036255 (613)
614:    learn: 0.0044351        test: 0.0036196 best: 0.0036196 (614)
615:    learn: 0.0044290        test: 0.0036148 best: 0.0036148 (615)
616:    learn: 0.0044220        test: 0.0036088 best: 0.0036088 (616)
617:    learn: 0.0044147        test: 0.0036025 best: 0.0036025 (617)   total: 4m 2s    remaining: 2m 30s
618:    learn: 0.0044082        test: 0.0035972 best: 0.0035972 (618)
619:    learn: 0.0044026        test: 0.0035925 best: 0.0035925 (619)
620:    learn: 0.0043962        test: 0.0035869 best: 0.0035869 (620)
621:    learn: 0.0043896        test: 0.0035812 best: 0.0035812 (621)
622:    learn: 0.0043832        test: 0.0035760 best: 0.0035760 (622)
623:    learn: 0.0043761        test: 0.0035703 best: 0.0035703 (623)
624:    learn: 0.0043698        test: 0.0035655 best: 0.0035655 (624)
625:    learn: 0.0043630        test: 0.0035602 best: 0.0035602 (625)
626:    learn: 0.0043573        test: 0.0035557 best: 0.0035557 (626)
627:    learn: 0.0043508        test: 0.0035505 best: 0.0035505 (627)   total: 4m 7s    remaining: 2m 26s
628:    learn: 0.0043453        test: 0.0035460 best: 0.0035460 (628)
629:    learn: 0.0043392        test: 0.0035412 best: 0.0035412 (629)
630:    learn: 0.0043328        test: 0.0035361 best: 0.0035361 (630)
631:    learn: 0.0043268        test: 0.0035313 best: 0.0035313 (631)
632:    learn: 0.0043213        test: 0.0035271 best: 0.0035271 (632)
633:    learn: 0.0043154        test: 0.0035223 best: 0.0035223 (633)
634:    learn: 0.0043093        test: 0.0035174 best: 0.0035174 (634)
635:    learn: 0.0043038        test: 0.0035126 best: 0.0035126 (635)
636:    learn: 0.0042975        test: 0.0035072 best: 0.0035072 (636)
637:    learn: 0.0042911        test: 0.0035025 best: 0.0035025 (637)
638:    learn: 0.0042850        test: 0.0034982 best: 0.0034982 (638)   total: 4m 12s   remaining: 2m 22s
639:    learn: 0.0042787        test: 0.0034929 best: 0.0034929 (639)
640:    learn: 0.0042724        test: 0.0034882 best: 0.0034882 (640)
641:    learn: 0.0042667        test: 0.0034838 best: 0.0034838 (641)
642:    learn: 0.0042604        test: 0.0034792 best: 0.0034792 (642)
643:    learn: 0.0042540        test: 0.0034747 best: 0.0034747 (643)
644:    learn: 0.0042487        test: 0.0034706 best: 0.0034706 (644)
645:    learn: 0.0042422        test: 0.0034656 best: 0.0034656 (645)
646:    learn: 0.0042370        test: 0.0034616 best: 0.0034616 (646)   total: 4m 15s   remaining: 2m 19s
647:    learn: 0.0042312        test: 0.0034567 best: 0.0034567 (647)
648:    learn: 0.0042255        test: 0.0034519 best: 0.0034519 (648)
649:    learn: 0.0042196        test: 0.0034476 best: 0.0034476 (649)
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650:    learn: 0.0042140        test: 0.0034429 best: 0.0034429 (650)
651:    learn: 0.0042084        test: 0.0034382 best: 0.0034382 (651)
652:    learn: 0.0042022        test: 0.0034333 best: 0.0034333 (652)
653:    learn: 0.0041955        test: 0.0034281 best: 0.0034281 (653)
654:    learn: 0.0041897        test: 0.0034236 best: 0.0034236 (654)
655:    learn: 0.0041832        test: 0.0034181 best: 0.0034181 (655)
656:    learn: 0.0041770        test: 0.0034130 best: 0.0034130 (656)
657:    learn: 0.0041713        test: 0.0034085 best: 0.0034085 (657)   total: 4m 21s   remaining: 2m 15s
658:    learn: 0.0041660        test: 0.0034045 best: 0.0034045 (658)
659:    learn: 0.0041606        test: 0.0034004 best: 0.0034004 (659)
660:    learn: 0.0041544        test: 0.0033962 best: 0.0033962 (660)
661:    learn: 0.0041491        test: 0.0033921 best: 0.0033921 (661)
662:    learn: 0.0041435        test: 0.0033878 best: 0.0033878 (662)
663:    learn: 0.0041377        test: 0.0033834 best: 0.0033834 (663)
664:    learn: 0.0041316        test: 0.0033788 best: 0.0033788 (664)
