

```
In [1]: #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")
```

C:\Users\Sasik\AppData\Roaming\Python\Python38\site-packages\statsmodels\tools\\_testing.py:19: FutureWarning: pandas.util.testing is deprecated. Use the functions in the public API at pandas.testing instead.  
import pandas.util.testing as tm

```
In [2]: df = pd.read_csv("D:\\M.Tech\\Main_Project Files\\uci_datasets_heart_disease.csv").abs()
```

```
In [5]: # Split the dataframe into data and labels
X_train = df.drop('thal', axis=1) # data
y_train = df.target # labels
```

```
In [6]: # 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 [7]: # 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: 0:00:07.649952

```

In [8]: # 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: 76.57  
 Accuracy CV 10-Fold: 65.35  
 Running Time: 0:00:00.205306

```
In [9]: # 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: 0:00:00.072199

```
In [10]: # 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: 96.04  
Accuracy CV 10-Fold: 74.59  
Running Time: 0:00:00.178395

```
In [11]: # 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: 52.48  
Accuracy CV 10-Fold: 62.05  
Running Time: 0:00:00.181384

```
In [12]: # 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: 0:00:00.203014

```
In [13]: # 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: 0:00:00.642025

```
In [14]: # Define the categorical features for the CatBoost model
cat_features = np.where(X_train.dtypes != np.float)[0]
cat_features
```

Out[14]: array([], dtype=int64)

```
In [15]: # 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 [16]: catboost_model = CatBoostClassifier(iterations=1000,
                                             custom_loss=['Accuracy'],
                                             loss_function='Logloss')
```

```
# 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 0.006187

0:	learn: 0.6769517	total: 82ms	remaining: 1m 21s
1:	learn: 0.6652268	total: 85.4ms	remaining: 42.6s
2:	learn: 0.6523390	total: 88.7ms	remaining: 29.5s
3:	learn: 0.6400217	total: 91.9ms	remaining: 22.9s
4:	learn: 0.6281723	total: 94.9ms	remaining: 18.9s
5:	learn: 0.6176303	total: 97.9ms	remaining: 16.2s
6:	learn: 0.6049916	total: 100ms	remaining: 14.2s
7:	learn: 0.5953416	total: 103ms	remaining: 12.8s
8:	learn: 0.5844558	total: 106ms	remaining: 11.7s
9:	learn: 0.5742407	total: 110ms	remaining: 10.9s
10:	learn: 0.5641131	total: 113ms	remaining: 10.2s
11:	learn: 0.5548649	total: 116ms	remaining: 9.59s
12:	learn: 0.5433799	total: 119ms	remaining: 9.04s
13:	learn: 0.5346458	total: 122ms	remaining: 8.6s
14:	learn: 0.5233018	total: 125ms	remaining: 8.21s
15:	learn: 0.5114155	total: 127ms	remaining: 7.83s
16:	learn: 0.5026281	total: 131ms	remaining: 7.55s
17:	learn: 0.4918160	total: 133ms	remaining: 7.28s
18:	learn: 0.4830524	total: 136ms	remaining: 7.04s
19:	learn: 0.4757972	total: 140ms	remaining: 6.85s
20:	learn: 0.4665171	total: 143ms	remaining: 6.67s
21:	learn: 0.4574732	total: 146ms	remaining: 6.51s
22:	learn: 0.4482543	total: 149ms	remaining: 6.34s
23:	learn: 0.4385326	total: 152ms	remaining: 6.2s
24:	learn: 0.4289223	total: 155ms	remaining: 6.03s
25:	learn: 0.4215766	total: 158ms	remaining: 5.91s
26:	learn: 0.4131617	total: 160ms	remaining: 5.78s
27:	learn: 0.4070592	total: 164ms	remaining: 5.68s
28:	learn: 0.3999119	total: 167ms	remaining: 5.6s
29:	learn: 0.3916440	total: 170ms	remaining: 5.5s
30:	learn: 0.3843788	total: 173ms	remaining: 5.42s
31:	learn: 0.3769980	total: 177ms	remaining: 5.35s
32:	learn: 0.3695683	total: 180ms	remaining: 5.28s
33:	learn: 0.3625672	total: 184ms	remaining: 5.22s
34:	learn: 0.3566740	total: 187ms	remaining: 5.15s
35:	learn: 0.3510873	total: 190ms	remaining: 5.08s
36:	learn: 0.3438106	total: 192ms	remaining: 4.99s
37:	learn: 0.3380893	total: 195ms	remaining: 4.93s

38:	learn: 0.3332623	total: 197ms	remaining: 4.86s
39:	learn: 0.3274065	total: 199ms	remaining: 4.77s
40:	learn: 0.3217272	total: 201ms	remaining: 4.7s
41:	learn: 0.3162281	total: 203ms	remaining: 4.63s
42:	learn: 0.3102220	total: 205ms	remaining: 4.56s
43:	learn: 0.3035937	total: 207ms	remaining: 4.5s
44:	learn: 0.2989310	total: 210ms	remaining: 4.45s
45:	learn: 0.2943338	total: 213ms	remaining: 4.41s
46:	learn: 0.2894337	total: 215ms	remaining: 4.37s
47:	learn: 0.2844663	total: 218ms	remaining: 4.33s
48:	learn: 0.2790161	total: 222ms	remaining: 4.3s
49:	learn: 0.2751881	total: 225ms	remaining: 4.27s
50:	learn: 0.2683011	total: 227ms	remaining: 4.22s
51:	learn: 0.2632670	total: 230ms	remaining: 4.2s
52:	learn: 0.2584146	total: 234ms	remaining: 4.18s
53:	learn: 0.2532647	total: 236ms	remaining: 4.14s
54:	learn: 0.2495182	total: 239ms	remaining: 4.1s
55:	learn: 0.2457273	total: 242ms	remaining: 4.08s
56:	learn: 0.2422497	total: 246ms	remaining: 4.08s
57:	learn: 0.2391222	total: 249ms	remaining: 4.05s
58:	learn: 0.2354687	total: 252ms	remaining: 4.03s
59:	learn: 0.2321770	total: 256ms	remaining: 4.01s
60:	learn: 0.2281360	total: 259ms	remaining: 3.99s
61:	learn: 0.2244292	total: 262ms	remaining: 3.96s
62:	learn: 0.2209314	total: 265ms	remaining: 3.94s
63:	learn: 0.2167220	total: 267ms	remaining: 3.91s
64:	learn: 0.2130075	total: 271ms	remaining: 3.89s
65:	learn: 0.2101535	total: 274ms	remaining: 3.88s
66:	learn: 0.2066443	total: 277ms	remaining: 3.86s
67:	learn: 0.2029259	total: 281ms	remaining: 3.85s
68:	learn: 0.1997905	total: 284ms	remaining: 3.83s
69:	learn: 0.1957790	total: 288ms	remaining: 3.82s
70:	learn: 0.1926106	total: 291ms	remaining: 3.8s
71:	learn: 0.1884498	total: 293ms	remaining: 3.78s
72:	learn: 0.1853987	total: 296ms	remaining: 3.76s
73:	learn: 0.1826601	total: 299ms	remaining: 3.74s
74:	learn: 0.1806288	total: 302ms	remaining: 3.73s
75:	learn: 0.1773916	total: 304ms	remaining: 3.7s
76:	learn: 0.1731793	total: 306ms	remaining: 3.67s
77:	learn: 0.1700685	total: 309ms	remaining: 3.65s
78:	learn: 0.1671872	total: 312ms	remaining: 3.64s
79:	learn: 0.1648737	total: 315ms	remaining: 3.62s
80:	learn: 0.1631330	total: 318ms	remaining: 3.61s
81:	learn: 0.1611911	total: 321ms	remaining: 3.6s
82:	learn: 0.1574813	total: 323ms	remaining: 3.57s
83:	learn: 0.1553190	total: 327ms	remaining: 3.56s
84:	learn: 0.1525885	total: 330ms	remaining: 3.55s