665:    learn: 0.0041266        test: 0.0033751 best: 0.0033751 (665)
666:    learn: 0.0041214        test: 0.0033711 best: 0.0033711 (666)
667:    learn: 0.0041161        test: 0.0033668 best: 0.0033668 (667)
668:    learn: 0.0041109        test: 0.0033625 best: 0.0033625 (668)
669:    learn: 0.0041052        test: 0.0033583 best: 0.0033583 (669)
670:    learn: 0.0040993        test: 0.0033538 best: 0.0033538 (670)
671:    learn: 0.0040937        test: 0.0033492 best: 0.0033492 (671)   total: 4m 27s   remaining: 2m 10s
672:    learn: 0.0040884        test: 0.0033452 best: 0.0033452 (672)
673:    learn: 0.0040827        test: 0.0033406 best: 0.0033406 (673)
674:    learn: 0.0040775        test: 0.0033362 best: 0.0033362 (674)
675:    learn: 0.0040723        test: 0.0033319 best: 0.0033319 (675)
676:    learn: 0.0040672        test: 0.0033282 best: 0.0033282 (676)
677:    learn: 0.0040623        test: 0.0033242 best: 0.0033242 (677)
678:    learn: 0.0040570        test: 0.0033200 best: 0.0033200 (678)
679:    learn: 0.0040515        test: 0.0033158 best: 0.0033158 (679)
680:    learn: 0.0040459        test: 0.0033109 best: 0.0033109 (680)
681:    learn: 0.0040408        test: 0.0033069 best: 0.0033069 (681)
682:    learn: 0.0040355        test: 0.0033028 best: 0.0033028 (682)
683:    learn: 0.0040306        test: 0.0032992 best: 0.0032992 (683)
684:    learn: 0.0040252        test: 0.0032950 best: 0.0032950 (684)
685:    learn: 0.0040197        test: 0.0032902 best: 0.0032902 (685)   total: 4m 33s   remaining: 2m 5s
686:    learn: 0.0040143        test: 0.0032856 best: 0.0032856 (686)
687:    learn: 0.0040090        test: 0.0032814 best: 0.0032814 (687)
688:    learn: 0.0040037        test: 0.0032773 best: 0.0032773 (688)
689:    learn: 0.0039988        test: 0.0032733 best: 0.0032733 (689)
690:    learn: 0.0039929        test: 0.0032686 best: 0.0032686 (690)
691:    learn: 0.0039868        test: 0.0032636 best: 0.0032636 (691)
692:    learn: 0.0039817        test: 0.0032595 best: 0.0032595 (692)
693:    learn: 0.0039769        test: 0.0032560 best: 0.0032560 (693)
694:    learn: 0.0039721        test: 0.0032518 best: 0.0032518 (694)
695:    learn: 0.0039674        test: 0.0032485 best: 0.0032485 (695)
696:    learn: 0.0039625        test: 0.0032445 best: 0.0032445 (696)
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697:    learn: 0.0039575        test: 0.0032400 best: 0.0032400 (697)
698:    learn: 0.0039522        test: 0.0032352 best: 0.0032352 (698)
699:    learn: 0.0039470        test: 0.0032306 best: 0.0032306 (699)
700:    learn: 0.0039418        test: 0.0032261 best: 0.0032261 (700)   total: 4m 40s   remaining: 1m 59s
701:    learn: 0.0039365        test: 0.0032218 best: 0.0032218 (701)
702:    learn: 0.0039316        test: 0.0032176 best: 0.0032176 (702)
703:    learn: 0.0039268        test: 0.0032139 best: 0.0032139 (703)
704:    learn: 0.0039216        test: 0.0032098 best: 0.0032098 (704)
705:    learn: 0.0039165        test: 0.0032058 best: 0.0032058 (705)
706:    learn: 0.0039115        test: 0.0032018 best: 0.0032018 (706)
707:    learn: 0.0039059        test: 0.0031976 best: 0.0031976 (707)
708:    learn: 0.0039008        test: 0.0031939 best: 0.0031939 (708)
709:    learn: 0.0038961        test: 0.0031903 best: 0.0031903 (709)
710:    learn: 0.0038908        test: 0.0031862 best: 0.0031862 (710)
711:    learn: 0.0038862        test: 0.0031822 best: 0.0031822 (711)
712:    learn: 0.0038812        test: 0.0031785 best: 0.0031785 (712)
713:    learn: 0.0038766        test: 0.0031752 best: 0.0031752 (713)   total: 4m 45s   remaining: 1m 54s
714:    learn: 0.0038712        test: 0.0031708 best: 0.0031708 (714)
715:    learn: 0.0038662        test: 0.0031666 best: 0.0031666 (715)
716:    learn: 0.0038617        test: 0.0031632 best: 0.0031632 (716)
717:    learn: 0.0038570        test: 0.0031595 best: 0.0031595 (717)
718:    learn: 0.0038520        test: 0.0031554 best: 0.0031554 (718)
719:    learn: 0.0038472        test: 0.0031517 best: 0.0031517 (719)
720:    learn: 0.0038431        test: 0.0031484 best: 0.0031484 (720)
721:    learn: 0.0038386        test: 0.0031447 best: 0.0031447 (721)
722:    learn: 0.0038337        test: 0.0031403 best: 0.0031403 (722)
723:    learn: 0.0038292        test: 0.0031364 best: 0.0031364 (723)
724:    learn: 0.0038241        test: 0.0031322 best: 0.0031322 (724)
725:    learn: 0.0038194        test: 0.0031284 best: 0.0031284 (725)
726:    learn: 0.0038149        test: 0.0031247 best: 0.0031247 (726)
727:    learn: 0.0038100        test: 0.0031207 best: 0.0031207 (727)
728:    learn: 0.0038053        test: 0.0031170 best: 0.0031170 (728)
729:    learn: 0.0038006        test: 0.0031132 best: 0.0031132 (729)   total: 4m 52s   remaining: 1m 48s
730:    learn: 0.0037964        test: 0.0031097 best: 0.0031097 (730)
731:    learn: 0.0037916        test: 0.0031063 best: 0.0031063 (731)
732:    learn: 0.0037872        test: 0.0031029 best: 0.0031029 (732)
733:    learn: 0.0037820        test: 0.0030988 best: 0.0030988 (733)
734:    learn: 0.0037774        test: 0.0030950 best: 0.0030950 (734)
735:    learn: 0.0037726        test: 0.0030911 best: 0.0030911 (735)
736:    learn: 0.0037683        test: 0.0030876 best: 0.0030876 (736)
737:    learn: 0.0037636        test: 0.0030839 best: 0.0030839 (737)
738:    learn: 0.0037590        test: 0.0030800 best: 0.0030800 (738)
739:    learn: 0.0037547        test: 0.0030767 best: 0.0030767 (739)
740:    learn: 0.0037502        test: 0.0030730 best: 0.0030730 (740)   total: 4m 57s   remaining: 1m 43s
741:    learn: 0.0037458        test: 0.0030697 best: 0.0030697 (741)
742:    learn: 0.0037414        test: 0.0030661 best: 0.0030661 (742)
743:    learn: 0.0037365        test: 0.0030625 best: 0.0030625 (743)
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744:    learn: 0.0037319        test: 0.0030587 best: 0.0030587 (744)
745:    learn: 0.0037274        test: 0.0030552 best: 0.0030552 (745)
746:    learn: 0.0037226        test: 0.0030516 best: 0.0030516 (746)
747:    learn: 0.0037177        test: 0.0030477 best: 0.0030477 (747)
748:    learn: 0.0037135        test: 0.0030443 best: 0.0030443 (748)
749:    learn: 0.0037092        test: 0.0030408 best: 0.0030408 (749)   total: 5m 1s    remaining: 1m 40s
750:    learn: 0.0037047        test: 0.0030375 best: 0.0030375 (750)
751:    learn: 0.0036995        test: 0.0030334 best: 0.0030334 (751)
752:    learn: 0.0036948        test: 0.0030298 best: 0.0030298 (752)
753:    learn: 0.0036906        test: 0.0030266 best: 0.0030266 (753)
754:    learn: 0.0036862        test: 0.0030231 best: 0.0030231 (754)
755:    learn: 0.0036822        test: 0.0030199 best: 0.0030199 (755)
756:    learn: 0.0036775        test: 0.0030162 best: 0.0030162 (756)
757:    learn: 0.0036733        test: 0.0030130 best: 0.0030130 (757)
758:    learn: 0.0036692        test: 0.0030098 best: 0.0030098 (758)
759:    learn: 0.0036648        test: 0.0030063 best: 0.0030063 (759)
760:    learn: 0.0036606        test: 0.0030030 best: 0.0030030 (760)
761:    learn: 0.0036563        test: 0.0029995 best: 0.0029995 (761)   total: 5m 6s    remaining: 1m 35s
762:    learn: 0.0036521        test: 0.0029964 best: 0.0029964 (762)
763:    learn: 0.0036477        test: 0.0029927 best: 0.0029927 (763)
764:    learn: 0.0036431        test: 0.0029887 best: 0.0029887 (764)
765:    learn: 0.0036387        test: 0.0029851 best: 0.0029851 (765)
766:    learn: 0.0036349        test: 0.0029821 best: 0.0029821 (766)
767:    learn: 0.0036308        test: 0.0029787 best: 0.0029787 (767)
768:    learn: 0.0036262        test: 0.0029751 best: 0.0029751 (768)
769:    learn: 0.0036222        test: 0.0029720 best: 0.0029720 (769)