85:	learn: 0.1507389	total: 333ms	remaining: 3.54s
86:	learn: 0.1479051	total: 336ms	remaining: 3.53s
87:	learn: 0.1458738	total: 339ms	remaining: 3.51s
88:	learn: 0.1443026	total: 342ms	remaining: 3.5s
89:	learn: 0.1423606	total: 347ms	remaining: 3.51s
90:	learn: 0.1402780	total: 351ms	remaining: 3.5s
91:	learn: 0.1380098	total: 353ms	remaining: 3.48s
92:	learn: 0.1359823	total: 356ms	remaining: 3.47s
93:	learn: 0.1341452	total: 359ms	remaining: 3.46s
94:	learn: 0.1315126	total: 361ms	remaining: 3.44s
95:	learn: 0.1298912	total: 365ms	remaining: 3.43s
96:	learn: 0.1275545	total: 367ms	remaining: 3.42s
97:	learn: 0.1252559	total: 369ms	remaining: 3.4s
98:	learn: 0.1235922	total: 373ms	remaining: 3.39s
99:	learn: 0.1217195	total: 375ms	remaining: 3.38s
100:	learn: 0.1200752	total: 378ms	remaining: 3.37s
101:	learn: 0.1187590	total: 381ms	remaining: 3.36s
102:	learn: 0.1175659	total: 384ms	remaining: 3.35s
103:	learn: 0.1162367	total: 387ms	remaining: 3.33s
104:	learn: 0.1146885	total: 391ms	remaining: 3.33s
105:	learn: 0.1125209	total: 393ms	remaining: 3.31s
106:	learn: 0.1105885	total: 396ms	remaining: 3.3s
107:	learn: 0.1090765	total: 398ms	remaining: 3.29s
108:	learn: 0.1077752	total: 401ms	remaining: 3.28s
109:	learn: 0.1065562	total: 405ms	remaining: 3.28s
110:	learn: 0.1046590	total: 408ms	remaining: 3.27s
111:	learn: 0.1033076	total: 411ms	remaining: 3.26s
112:	learn: 0.1017725	total: 415ms	remaining: 3.26s
113:	learn: 0.1008378	total: 419ms	remaining: 3.25s
114:	learn: 0.0993055	total: 422ms	remaining: 3.25s
115:	learn: 0.0980634	total: 425ms	remaining: 3.24s
116:	learn: 0.0965404	total: 429ms	remaining: 3.24s
117:	learn: 0.0951381	total: 432ms	remaining: 3.23s
118:	learn: 0.0942857	total: 436ms	remaining: 3.23s
119:	learn: 0.0931287	total: 439ms	remaining: 3.22s
120:	learn: 0.0922701	total: 443ms	remaining: 3.22s
121:	learn: 0.0909028	total: 446ms	remaining: 3.21s
122:	learn: 0.0893657	total: 448ms	remaining: 3.19s
123:	learn: 0.0878288	total: 451ms	remaining: 3.19s
124:	learn: 0.0868063	total: 455ms	remaining: 3.18s
125:	learn: 0.0858157	total: 458ms	remaining: 3.18s
126:	learn: 0.0848828	total: 461ms	remaining: 3.17s
127:	learn: 0.0839224	total: 464ms	remaining: 3.16s
128:	learn: 0.0831002	total: 468ms	remaining: 3.16s
129:	learn: 0.0823412	total: 471ms	remaining: 3.15s
130:	learn: 0.0811395	total: 474ms	remaining: 3.14s
131:	learn: 0.0801255	total: 477ms	remaining: 3.14s

132:	learn: 0.0790917	total: 481ms	remaining: 3.14s
133:	learn: 0.0782189	total: 485ms	remaining: 3.13s
134:	learn: 0.0772176	total: 488ms	remaining: 3.13s
135:	learn: 0.0762203	total: 491ms	remaining: 3.12s
136:	learn: 0.0753513	total: 495ms	remaining: 3.12s
137:	learn: 0.0746553	total: 499ms	remaining: 3.12s
138:	learn: 0.0735736	total: 502ms	remaining: 3.11s
139:	learn: 0.0723088	total: 505ms	remaining: 3.1s
140:	learn: 0.0716065	total: 508ms	remaining: 3.1s
141:	learn: 0.0707910	total: 512ms	remaining: 3.09s
142:	learn: 0.0700133	total: 515ms	remaining: 3.09s
143:	learn: 0.0689905	total: 518ms	remaining: 3.08s
144:	learn: 0.0682033	total: 521ms	remaining: 3.07s
145:	learn: 0.0675287	total: 524ms	remaining: 3.07s
146:	learn: 0.0668404	total: 528ms	remaining: 3.06s
147:	learn: 0.0657986	total: 532ms	remaining: 3.06s
148:	learn: 0.0651568	total: 535ms	remaining: 3.06s
149:	learn: 0.0645015	total: 538ms	remaining: 3.05s
150:	learn: 0.0639322	total: 542ms	remaining: 3.05s
151:	learn: 0.0631112	total: 546ms	remaining: 3.05s
152:	learn: 0.0625514	total: 550ms	remaining: 3.04s
153:	learn: 0.0617392	total: 552ms	remaining: 3.03s
154:	learn: 0.0609865	total: 555ms	remaining: 3.03s
155:	learn: 0.0603063	total: 559ms	remaining: 3.02s
156:	learn: 0.0594604	total: 561ms	remaining: 3.01s
157:	learn: 0.0586909	total: 564ms	remaining: 3.01s
158:	learn: 0.0581255	total: 567ms	remaining: 3s
159:	learn: 0.0575602	total: 570ms	remaining: 2.99s
160:	learn: 0.0570161	total: 573ms	remaining: 2.99s
161:	learn: 0.0562217	total: 575ms	remaining: 2.98s
162:	learn: 0.0554487	total: 578ms	remaining: 2.97s
163:	learn: 0.0548629	total: 581ms	remaining: 2.96s
164:	learn: 0.0544460	total: 584ms	remaining: 2.96s
165:	learn: 0.0539670	total: 587ms	remaining: 2.95s
166:	learn: 0.0533683	total: 590ms	remaining: 2.94s
167:	learn: 0.0530139	total: 594ms	remaining: 2.94s
168:	learn: 0.0524048	total: 597ms	remaining: 2.94s
169:	learn: 0.0520244	total: 601ms	remaining: 2.93s
170:	learn: 0.0514606	total: 604ms	remaining: 2.93s
171:	learn: 0.0510137	total: 607ms	remaining: 2.92s
172:	learn: 0.0506524	total: 610ms	remaining: 2.91s
173:	learn: 0.0498934	total: 612ms	remaining: 2.91s
174:	learn: 0.0494319	total: 615ms	remaining: 2.9s
175:	learn: 0.0488411	total: 617ms	remaining: 2.89s
176:	learn: 0.0481345	total: 619ms	remaining: 2.88s
177:	learn: 0.0476529	total: 622ms	remaining: 2.87s
178:	learn: 0.0472675	total: 624ms	remaining: 2.86s