770:    learn: 0.0036181        test: 0.0029687 best: 0.0029687 (770)   total: 5m 10s   remaining: 1m 32s
771:    learn: 0.0036139        test: 0.0029653 best: 0.0029653 (771)
772:    learn: 0.0036097        test: 0.0029621 best: 0.0029621 (772)
773:    learn: 0.0036056        test: 0.0029586 best: 0.0029586 (773)
774:    learn: 0.0036009        test: 0.0029551 best: 0.0029551 (774)
775:    learn: 0.0035962        test: 0.0029512 best: 0.0029512 (775)
776:    learn: 0.0035919        test: 0.0029480 best: 0.0029480 (776)
777:    learn: 0.0035874        test: 0.0029447 best: 0.0029447 (777)
778:    learn: 0.0035831        test: 0.0029410 best: 0.0029410 (778)
779:    learn: 0.0035789        test: 0.0029375 best: 0.0029375 (779)
780:    learn: 0.0035743        test: 0.0029338 best: 0.0029338 (780)
781:    learn: 0.0035703        test: 0.0029306 best: 0.0029306 (781)
782:    learn: 0.0035658        test: 0.0029271 best: 0.0029271 (782)
783:    learn: 0.0035616        test: 0.0029234 best: 0.0029234 (783)   total: 5m 16s   remaining: 1m 27s
784:    learn: 0.0035572        test: 0.0029199 best: 0.0029199 (784)
785:    learn: 0.0035533        test: 0.0029168 best: 0.0029168 (785)
786:    learn: 0.0035493        test: 0.0029137 best: 0.0029137 (786)
787:    learn: 0.0035454        test: 0.0029109 best: 0.0029109 (787)
788:    learn: 0.0035413        test: 0.0029077 best: 0.0029077 (788)
789:    learn: 0.0035372        test: 0.0029040 best: 0.0029040 (789)
790:    learn: 0.0035332        test: 0.0029009 best: 0.0029009 (790)
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791:    learn: 0.0035294        test: 0.0028979 best: 0.0028979 (791)
792:    learn: 0.0035253        test: 0.0028948 best: 0.0028948 (792)
793:    learn: 0.0035212        test: 0.0028914 best: 0.0028914 (793)
794:    learn: 0.0035168        test: 0.0028877 best: 0.0028877 (794)   total: 5m 21s   remaining: 1m 22s
795:    learn: 0.0035130        test: 0.0028846 best: 0.0028846 (795)
796:    learn: 0.0035093        test: 0.0028815 best: 0.0028815 (796)
797:    learn: 0.0035052        test: 0.0028784 best: 0.0028784 (797)
798:    learn: 0.0035010        test: 0.0028750 best: 0.0028750 (798)
799:    learn: 0.0034972        test: 0.0028719 best: 0.0028719 (799)
800:    learn: 0.0034934        test: 0.0028689 best: 0.0028689 (800)
801:    learn: 0.0034895        test: 0.0028661 best: 0.0028661 (801)
802:    learn: 0.0034856        test: 0.0028632 best: 0.0028632 (802)   total: 5m 25s   remaining: 1m 19s
803:    learn: 0.0034816        test: 0.0028597 best: 0.0028597 (803)
804:    learn: 0.0034776        test: 0.0028566 best: 0.0028566 (804)
805:    learn: 0.0034739        test: 0.0028537 best: 0.0028537 (805)
806:    learn: 0.0034701        test: 0.0028507 best: 0.0028507 (806)
807:    learn: 0.0034661        test: 0.0028477 best: 0.0028477 (807)
808:    learn: 0.0034620        test: 0.0028445 best: 0.0028445 (808)
809:    learn: 0.0034580        test: 0.0028414 best: 0.0028414 (809)
810:    learn: 0.0034543        test: 0.0028384 best: 0.0028384 (810)
811:    learn: 0.0034504        test: 0.0028353 best: 0.0028353 (811)
812:    learn: 0.0034469        test: 0.0028327 best: 0.0028327 (812)
813:    learn: 0.0034429        test: 0.0028294 best: 0.0028294 (813)   total: 5m 30s   remaining: 1m 15s
814:    learn: 0.0034390        test: 0.0028262 best: 0.0028262 (814)
815:    learn: 0.0034353        test: 0.0028233 best: 0.0028233 (815)
816:    learn: 0.0034318        test: 0.0028202 best: 0.0028202 (816)
817:    learn: 0.0034280        test: 0.0028172 best: 0.0028172 (817)
818:    learn: 0.0034241        test: 0.0028140 best: 0.0028140 (818)
819:    learn: 0.0034200        test: 0.0028105 best: 0.0028105 (819)
820:    learn: 0.0034162        test: 0.0028077 best: 0.0028077 (820)
821:    learn: 0.0034123        test: 0.0028044 best: 0.0028044 (821)
822:    learn: 0.0034087        test: 0.0028013 best: 0.0028013 (822)
823:    learn: 0.0034052        test: 0.0027985 best: 0.0027985 (823)
824:    learn: 0.0034015        test: 0.0027955 best: 0.0027955 (824)   total: 5m 36s   remaining: 1m 11s
825:    learn: 0.0033977        test: 0.0027924 best: 0.0027924 (825)
826:    learn: 0.0033939        test: 0.0027896 best: 0.0027896 (826)
827:    learn: 0.0033903        test: 0.0027868 best: 0.0027868 (827)
828:    learn: 0.0033865        test: 0.0027839 best: 0.0027839 (828)
829:    learn: 0.0033829        test: 0.0027812 best: 0.0027812 (829)
830:    learn: 0.0033790        test: 0.0027780 best: 0.0027780 (830)
831:    learn: 0.0033753        test: 0.0027750 best: 0.0027750 (831)
832:    learn: 0.0033715        test: 0.0027721 best: 0.0027721 (832)   total: 5m 39s   remaining: 1m 8s
833:    learn: 0.0033675        test: 0.0027687 best: 0.0027687 (833)
834:    learn: 0.0033639        test: 0.0027656 best: 0.0027656 (834)
835:    learn: 0.0033608        test: 0.0027631 best: 0.0027631 (835)
836:    learn: 0.0033572        test: 0.0027603 best: 0.0027603 (836)
837:    learn: 0.0033531        test: 0.0027569 best: 0.0027569 (837)
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838:    learn: 0.0033493        test: 0.0027540 best: 0.0027540 (838)
839:    learn: 0.0033460        test: 0.0027515 best: 0.0027515 (839)
840:    learn: 0.0033423        test: 0.0027486 best: 0.0027486 (840)   total: 5m 43s   remaining: 1m 4s
841:    learn: 0.0033389        test: 0.0027460 best: 0.0027460 (841)
842:    learn: 0.0033356        test: 0.0027433 best: 0.0027433 (842)
843:    learn: 0.0033323        test: 0.0027409 best: 0.0027409 (843)
844:    learn: 0.0033284        test: 0.0027376 best: 0.0027376 (844)
845:    learn: 0.0033251        test: 0.0027351 best: 0.0027351 (845)
846:    learn: 0.0033216        test: 0.0027322 best: 0.0027322 (846)   total: 5m 47s   remaining: 1m 2s
847:    learn: 0.0033179        test: 0.0027293 best: 0.0027293 (847)
848:    learn: 0.0033144        test: 0.0027268 best: 0.0027268 (848)
849:    learn: 0.0033109        test: 0.0027239 best: 0.0027239 (849)
850:    learn: 0.0033073        test: 0.0027209 best: 0.0027209 (850)
851:    learn: 0.0033036        test: 0.0027182 best: 0.0027182 (851)
852:    learn: 0.0033000        test: 0.0027153 best: 0.0027153 (852)
853:    learn: 0.0032965        test: 0.0027125 best: 0.0027125 (853)
854:    learn: 0.0032935        test: 0.0027103 best: 0.0027103 (854)
855:    learn: 0.0032900        test: 0.0027077 best: 0.0027077 (855)   total: 5m 51s   remaining: 59.1s
856:    learn: 0.0032865        test: 0.0027048 best: 0.0027048 (856)
857:    learn: 0.0032830        test: 0.0027022 best: 0.0027022 (857)
858:    learn: 0.0032794        test: 0.0026991 best: 0.0026991 (858)
859:    learn: 0.0032759        test: 0.0026964 best: 0.0026964 (859)
860:    learn: 0.0032724        test: 0.0026936 best: 0.0026936 (860)
861:    learn: 0.0032691        test: 0.0026913 best: 0.0026913 (861)
862:    learn: 0.0032657        test: 0.0026886 best: 0.0026886 (862)   total: 5m 54s   remaining: 56.3s
863:    learn: 0.0032625        test: 0.0026861 best: 0.0026861 (863)
864:    learn: 0.0032590        test: 0.0026835 best: 0.0026835 (864)
865:    learn: 0.0032558        test: 0.0026809 best: 0.0026809 (865)
866:    learn: 0.0032529        test: 0.0026788 best: 0.0026788 (866)
867:    learn: 0.0032493        test: 0.0026758 best: 0.0026758 (867)
868:    learn: 0.0032459        test: 0.0026732 best: 0.0026732 (868)
869:    learn: 0.0032426        test: 0.0026708 best: 0.0026708 (869)
870:    learn: 0.0032390        test: 0.0026678 best: 0.0026678 (870)
871:    learn: 0.0032358        test: 0.0026654 best: 0.0026654 (871)