179:	learn: 0.0469107	total: 627ms	remaining: 2.85s
180:	learn: 0.0463620	total: 629ms	remaining: 2.84s
181:	learn: 0.0460030	total: 631ms	remaining: 2.83s
182:	learn: 0.0454616	total: 632ms	remaining: 2.82s
183:	learn: 0.0451024	total: 635ms	remaining: 2.82s
184:	learn: 0.0446511	total: 647ms	remaining: 2.85s
185:	learn: 0.0442572	total: 650ms	remaining: 2.84s
186:	learn: 0.0438940	total: 652ms	remaining: 2.83s
187:	learn: 0.0434572	total: 654ms	remaining: 2.83s
188:	learn: 0.0427904	total: 656ms	remaining: 2.81s
189:	learn: 0.0425079	total: 658ms	remaining: 2.81s
190:	learn: 0.0421708	total: 660ms	remaining: 2.79s
191:	learn: 0.0417828	total: 662ms	remaining: 2.79s
192:	learn: 0.0414281	total: 664ms	remaining: 2.78s
193:	learn: 0.0410837	total: 666ms	remaining: 2.77s
194:	learn: 0.0404740	total: 668ms	remaining: 2.75s
195:	learn: 0.0400479	total: 670ms	remaining: 2.75s
196:	learn: 0.0397436	total: 672ms	remaining: 2.74s
197:	learn: 0.0394044	total: 674ms	remaining: 2.73s
198:	learn: 0.0390585	total: 676ms	remaining: 2.72s
199:	learn: 0.0387171	total: 679ms	remaining: 2.71s
200:	learn: 0.0385284	total: 681ms	remaining: 2.71s
201:	learn: 0.0382368	total: 683ms	remaining: 2.7s
202:	learn: 0.0379597	total: 686ms	remaining: 2.69s
203:	learn: 0.0377169	total: 688ms	remaining: 2.68s
204:	learn: 0.0374676	total: 690ms	remaining: 2.68s
205:	learn: 0.0371343	total: 692ms	remaining: 2.67s
206:	learn: 0.0367458	total: 695ms	remaining: 2.66s
207:	learn: 0.0364045	total: 697ms	remaining: 2.65s
208:	learn: 0.0361922	total: 699ms	remaining: 2.65s
209:	learn: 0.0356452	total: 701ms	remaining: 2.64s
210:	learn: 0.0353494	total: 703ms	remaining: 2.63s
211:	learn: 0.0350934	total: 706ms	remaining: 2.62s
212:	learn: 0.0348242	total: 707ms	remaining: 2.61s
213:	learn: 0.0345433	total: 710ms	remaining: 2.61s
214:	learn: 0.0342528	total: 712ms	remaining: 2.6s
215:	learn: 0.0339207	total: 714ms	remaining: 2.59s
216:	learn: 0.0337286	total: 716ms	remaining: 2.58s
217:	learn: 0.0331751	total: 717ms	remaining: 2.57s
218:	learn: 0.0329801	total: 719ms	remaining: 2.56s
219:	learn: 0.0326894	total: 721ms	remaining: 2.56s
220:	learn: 0.0323278	total: 723ms	remaining: 2.55s
221:	learn: 0.0321883	total: 726ms	remaining: 2.54s
222:	learn: 0.0319658	total: 730ms	remaining: 2.54s
223:	learn: 0.0317212	total: 734ms	remaining: 2.54s
224:	learn: 0.0315524	total: 737ms	remaining: 2.54s
225:	learn: 0.0313128	total: 742ms	remaining: 2.54s

226:	learn: 0.0311367	total: 746ms	remaining: 2.54s
227:	learn: 0.0309363	total: 749ms	remaining: 2.54s
228:	learn: 0.0306443	total: 752ms	remaining: 2.53s
229:	learn: 0.0304011	total: 755ms	remaining: 2.53s
230:	learn: 0.0301634	total: 757ms	remaining: 2.52s
231:	learn: 0.0300122	total: 760ms	remaining: 2.52s
232:	learn: 0.0296311	total: 762ms	remaining: 2.51s
233:	learn: 0.0293236	total: 764ms	remaining: 2.5s
234:	learn: 0.0290502	total: 767ms	remaining: 2.5s
235:	learn: 0.0288086	total: 770ms	remaining: 2.49s
236:	learn: 0.0286449	total: 772ms	remaining: 2.49s
237:	learn: 0.0284247	total: 775ms	remaining: 2.48s
238:	learn: 0.0282917	total: 779ms	remaining: 2.48s
239:	learn: 0.0280905	total: 782ms	remaining: 2.48s
240:	learn: 0.0277130	total: 785ms	remaining: 2.47s
241:	learn: 0.0275617	total: 789ms	remaining: 2.47s
242:	learn: 0.0274082	total: 814ms	remaining: 2.54s
243:	learn: 0.0272551	total: 817ms	remaining: 2.53s
244:	learn: 0.0271108	total: 820ms	remaining: 2.52s
245:	learn: 0.0269691	total: 822ms	remaining: 2.52s
246:	learn: 0.0267028	total: 824ms	remaining: 2.51s
247:	learn: 0.0265220	total: 826ms	remaining: 2.5s
248:	learn: 0.0261803	total: 827ms	remaining: 2.5s
249:	learn: 0.0259554	total: 829ms	remaining: 2.49s
250:	learn: 0.0256725	total: 831ms	remaining: 2.48s
251:	learn: 0.0254050	total: 833ms	remaining: 2.47s
252:	learn: 0.0252922	total: 836ms	remaining: 2.47s
253:	learn: 0.0251428	total: 838ms	remaining: 2.46s
254:	learn: 0.0249928	total: 840ms	remaining: 2.45s
255:	learn: 0.0248547	total: 842ms	remaining: 2.45s
256:	learn: 0.0247602	total: 845ms	remaining: 2.44s
257:	learn: 0.0246195	total: 847ms	remaining: 2.44s
258:	learn: 0.0243901	total: 849ms	remaining: 2.43s
259:	learn: 0.0240288	total: 851ms	remaining: 2.42s
260:	learn: 0.0237156	total: 853ms	remaining: 2.41s
261:	learn: 0.0235730	total: 856ms	remaining: 2.41s
262:	learn: 0.0232885	total: 858ms	remaining: 2.4s
263:	learn: 0.0231125	total: 862ms	remaining: 2.4s
264:	learn: 0.0229724	total: 865ms	remaining: 2.4s
265:	learn: 0.0228277	total: 868ms	remaining: 2.39s
266:	learn: 0.0226883	total: 870ms	remaining: 2.39s
267:	learn: 0.0225058	total: 873ms	remaining: 2.38s
268:	learn: 0.0224188	total: 876ms	remaining: 2.38s
269:	learn: 0.0222950	total: 879ms	remaining: 2.38s
270:	learn: 0.0221472	total: 883ms	remaining: 2.38s
271:	learn: 0.0218670	total: 886ms	remaining: 2.37s
272:	learn: 0.0216232	total: 888ms	remaining: 2.36s