872:    learn: 0.0032328        test: 0.0026632 best: 0.0026632 (872)
873:    learn: 0.0032290        test: 0.0026605 best: 0.0026605 (873)   total: 5m 59s   remaining: 51.9s
874:    learn: 0.0032257        test: 0.0026580 best: 0.0026580 (874)
875:    learn: 0.0032227        test: 0.0026557 best: 0.0026557 (875)
876:    learn: 0.0032190        test: 0.0026527 best: 0.0026527 (876)
877:    learn: 0.0032155        test: 0.0026499 best: 0.0026499 (877)
878:    learn: 0.0032123        test: 0.0026475 best: 0.0026475 (878)
879:    learn: 0.0032088        test: 0.0026448 best: 0.0026448 (879)
880:    learn: 0.0032055        test: 0.0026421 best: 0.0026421 (880)
881:    learn: 0.0032026        test: 0.0026397 best: 0.0026397 (881)
882:    learn: 0.0031993        test: 0.0026371 best: 0.0026371 (882)
883:    learn: 0.0031956        test: 0.0026343 best: 0.0026343 (883)   total: 6m 4s    remaining: 47.8s
884:    learn: 0.0031924        test: 0.0026316 best: 0.0026316 (884)
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885:    learn: 0.0031888        test: 0.0026288 best: 0.0026288 (885)
886:    learn: 0.0031857        test: 0.0026262 best: 0.0026262 (886)
887:    learn: 0.0031827        test: 0.0026237 best: 0.0026237 (887)
888:    learn: 0.0031796        test: 0.0026210 best: 0.0026210 (888)
889:    learn: 0.0031765        test: 0.0026183 best: 0.0026183 (889)
890:    learn: 0.0031731        test: 0.0026153 best: 0.0026153 (890)
891:    learn: 0.0031699        test: 0.0026124 best: 0.0026124 (891)
892:    learn: 0.0031668        test: 0.0026100 best: 0.0026100 (892)
893:    learn: 0.0031635        test: 0.0026074 best: 0.0026074 (893)
894:    learn: 0.0031605        test: 0.0026051 best: 0.0026051 (894)
895:    learn: 0.0031573        test: 0.0026024 best: 0.0026024 (895)
896:    learn: 0.0031541        test: 0.0025997 best: 0.0025997 (896)   total: 6m 9s    remaining: 42.5s
897:    learn: 0.0031508        test: 0.0025975 best: 0.0025975 (897)
898:    learn: 0.0031477        test: 0.0025950 best: 0.0025950 (898)
899:    learn: 0.0031447        test: 0.0025926 best: 0.0025926 (899)
900:    learn: 0.0031415        test: 0.0025903 best: 0.0025903 (900)
901:    learn: 0.0031387        test: 0.0025879 best: 0.0025879 (901)
902:    learn: 0.0031352        test: 0.0025851 best: 0.0025851 (902)
903:    learn: 0.0031320        test: 0.0025827 best: 0.0025827 (903)
904:    learn: 0.0031288        test: 0.0025802 best: 0.0025802 (904)
905:    learn: 0.0031255        test: 0.0025776 best: 0.0025776 (905)
906:    learn: 0.0031223        test: 0.0025751 best: 0.0025751 (906)
907:    learn: 0.0031189        test: 0.0025724 best: 0.0025724 (907)
908:    learn: 0.0031159        test: 0.0025700 best: 0.0025700 (908)
909:    learn: 0.0031127        test: 0.0025675 best: 0.0025675 (909)   total: 6m 17s   remaining: 37.3s
910:    learn: 0.0031094        test: 0.0025649 best: 0.0025649 (910)
911:    learn: 0.0031061        test: 0.0025623 best: 0.0025623 (911)
912:    learn: 0.0031032        test: 0.0025602 best: 0.0025602 (912)
913:    learn: 0.0031003        test: 0.0025580 best: 0.0025580 (913)
914:    learn: 0.0030970        test: 0.0025555 best: 0.0025555 (914)
915:    learn: 0.0030941        test: 0.0025530 best: 0.0025530 (915)
916:    learn: 0.0030915        test: 0.0025511 best: 0.0025511 (916)
917:    learn: 0.0030884        test: 0.0025486 best: 0.0025486 (917)   total: 6m 20s   remaining: 34s
918:    learn: 0.0030852        test: 0.0025461 best: 0.0025461 (918)
919:    learn: 0.0030819        test: 0.0025438 best: 0.0025438 (919)
920:    learn: 0.0030789        test: 0.0025415 best: 0.0025415 (920)
921:    learn: 0.0030759        test: 0.0025392 best: 0.0025392 (921)
922:    learn: 0.0030730        test: 0.0025371 best: 0.0025371 (922)
923:    learn: 0.0030699        test: 0.0025349 best: 0.0025349 (923)
924:    learn: 0.0030670        test: 0.0025325 best: 0.0025325 (924)
925:    learn: 0.0030643        test: 0.0025303 best: 0.0025303 (925)
926:    learn: 0.0030612        test: 0.0025279 best: 0.0025279 (926)
927:    learn: 0.0030577        test: 0.0025250 best: 0.0025250 (927)
928:    learn: 0.0030546        test: 0.0025225 best: 0.0025225 (928)
929:    learn: 0.0030516        test: 0.0025203 best: 0.0025203 (929)
930:    learn: 0.0030487        test: 0.0025182 best: 0.0025182 (930)
931:    learn: 0.0030456        test: 0.0025159 best: 0.0025159 (931)   total: 6m 26s   remaining: 28.2s
```

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932:    learn: 0.0030429        test: 0.0025137 best: 0.0025137 (932)
933:    learn: 0.0030400        test: 0.0025114 best: 0.0025114 (933)
934:    learn: 0.0030370        test: 0.0025090 best: 0.0025090 (934)
935:    learn: 0.0030342        test: 0.0025067 best: 0.0025067 (935)
936:    learn: 0.0030312        test: 0.0025043 best: 0.0025043 (936)
937:    learn: 0.0030279        test: 0.0025016 best: 0.0025016 (937)
938:    learn: 0.0030252        test: 0.0024992 best: 0.0024992 (938)
939:    learn: 0.0030224        test: 0.0024970 best: 0.0024970 (939)
940:    learn: 0.0030197        test: 0.0024947 best: 0.0024947 (940)
941:    learn: 0.0030171        test: 0.0024926 best: 0.0024926 (941)   total: 6m 31s   remaining: 24.1s
942:    learn: 0.0030144        test: 0.0024907 best: 0.0024907 (942)
943:    learn: 0.0030115        test: 0.0024883 best: 0.0024883 (943)
944:    learn: 0.0030085        test: 0.0024858 best: 0.0024858 (944)
945:    learn: 0.0030057        test: 0.0024836 best: 0.0024836 (945)
946:    learn: 0.0030030        test: 0.0024814 best: 0.0024814 (946)
947:    learn: 0.0030000        test: 0.0024791 best: 0.0024791 (947)
948:    learn: 0.0029973        test: 0.0024768 best: 0.0024768 (948)
949:    learn: 0.0029942        test: 0.0024745 best: 0.0024745 (949)
950:    learn: 0.0029913        test: 0.0024724 best: 0.0024724 (950)
951:    learn: 0.0029887        test: 0.0024700 best: 0.0024700 (951)
952:    learn: 0.0029858        test: 0.0024679 best: 0.0024679 (952)
953:    learn: 0.0029833        test: 0.0024655 best: 0.0024655 (953)   total: 6m 36s   remaining: 19.1s
954:    learn: 0.0029807        test: 0.0024634 best: 0.0024634 (954)
955:    learn: 0.0029780        test: 0.0024613 best: 0.0024613 (955)
956:    learn: 0.0029748        test: 0.0024587 best: 0.0024587 (956)
957:    learn: 0.0029715        test: 0.0024560 best: 0.0024560 (957)
958:    learn: 0.0029686        test: 0.0024539 best: 0.0024539 (958)
959:    learn: 0.0029659        test: 0.0024519 best: 0.0024519 (959)
960:    learn: 0.0029631        test: 0.0024496 best: 0.0024496 (960)
961:    learn: 0.0029604        test: 0.0024476 best: 0.0024476 (961)   total: 6m 40s   remaining: 15.8s
962:    learn: 0.0029578        test: 0.0024455 best: 0.0024455 (962)
963:    learn: 0.0029548        test: 0.0024434 best: 0.0024434 (963)
964:    learn: 0.0029522        test: 0.0024414 best: 0.0024414 (964)
965:    learn: 0.0029495        test: 0.0024393 best: 0.0024393 (965)
966:    learn: 0.0029467        test: 0.0024372 best: 0.0024372 (966)
967:    learn: 0.0029441        test: 0.0024352 best: 0.0024352 (967)
968:    learn: 0.0029415        test: 0.0024330 best: 0.0024330 (968)
969:    learn: 0.0029387        test: 0.0024309 best: 0.0024309 (969)
970:    learn: 0.0029357        test: 0.0024288 best: 0.0024288 (970)
971:    learn: 0.0029332        test: 0.0024269 best: 0.0024269 (971)
972:    learn: 0.0029308        test: 0.0024249 best: 0.0024249 (972)   total: 6m 45s   remaining: 11.3s
973:    learn: 0.0029283        test: 0.0024228 best: 0.0024228 (973)
974:    learn: 0.0029255        test: 0.0024208 best: 0.0024208 (974)   total: 6m 46s   remaining: 10.4s