273:	learn: 0.0215177	total: 891ms	remaining: 2.36s
274:	learn: 0.0213384	total: 893ms	remaining: 2.35s
275:	learn: 0.0212553	total: 896ms	remaining: 2.35s
276:	learn: 0.0211578	total: 900ms	remaining: 2.35s
277:	learn: 0.0210095	total: 903ms	remaining: 2.35s
278:	learn: 0.0208394	total: 907ms	remaining: 2.34s
279:	learn: 0.0206489	total: 910ms	remaining: 2.34s
280:	learn: 0.0204598	total: 913ms	remaining: 2.34s
281:	learn: 0.0202642	total: 918ms	remaining: 2.34s
282:	learn: 0.0201776	total: 922ms	remaining: 2.34s
283:	learn: 0.0200440	total: 926ms	remaining: 2.33s
284:	learn: 0.0199074	total: 929ms	remaining: 2.33s
285:	learn: 0.0198322	total: 933ms	remaining: 2.33s
286:	learn: 0.0197502	total: 936ms	remaining: 2.32s
287:	learn: 0.0196433	total: 939ms	remaining: 2.32s
288:	learn: 0.0195051	total: 942ms	remaining: 2.32s
289:	learn: 0.0193966	total: 946ms	remaining: 2.31s
290:	learn: 0.0193003	total: 949ms	remaining: 2.31s
291:	learn: 0.0191043	total: 952ms	remaining: 2.31s
292:	learn: 0.0189700	total: 956ms	remaining: 2.31s
293:	learn: 0.0188730	total: 959ms	remaining: 2.3s
294:	learn: 0.0186836	total: 961ms	remaining: 2.3s
295:	learn: 0.0185893	total: 964ms	remaining: 2.29s
296:	learn: 0.0184258	total: 967ms	remaining: 2.29s
297:	learn: 0.0183278	total: 971ms	remaining: 2.29s
298:	learn: 0.0182157	total: 974ms	remaining: 2.28s
299:	learn: 0.0180001	total: 978ms	remaining: 2.28s
300:	learn: 0.0179347	total: 981ms	remaining: 2.28s
301:	learn: 0.0178344	total: 984ms	remaining: 2.27s
302:	learn: 0.0177532	total: 987ms	remaining: 2.27s
303:	learn: 0.0176272	total: 990ms	remaining: 2.27s
304:	learn: 0.0175235	total: 993ms	remaining: 2.26s
305:	learn: 0.0174096	total: 997ms	remaining: 2.26s
306:	learn: 0.0173596	total: 1000ms	remaining: 2.26s
307:	learn: 0.0171817	total: 1s	remaining: 2.25s
308:	learn: 0.0171089	total: 1s	remaining: 2.25s
309:	learn: 0.0170384	total: 1.01s	remaining: 2.24s
310:	learn: 0.0169367	total: 1.01s	remaining: 2.24s
311:	learn: 0.0168462	total: 1.01s	remaining: 2.24s
312:	learn: 0.0167547	total: 1.02s	remaining: 2.23s
313:	learn: 0.0166592	total: 1.02s	remaining: 2.23s
314:	learn: 0.0165939	total: 1.02s	remaining: 2.23s
315:	learn: 0.0165003	total: 1.03s	remaining: 2.23s
316:	learn: 0.0164109	total: 1.03s	remaining: 2.22s
317:	learn: 0.0162902	total: 1.03s	remaining: 2.22s
318:	learn: 0.0162276	total: 1.04s	remaining: 2.22s
319:	learn: 0.0160703	total: 1.04s	remaining: 2.21s

320:	learn: 0.0160115	total: 1.04s	remaining: 2.21s
321:	learn: 0.0159685	total: 1.05s	remaining: 2.21s
322:	learn: 0.0158676	total: 1.05s	remaining: 2.2s
323:	learn: 0.0158136	total: 1.05s	remaining: 2.2s
324:	learn: 0.0156130	total: 1.06s	remaining: 2.19s
325:	learn: 0.0155137	total: 1.06s	remaining: 2.19s
326:	learn: 0.0154483	total: 1.06s	remaining: 2.19s
327:	learn: 0.0153691	total: 1.06s	remaining: 2.18s
328:	learn: 0.0153083	total: 1.07s	remaining: 2.18s
329:	learn: 0.0152541	total: 1.07s	remaining: 2.17s
330:	learn: 0.0152000	total: 1.07s	remaining: 2.17s
331:	learn: 0.0151678	total: 1.08s	remaining: 2.17s
332:	learn: 0.0151101	total: 1.08s	remaining: 2.16s
333:	learn: 0.0150592	total: 1.08s	remaining: 2.16s
334:	learn: 0.0150121	total: 1.09s	remaining: 2.16s
335:	learn: 0.0149334	total: 1.09s	remaining: 2.15s
336:	learn: 0.0148654	total: 1.09s	remaining: 2.15s
337:	learn: 0.0147571	total: 1.1s	remaining: 2.15s
338:	learn: 0.0146966	total: 1.1s	remaining: 2.14s
339:	learn: 0.0146518	total: 1.1s	remaining: 2.14s
340:	learn: 0.0145678	total: 1.11s	remaining: 2.14s
341:	learn: 0.0144842	total: 1.11s	remaining: 2.13s
342:	learn: 0.0143897	total: 1.11s	remaining: 2.13s
343:	learn: 0.0143312	total: 1.12s	remaining: 2.13s
344:	learn: 0.0142747	total: 1.12s	remaining: 2.13s
345:	learn: 0.0141448	total: 1.12s	remaining: 2.12s
346:	learn: 0.0140412	total: 1.13s	remaining: 2.12s
347:	learn: 0.0139798	total: 1.13s	remaining: 2.11s
348:	learn: 0.0138425	total: 1.13s	remaining: 2.11s
349:	learn: 0.0136758	total: 1.13s	remaining: 2.1s
350:	learn: 0.0135669	total: 1.13s	remaining: 2.1s
351:	learn: 0.0134804	total: 1.14s	remaining: 2.09s
352:	learn: 0.0134061	total: 1.14s	remaining: 2.09s
353:	learn: 0.0133663	total: 1.14s	remaining: 2.09s
354:	learn: 0.0132983	total: 1.15s	remaining: 2.09s
355:	learn: 0.0132537	total: 1.15s	remaining: 2.08s
356:	learn: 0.0131875	total: 1.16s	remaining: 2.08s
357:	learn: 0.0131164	total: 1.16s	remaining: 2.08s
358:	learn: 0.0130387	total: 1.16s	remaining: 2.07s
359:	learn: 0.0129909	total: 1.17s	remaining: 2.07s
360:	learn: 0.0129329	total: 1.17s	remaining: 2.07s
361:	learn: 0.0128773	total: 1.17s	remaining: 2.06s
362:	learn: 0.0128218	total: 1.17s	remaining: 2.06s
363:	learn: 0.0127388	total: 1.18s	remaining: 2.06s
364:	learn: 0.0127016	total: 1.18s	remaining: 2.05s
365:	learn: 0.0126121	total: 1.18s	remaining: 2.05s
366:	learn: 0.0125869	total: 1.19s	remaining: 2.04s

367:	learn: 0.0125409	total: 1.19s	remaining: 2.04s
368:	learn: 0.0124858	total: 1.19s	remaining: 2.04s
369:	learn: 0.0124372	total: 1.19s	remaining: 2.03s
370:	learn: 0.0123757	total: 1.2s	remaining: 2.03s
371:	learn: 0.0123376	total: 1.2s	remaining: 2.03s
372:	learn: 0.0122943	total: 1.2s	remaining: 2.02s
373:	learn: 0.0122615	total: 1.21s	remaining: 2.02s
374:	learn: 0.0121676	total: 1.21s	remaining: 2.02s
375:	learn: 0.0121160	total: 1.21s	remaining: 2.01s
376:	learn: 0.0120735	total: 1.22s	remaining: 2.01s
377:	learn: 0.0120389	total: 1.22s	remaining: 2.01s
378:	learn: 0.0120086	total: 1.22s	remaining: 2s
379:	learn: 0.0119418	total: 1.23s	remaining: 2s
380:	learn: 0.0118854	total: 1.23s	remaining: 2s
381:	learn: 0.0118508	total: 1.23s	remaining: 2s
382:	learn: 0.0117581	total: 1.24s	remaining: 1.99s
383:	learn: 0.0117103	total: 1.24s	remaining: 1.99s
384:	learn: 0.0116701	total: 1.24s	remaining: 1.98s
385:	learn: 0.0116143	total: 1.25s	remaining: 1.98s
386:	learn: 0.0115424	total: 1.25s	remaining: 1.98s
387:	learn: 0.0114867	total: 1.25s	remaining: 1.97s
388:	learn: 0.0114516	total: 1.25s	remaining: 1.97s
389:	learn: 0.0113893	total: 1.26s	remaining: 1.97s
390:	learn: 0.0113431	total: 1.26s	remaining: 1.96s
391:	learn: 0.0113191	total: 1.26s	remaining: 1.96s
392:	learn: 0.0112962	total: 1.27s	remaining: 1.96s
393:	learn: 0.0111712	total: 1.27s	remaining: 1.95s
394:	learn: 0.0111333	total: 1.27s	remaining: 1.95s
395:	learn: 0.0110815	total: 1.28s	remaining: 1.95s
396:	learn: 0.0109944	total: 1.28s	remaining: 1.94s
397:	learn: 0.0109559	total: 1.28s	remaining: 1.94s
398:	learn: 0.0109169	total: 1.29s	remaining: 1.94s
399:	learn: 0.0108710	total: 1.29s	remaining: 1.94s
400:	learn: 0.0108484	total: 1.29s	remaining: 1.93s
401:	learn: 0.0107721	total: 1.29s	remaining: 1.93s
402:	learn: 0.0107134	total: 1.3s	remaining: 1.93s
403:	learn: 0.0106732	total: 1.3s	remaining: 1.92s
404:	learn: 0.0106373	total: 1.31s	remaining: 1.92s
405:	learn: 0.0106056	total: 1.31s	remaining: 1.92s
406:	learn: 0.0105698	total: 1.31s	remaining: 1.91s
407:	learn: 0.0105290	total: 1.32s	remaining: 1.91s
408:	learn: 0.0104885	total: 1.32s	remaining: 1.91s
409:	learn: 0.0104565	total: 1.32s	remaining: 1.9s
410:	learn: 0.0104120	total: 1.33s	remaining: 1.9s
411:	learn: 0.0103709	total: 1.33s	remaining: 1.9s
412:	learn: 0.0103348	total: 1.33s	remaining: 1.9s
413:	learn: 0.0103047	total: 1.34s	remaining: 1.89s

414:	learn: 0.0102683	total: 1.34s	remaining: 1.89s
415:	learn: 0.0102396	total: 1.34s	remaining: 1.88s
416:	learn: 0.0101970	total: 1.34s	remaining: 1.88s
417:	learn: 0.0101713	total: 1.35s	remaining: 1.88s
418:	learn: 0.0101316	total: 1.35s	remaining: 1.87s
419:	learn: 0.0101039	total: 1.35s	remaining: 1.87s
420:	learn: 0.0100521	total: 1.35s	remaining: 1.86s
421:	learn: 0.0100219	total: 1.36s	remaining: 1.86s
422:	learn: 0.0099680	total: 1.36s	remaining: 1.85s
423:	learn: 0.0099298	total: 1.36s	remaining: 1.85s
424:	learn: 0.0098952	total: 1.36s	remaining: 1.84s
425:	learn: 0.0098447	total: 1.37s	remaining: 1.84s
426:	learn: 0.0097818	total: 1.37s	remaining: 1.84s
427:	learn: 0.0097434	total: 1.37s	remaining: 1.83s
428:	learn: 0.0097160	total: 1.37s	remaining: 1.83s
429:	learn: 0.0096869	total: 1.38s	remaining: 1.82s
430:	learn: 0.0096606	total: 1.38s	remaining: 1.82s
431:	learn: 0.0096267	total: 1.38s	remaining: 1.82s
432:	learn: 0.0095860	total: 1.39s	remaining: 1.81s
433:	learn: 0.0095583	total: 1.39s	remaining: 1.81s
434:	learn: 0.0095089	total: 1.39s	remaining: 1.8s
435:	learn: 0.0094666	total: 1.39s	remaining: 1.8s
436:	learn: 0.0094208	total: 1.39s	remaining: 1.79s
437:	learn: 0.0093855	total: 1.4s	remaining: 1.79s
438:	learn: 0.0093061	total: 1.4s	remaining: 1.78s
439:	learn: 0.0092808	total: 1.4s	remaining: 1.78s
440:	learn: 0.0092507	total: 1.4s	remaining: 1.78s
441:	learn: 0.0091981	total: 1.4s	remaining: 1.77s
442:	learn: 0.0091753	total: 1.41s	remaining: 1.77s
443:	learn: 0.0091589	total: 1.41s	remaining: 1.76s
444:	learn: 0.0091264	total: 1.41s	remaining: 1.76s
445:	learn: 0.0090853	total: 1.41s	remaining: 1.75s
446:	learn: 0.0090581	total: 1.41s	remaining: 1.75s
447:	learn: 0.0090198	total: 1.42s	remaining: 1.74s
448:	learn: 0.0089883	total: 1.42s	remaining: 1.74s
449:	learn: 0.0089611	total: 1.42s	remaining: 1.74s
450:	learn: 0.0089373	total: 1.42s	remaining: 1.73s
451:	learn: 0.0089060	total: 1.42s	remaining: 1.73s
452:	learn: 0.0088590	total: 1.43s	remaining: 1.72s
453:	learn: 0.0088111	total: 1.43s	remaining: 1.72s
454:	learn: 0.0087615	total: 1.43s	remaining: 1.71s
455:	learn: 0.0087097	total: 1.43s	remaining: 1.71s
456:	learn: 0.0086792	total: 1.43s	remaining: 1.7s
457:	learn: 0.0086305	total: 1.44s	remaining: 1.7s
458:	learn: 0.0085999	total: 1.44s	remaining: 1.69s
459:	learn: 0.0085511	total: 1.44s	remaining: 1.69s
460:	learn: 0.0085355	total: 1.44s	remaining: 1.68s

461:	learn: 0.0084670	total: 1.44s	remaining: 1.68s
462:	learn: 0.0084473	total: 1.44s	remaining: 1.68s
463:	learn: 0.0083820	total: 1.45s	remaining: 1.67s
464:	learn: 0.0083614	total: 1.45s	remaining: 1.67s
465:	learn: 0.0083406	total: 1.45s	remaining: 1.66s
466:	learn: 0.0083207	total: 1.45s	remaining: 1.66s
467:	learn: 0.0083043	total: 1.45s	remaining: 1.65s
468:	learn: 0.0082767	total: 1.46s	remaining: 1.65s
469:	learn: 0.0082533	total: 1.46s	remaining: 1.64s
470:	learn: 0.0082376	total: 1.46s	remaining: 1.64s
471:	learn: 0.0082004	total: 1.46s	remaining: 1.64s
472:	learn: 0.0081666	total: 1.46s	remaining: 1.63s
473:	learn: 0.0081398	total: 1.47s	remaining: 1.63s
474:	learn: 0.0081132	total: 1.47s	remaining: 1.62s
475:	learn: 0.0080809	total: 1.47s	remaining: 1.62s
476:	learn: 0.0080533	total: 1.47s	remaining: 1.61s
477:	learn: 0.0080361	total: 1.47s	remaining: 1.61s
478:	learn: 0.0079999	total: 1.48s	remaining: 1.6s
479:	learn: 0.0079831	total: 1.48s	remaining: 1.6s
480:	learn: 0.0079450	total: 1.48s	remaining: 1.6s
481:	learn: 0.0079120	total: 1.48s	remaining: 1.59s
482:	learn: 0.0078903	total: 1.48s	remaining: 1.59s
483:	learn: 0.0078738	total: 1.49s	remaining: 1.58s
484:	learn: 0.0078367	total: 1.49s	remaining: 1.58s
485:	learn: 0.0078151	total: 1.49s	remaining: 1.58s
486:	learn: 0.0077936	total: 1.49s	remaining: 1.57s
487:	learn: 0.0077414	total: 1.49s	remaining: 1.57s
488:	learn: 0.0077218	total: 1.5s	remaining: 1.56s
489:	learn: 0.0077050	total: 1.5s	remaining: 1.56s
490:	learn: 0.0076333	total: 1.5s	remaining: 1.55s
491:	learn: 0.0076198	total: 1.5s	remaining: 1.55s
492:	learn: 0.0075979	total: 1.5s	remaining: 1.54s
493:	learn: 0.0075836	total: 1.5s	remaining: 1.54s
494:	learn: 0.0075625	total: 1.51s	remaining: 1.54s
495:	learn: 0.0075479	total: 1.51s	remaining: 1.53s
496:	learn: 0.0075311	total: 1.51s	remaining: 1.53s
497:	learn: 0.0075150	total: 1.51s	remaining: 1.52s
498:	learn: 0.0074881	total: 1.51s	remaining: 1.52s
499:	learn: 0.0074693	total: 1.52s	remaining: 1.52s
500:	learn: 0.0074477	total: 1.52s	remaining: 1.51s
501:	learn: 0.0074313	total: 1.52s	remaining: 1.51s
502:	learn: 0.0073876	total: 1.52s	remaining: 1.5s
503:	learn: 0.0073675	total: 1.52s	remaining: 1.5s
504:	learn: 0.0073578	total: 1.53s	remaining: 1.5s
505:	learn: 0.0073305	total: 1.53s	remaining: 1.49s
506:	learn: 0.0073153	total: 1.53s	remaining: 1.49s
507:	learn: 0.0072765	total: 1.53s	remaining: 1.48s

508:	learn: 0.0072524	total: 1.53s	remaining: 1.48s
509:	learn: 0.0072262	total: 1.53s	remaining: 1.48s
510:	learn: 0.0072079	total: 1.54s	remaining: 1.47s
511:	learn: 0.0071845	total: 1.54s	remaining: 1.47s
512:	learn: 0.0071565	total: 1.54s	remaining: 1.46s
513:	learn: 0.0071403	total: 1.54s	remaining: 1.46s
514:	learn: 0.0071165	total: 1.54s	remaining: 1.45s
515:	learn: 0.0071072	total: 1.55s	remaining: 1.45s
516:	learn: 0.0070920	total: 1.55s	remaining: 1.45s
517:	learn: 0.0070727	total: 1.55s	remaining: 1.44s
518:	learn: 0.0070607	total: 1.55s	remaining: 1.44s
519:	learn: 0.0070450	total: 1.55s	remaining: 1.43s
520:	learn: 0.0070269	total: 1.56s	remaining: 1.43s
521:	learn: 0.0070038	total: 1.56s	remaining: 1.43s
522:	learn: 0.0069416	total: 1.56s	remaining: 1.42s
523:	learn: 0.0069161	total: 1.56s	remaining: 1.42s
524:	learn: 0.0068963	total: 1.56s	remaining: 1.42s
525:	learn: 0.0068788	total: 1.57s	remaining: 1.41s
526:	learn: 0.0068589	total: 1.57s	remaining: 1.41s
527:	learn: 0.0068478	total: 1.57s	remaining: 1.4s
528:	learn: 0.0068297	total: 1.57s	remaining: 1.4s
529:	learn: 0.0068058	total: 1.57s	remaining: 1.4s
530:	learn: 0.0067959	total: 1.58s	remaining: 1.39s
531:	learn: 0.0067809	total: 1.58s	remaining: 1.39s
532:	learn: 0.0067577	total: 1.58s	remaining: 1.38s
533:	learn: 0.0067210	total: 1.58s	remaining: 1.38s
534:	learn: 0.0066977	total: 1.58s	remaining: 1.38s
535:	learn: 0.0066754	total: 1.58s	remaining: 1.37s
536:	learn: 0.0066415	total: 1.59s	remaining: 1.37s
537:	learn: 0.0066270	total: 1.59s	remaining: 1.36s
538:	learn: 0.0065810	total: 1.59s	remaining: 1.36s
539:	learn: 0.0065487	total: 1.59s	remaining: 1.35s
540:	learn: 0.0065268	total: 1.59s	remaining: 1.35s
541:	learn: 0.0065076	total: 1.59s	remaining: 1.35s
542:	learn: 0.0064905	total: 1.6s	remaining: 1.34s
543:	learn: 0.0064761	total: 1.6s	remaining: 1.34s
544:	learn: 0.0064656	total: 1.6s	remaining: 1.34s
545:	learn: 0.0064437	total: 1.6s	remaining: 1.33s
546:	learn: 0.0064141	total: 1.6s	remaining: 1.33s
547:	learn: 0.0063964	total: 1.6s	remaining: 1.32s
548:	learn: 0.0063796	total: 1.61s	remaining: 1.32s
549:	learn: 0.0063675	total: 1.61s	remaining: 1.32s
550:	learn: 0.0063413	total: 1.61s	remaining: 1.31s
551:	learn: 0.0063167	total: 1.61s	remaining: 1.31s
552:	learn: 0.0063060	total: 1.61s	remaining: 1.3s
553:	learn: 0.0062939	total: 1.62s	remaining: 1.3s
554:	learn: 0.0062825	total: 1.62s	remaining: 1.3s



555:	learn: 0.0062516	total: 1.62s	remaining: 1.29s
556:	learn: 0.0062359	total: 1.62s	remaining: 1.29s
557:	learn: 0.0062215	total: 1.63s	remaining: 1.29s
558:	learn: 0.0062104	total: 1.63s	remaining: 1.28s
559:	learn: 0.0061965	total: 1.63s	remaining: 1.28s
560:	learn: 0.0061644	total: 1.63s	remaining: 1.28s
561:	learn: 0.0061404	total: 1.63s	remaining: 1.27s
562:	learn: 0.0061160	total: 1.64s	remaining: 1.27s
563:	learn: 0.0060972	total: 1.64s	remaining: 1.26s
564:	learn: 0.0060816	total: 1.64s	remaining: 1.26s
565:	learn: 0.0060735	total: 1.64s	remaining: 1.26s
566:	learn: 0.0060486	total: 1.64s	remaining: 1.25s
567:	learn: 0.0060348	total: 1.64s	remaining: 1.25s
568:	learn: 0.0060183	total: 1.65s	remaining: 1.25s
569:	learn: 0.0060011	total: 1.65s	remaining: 1.24s
570:	learn: 0.0059750	total: 1.65s	remaining: 1.24s
571:	learn: 0.0059618	total: 1.65s	remaining: 1.24s
572:	learn: 0.0059527	total: 1.65s	remaining: 1.23s
573:	learn: 0.0059410	total: 1.66s	remaining: 1.23s
574:	learn: 0.0059261	total: 1.66s	remaining: 1.23s
575:	learn: 0.0059066	total: 1.66s	remaining: 1.22s
576:	learn: 0.0058886	total: 1.69s	remaining: 1.24s
577:	learn: 0.0058736	total: 1.69s	remaining: 1.23s
578:	learn: 0.0058576	total: 1.69s	remaining: 1.23s
579:	learn: 0.0058327	total: 1.7s	remaining: 1.23s
580:	learn: 0.0058208	total: 1.7s	remaining: 1.23s
581:	learn: 0.0058072	total: 1.7s	remaining: 1.22s
582:	learn: 0.0057800	total: 1.7s	remaining: 1.22s
583:	learn: 0.0057653	total: 1.71s	remaining: 1.22s
584:	learn: 0.0057468	total: 1.71s	remaining: 1.21s
585:	learn: 0.0057385	total: 1.71s	remaining: 1.21s
586:	learn: 0.0057249	total: 1.71s	remaining: 1.21s
587:	learn: 0.0057168	total: 1.72s	remaining: 1.2s
588:	learn: 0.0056837	total: 1.72s	remaining: 1.2s
589:	learn: 0.0056690	total: 1.72s	remaining: 1.2s
590:	learn: 0.0056557	total: 1.73s	remaining: 1.19s
591:	learn: 0.0056393	total: 1.73s	remaining: 1.19s
592:	learn: 0.0056040	total: 1.73s	remaining: 1.19s
593:	learn: 0.0055943	total: 1.73s	remaining: 1.18s
594:	learn: 0.0055845	total: 1.73s	remaining: 1.18s
595:	learn: 0.0055663	total: 1.74s	remaining: 1.18s
596:	learn: 0.0055593	total: 1.74s	remaining: 1.17s
597:	learn: 0.0055442	total: 1.74s	remaining: 1.17s
598:	learn: 0.0055281	total: 1.75s	remaining: 1.17s
599:	learn: 0.0055133	total: 1.75s	remaining: 1.17s
600:	learn: 0.0055069	total: 1.75s	remaining: 1.16s
601:	learn: 0.0054867	total: 1.75s	remaining: 1.16s

602:	learn: 0.0054764	total: 1.76s	remaining: 1.16s
603:	learn: 0.0054654	total: 1.76s	remaining: 1.15s
604:	learn: 0.0054533	total: 1.76s	remaining: 1.15s
605:	learn: 0.0054449	total: 1.77s	remaining: 1.15s
606:	learn: 0.0054346	total: 1.77s	remaining: 1.15s
607:	learn: 0.0054172	total: 1.77s	remaining: 1.14s
608:	learn: 0.0054087	total: 1.78s	remaining: 1.14s
609:	learn: 0.0053978	total: 1.78s	remaining: 1.14s
610:	learn: 0.0053750	total: 1.78s	remaining: 1.13s
611:	learn: 0.0053623	total: 1.78s	remaining: 1.13s
612:	learn: 0.0053513	total: 1.79s	remaining: 1.13s
613:	learn: 0.0053413	total: 1.79s	remaining: 1.13s
614:	learn: 0.0053221	total: 1.79s	remaining: 1.12s
615:	learn: 0.0053091	total: 1.8s	remaining: 1.12s
616:	learn: 0.0053014	total: 1.8s	remaining: 1.12s
617:	learn: 0.0052875	total: 1.8s	remaining: 1.11s
618:	learn: 0.0052746	total: 1.81s	remaining: 1.11s
619:	learn: 0.0052596	total: 1.81s	remaining: 1.11s
620:	learn: 0.0052483	total: 1.81s	remaining: 1.11s
621:	learn: 0.0052268	total: 1.82s	remaining: 1.1s
622:	learn: 0.0052054	total: 1.82s	remaining: 1.1s
623:	learn: 0.0051937	total: 1.82s	remaining: 1.1s
624:	learn: 0.0051836	total: 1.82s	remaining: 1.09s
625:	learn: 0.0051726	total: 1.83s	remaining: 1.09s
626:	learn: 0.0051593	total: 1.83s	remaining: 1.09s
627:	learn: 0.0051443	total: 1.83s	remaining: 1.09s
628:	learn: 0.0051309	total: 1.84s	remaining: 1.08s
629:	learn: 0.0051196	total: 1.84s	remaining: 1.08s
630:	learn: 0.0051104	total: 1.84s	remaining: 1.08s
631:	learn: 0.0050990	total: 1.85s	remaining: 1.08s
632:	learn: 0.0050822	total: 1.85s	remaining: 1.07s
633:	learn: 0.0050700	total: 1.85s	remaining: 1.07s
634:	learn: 0.0050569	total: 1.86s	remaining: 1.07s
635:	learn: 0.0050460	total: 1.86s	remaining: 1.06s
636:	learn: 0.0050305	total: 1.86s	remaining: 1.06s
637:	learn: 0.0050195	total: 1.87s	remaining: 1.06s
638:	learn: 0.0050049	total: 1.87s	remaining: 1.06s
639:	learn: 0.0049984	total: 1.87s	remaining: 1.05s
640:	learn: 0.0049784	total: 1.88s	remaining: 1.05s
641:	learn: 0.0049695	total: 1.88s	remaining: 1.05s
642:	learn: 0.0049582	total: 1.88s	remaining: 1.04s
643:	learn: 0.0049507	total: 1.89s	remaining: 1.04s
644:	learn: 0.0049417	total: 1.89s	remaining: 1.04s
645:	learn: 0.0049367	total: 1.89s	remaining: 1.04s
646:	learn: 0.0049197	total: 1.89s	remaining: 1.03s
647:	learn: 0.0049151	total: 1.9s	remaining: 1.03s
648:	learn: 0.0049029	total: 1.9s	remaining: 1.03s

649:	learn: 0.0048965	total: 1.9s	remaining: 1.02s
650:	learn: 0.0048700	total: 1.9s	remaining: 1.02s
651:	learn: 0.0048602	total: 1.91s	remaining: 1.02s
652:	learn: 0.0048504	total: 1.91s	remaining: 1.01s
653:	learn: 0.0048435	total: 1.91s	remaining: 1.01s
654:	learn: 0.0048306	total: 1.92s	remaining: 1.01s
655:	learn: 0.0048188	total: 1.92s	remaining: 1.01s
656:	learn: 0.0047916	total: 1.92s	remaining: 1s
657:	learn: 0.0047853	total: 1.93s	remaining: 1s
658:	learn: 0.0047797	total: 1.93s	remaining: 998ms
659:	learn: 0.0047667	total: 1.93s	remaining: 995ms
660:	learn: 0.0047322	total: 1.93s	remaining: 991ms
661:	learn: 0.0047163	total: 1.94s	remaining: 989ms
662:	learn: 0.0047108	total: 1.94s	remaining: 986ms
663:	learn: 0.0047001	total: 1.94s	remaining: 983ms
664:	learn: 0.0046741	total: 1.94s	remaining: 979ms
665:	learn: 0.0046645	total: 1.95s	remaining: 976ms
666:	learn: 0.0046500	total: 1.95s	remaining: 973ms
667:	learn: 0.0046417	total: 1.95s	remaining: 970ms
668:	learn: 0.0046341	total: 1.96s	remaining: 967ms
669:	learn: 0.0046235	total: 1.96s	remaining: 965ms
670:	learn: 0.0045982	total: 1.96s	remaining: 961ms
671:	learn: 0.0045894	total: 1.96s	remaining: 958ms
672:	learn: 0.0045688	total: 1.97s	remaining: 955ms
673:	learn: 0.0045548	total: 1.97s	remaining: 952ms
674:	learn: 0.0045312	total: 1.97s	remaining: 949ms
675:	learn: 0.0045255	total: 1.97s	remaining: 946ms
676:	learn: 0.0045089	total: 1.98s	remaining: 943ms
677:	learn: 0.0044847	total: 1.98s	remaining: 939ms
678:	learn: 0.0044755	total: 1.98s	remaining: 937ms
679:	learn: 0.0044515	total: 1.98s	remaining: 933ms
680:	learn: 0.0044422	total: 1.99s	remaining: 931ms
681:	learn: 0.0044237	total: 1.99s	remaining: 927ms
682:	learn: 0.0044160	total: 1.99s	remaining: 925ms
683:	learn: 0.0043976	total: 1.99s	remaining: 921ms
684:	learn: 0.0043924	total: 2s	remaining: 918ms
685:	learn: 0.0043876	total: 2s	remaining: 916ms
686:	learn: 0.0043783	total: 2s	remaining: 914ms
687:	learn: 0.0043706	total: 2.01s	remaining: 911ms
688:	learn: 0.0043647	total: 2.01s	remaining: 909ms
689:	learn: 0.0043594	total: 2.02s	remaining: 906ms
690:	learn: 0.0043526	total: 2.02s	remaining: 904ms
691:	learn: 0.0043433	total: 2.02s	remaining: 901ms
692:	learn: 0.0043307	total: 2.03s	remaining: 898ms
693:	learn: 0.0043187	total: 2.03s	remaining: 895ms
694:	learn: 0.0043077	total: 2.03s	remaining: 892ms
695:	learn: 0.0042983	total: 2.04s	remaining: 889ms

696:	learn: 0.0042947	total: 2.04s	remaining: 886ms
697:	learn: 0.0042897	total: 2.04s	remaining: 883ms
698:	learn: 0.0042842	total: 2.04s	remaining: 880ms
699:	learn: 0.0042782	total: 2.04s	remaining: 877ms
700:	learn: 0.0042732	total: 2.05s	remaining: 874ms
701:	learn: 0.0042653	total: 2.05s	remaining: 870ms
702:	learn: 0.0042602	total: 2.05s	remaining: 867ms
703:	learn: 0.0042493	total: 2.06s	remaining: 864ms
704:	learn: 0.0042398	total: 2.06s	remaining: 861ms
705:	learn: 0.0042227	total: 2.06s	remaining: 858ms
706:	learn: 0.0042050	total: 2.06s	remaining: 854ms
707:	learn: 0.0041981	total: 2.06s	remaining: 852ms
708:	learn: 0.0041928	total: 2.07s	remaining: 849ms
709:	learn: 0.0041875	total: 2.07s	remaining: 846ms
710:	learn: 0.0041823	total: 2.07s	remaining: 843ms
711:	learn: 0.0041666	total: 2.08s	remaining: 840ms
712:	learn: 0.0041550	total: 2.08s	remaining: 836ms
713:	learn: 0.0041494	total: 2.08s	remaining: 833ms
714:	learn: 0.0041410	total: 2.08s	remaining: 830ms
715:	learn: 0.0041292	total: 2.08s	remaining: 826ms
716:	learn: 0.0041210	total: 2.08s	remaining: 823ms
717:	learn: 0.0041165	total: 2.09s	remaining: 820ms
718:	learn: 0.0041111	total: 2.09s	remaining: 817ms
719:	learn: 0.0041046	total: 2.09s	remaining: 814ms
720:	learn: 0.0040903	total: 2.09s	remaining: 810ms
721:	learn: 0.0040841	total: 2.1s	remaining: 807ms
722:	learn: 0.0040787	total: 2.1s	remaining: 804ms
723:	learn: 0.0040718	total: 2.1s	remaining: 800ms
724:	learn: 0.0040630	total: 2.1s	remaining: 797ms
725:	learn: 0.0040581	total: 2.1s	remaining: 794ms
726:	learn: 0.0040518	total: 2.1s	remaining: 790ms
727:	learn: 0.0040430	total: 2.11s	remaining: 787ms
728:	learn: 0.0040361	total: 2.11s	remaining: 784ms
729:	learn: 0.0040236	total: 2.11s	remaining: 781ms
730:	learn: 0.0040112	total: 2.11s	remaining: 778ms
731:	learn: 0.0040051	total: 2.12s	remaining: 775ms
732:	learn: 0.0040014	total: 2.12s	remaining: 773ms
733:	learn: 0.0039918	total: 2.12s	remaining: 770ms
734:	learn: 0.0039842	total: 2.13s	remaining: 767ms
735:	learn: 0.0039730	total: 2.13s	remaining: 764ms
736:	learn: 0.0039657	total: 2.13s	remaining: 761ms
737:	learn: 0.0039620	total: 2.13s	remaining: 758ms
738:	learn: 0.0039526	total: 2.14s	remaining: 755ms
739:	learn: 0.0039447	total: 2.14s	remaining: 752ms
740:	learn: 0.0039368	total: 2.14s	remaining: 750ms
741:	learn: 0.0039261	total: 2.15s	remaining: 746ms
742:	learn: 0.0039199	total: 2.15s	remaining: 744ms

743:	learn: 0.0039127	total: 2.15s	remaining: 741ms
744:	learn: 0.0039039	total: 2.15s	remaining: 738ms
745:	learn: 0.0038992	total: 2.16s	remaining: 735ms
746:	learn: 0.0038901	total: 2.16s	remaining: 732ms
747:	learn: 0.0038844	total: 2.16s	remaining: 729ms
748:	learn: 0.0038739	total: 2.17s	remaining: 726ms
749:	learn: 0.0038634	total: 2.17s	remaining: 723ms
750:	learn: 0.0038601	total: 2.17s	remaining: 720ms
751:	learn: 0.0038522	total: 2.17s	remaining: 717ms
752:	learn: 0.0038453	total: 2.18s	remaining: 714ms
753:	learn: 0.0038356	total: 2.18s	remaining: 712ms
754:	learn: 0.0038309	total: 2.18s	remaining: 709ms
755:	learn: 0.0038196	total: 2.19s	remaining: 706ms
756:	learn: 0.0038072	total: 2.19s	remaining: 703ms
757:	learn: 0.0037992	total: 2.19s	remaining: 699ms
758:	learn: 0.0037908	total: 2.19s	remaining: 697ms
759:	learn: 0.0037865	total: 2.2s	remaining: 694ms
760:	learn: 0.0037816	total: 2.2s	remaining: 691ms
761:	learn: 0.0037673	total: 2.2s	remaining: 688ms
762:	learn: 0.0037612	total: 2.2s	remaining: 685ms
763:	learn: 0.0037554	total: 2.21s	remaining: 682ms
764:	learn: 0.0037462	total: 2.21s	remaining: 679ms
765:	learn: 0.0037349	total: 2.21s	remaining: 676ms
766:	learn: 0.0037192	total: 2.21s	remaining: 673ms
767:	learn: 0.0037135	total: 2.22s	remaining: 670ms
768:	learn: 0.0037061	total: 2.22s	remaining: 666ms
769:	learn: 0.0036993	total: 2.22s	remaining: 664ms
770:	learn: 0.0036916	total: 2.23s	remaining: 661ms
771:	learn: 0.0036867	total: 2.23s	remaining: 658ms
772:	learn: 0.0036818	total: 2.23s	remaining: 656ms
773:	learn: 0.0036786	total: 2.24s	remaining: 653ms
774:	learn: 0.0036739	total: 2.24s	remaining: 650ms
775:	learn: 0.0036569	total: 2.24s	remaining: 648ms
776:	learn: 0.0036514	total: 2.25s	remaining: 645ms
777:	learn: 0.0036460	total: 2.25s	remaining: 643ms
778:	learn: 0.0036353	total: 2.25s	remaining: 640ms
779:	learn: 0.0036327	total: 2.26s	remaining: 637ms
780:	learn: 0.0036163	total: 2.26s	remaining: 634ms
781:	learn: 0.0036105	total: 2.26s	remaining: 631ms
782:	learn: 0.0036053	total: 2.27s	remaining: 629ms
783:	learn: 0.0035978	total: 2.27s	remaining: 626ms
784:	learn: 0.0035873	total: 2.28s	remaining: 624ms
785:	learn: 0.0035813	total: 2.28s	remaining: 621ms
786:	learn: 0.0035763	total: 2.28s	remaining: 618ms
787:	learn: 0.0035679	total: 2.29s	remaining: 616ms
788:	learn: 0.0035551	total: 2.29s	remaining: 613ms
789:	learn: 0.0035503	total: 2.29s	remaining: 610ms

790:	learn: 0.0035443	total: 2.3s	remaining: 607ms
791:	learn: 0.0035365	total: 2.3s	remaining: 604ms
792:	learn: 0.0035324	total: 2.3s	remaining: 602ms
793:	learn: 0.0035282	total: 2.31s	remaining: 599ms
794:	learn: 0.0035236	total: 2