975:    learn: 0.0029227        test: 0.0024185 best: 0.0024185 (975)
976:    learn: 0.0029200        test: 0.0024166 best: 0.0024166 (976)
977:    learn: 0.0029173        test: 0.0024143 best: 0.0024143 (977)
978:    learn: 0.0029146        test: 0.0024123 best: 0.0024123 (978)
```

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979:    learn: 0.0029120        test: 0.0024103 best: 0.0024103 (979)
980:    learn: 0.0029093        test: 0.0024083 best: 0.0024083 (980)
981:    learn: 0.0029068        test: 0.0024064 best: 0.0024064 (981)
982:    learn: 0.0029041        test: 0.0024042 best: 0.0024042 (982)
983:    learn: 0.0029015        test: 0.0024021 best: 0.0024021 (983)
984:    learn: 0.0028988        test: 0.0023999 best: 0.0023999 (984)   total: 6m 51s   remaining: 6.26s
985:    learn: 0.0028962        test: 0.0023980 best: 0.0023980 (985)
986:    learn: 0.0028936        test: 0.0023960 best: 0.0023960 (986)
987:    learn: 0.0028911        test: 0.0023942 best: 0.0023942 (987)
988:    learn: 0.0028883        test: 0.0023919 best: 0.0023919 (988)
989:    learn: 0.0028858        test: 0.0023900 best: 0.0023900 (989)
990:    learn: 0.0028835        test: 0.0023879 best: 0.0023879 (990)
991:    learn: 0.0028807        test: 0.0023855 best: 0.0023855 (991)
992:    learn: 0.0028781        test: 0.0023834 best: 0.0023834 (992)
993:    learn: 0.0028755        test: 0.0023810 best: 0.0023810 (993)
994:    learn: 0.0028727        test: 0.0023789 best: 0.0023789 (994)
995:    learn: 0.0028702        test: 0.0023768 best: 0.0023768 (995)
996:    learn: 0.0028676        test: 0.0023748 best: 0.0023748 (996)
997:    learn: 0.0028650        test: 0.0023728 best: 0.0023728 (997)   total: 6m 56s   remaining: 834ms
998:    learn: 0.0028626        test: 0.0023709 best: 0.0023709 (998)
999:    learn: 0.0028600        test: 0.0023687 best: 0.0023687 (999)   total: 6m 57s   remaining: 0us
```

In [26]:
```
print("---CatBoost Metrics---")
print("Accuracy: {}".format(acc_catboost))
print("Accuracy cross-validation 10-Fold: {}".format(acc_cv_catboost))
print("Running Time: {}".format(datetime.timedelta(seconds=catboost_time)))
```

```
---CatBoost Metrics---
Accuracy: 100.0
Accuracy cross-validation 10-Fold: 100.0
Running Time: 0:06:58.308280
```

In [27]:
```
models = pd.DataFrame({
    'Model': ['KNN', 'Logistic Regression', 'Naive Bayes',
              'Stochastic Gradient Decent', 'Linear SVC',
              'Decision Tree', 'Gradient Boosting Trees',
              'CatBoost'],
    'Score': [
        acc_knn,
        acc_log,
        acc_gaussian,
        acc_sgd,
        acc_linear_svc,
        acc_dt,
        acc_gbt,
        acc_catboost
```

```
    ]})
print("---Reuglar Accuracy Scores---")
models.sort_values(by='Score', ascending=False)
```

```
---Reuglar Accuracy Scores---
```

Out[27]:

	Model	Score
1	Logistic Regression	100.00
2	Naive Bayes	100.00
5	Decision Tree	100.00
6	Gradient Boosting Trees	100.00
7	CatBoost	100.00
4	Linear SVC	95.56
0	KNN	76.45
3	Stochastic Gradient Decent	76.11

In [28]:

```
cv_models = pd.DataFrame({
    'Model': ['KNN', 'Logistic Regression', 'Naive Bayes',
              'Stochastic Gradient Decent', 'Linear SVC',
              'Decision Tree', 'Gradient Boosting Trees',
              'CatBoost'],
    'Score': [
        acc_cv_knn,
        acc_cv_log,
        acc_cv_gaussian,
        acc_cv_sgd,
        acc_cv_linear_svc,
        acc_cv_dt,
        acc_cv_gbt,
        acc_cv_catboost
    ]})
print('---Cross-validation Accuracy Scores---')
cv_models.sort_values(by='Score', ascending=False)
```

```
---Cross-validation Accuracy Scores---
```

Out[28]:

	Model	Score
1	Logistic Regression	100.00

	Model	Score
2	Naive Bayes	100.00
5	Decision Tree	100.00
6	Gradient Boosting Trees	100.00
7	CatBoost	100.00
4	Linear SVC	81.23
3	Stochastic Gradient Decent	64.51
0	KNN	62.80

In [ ]: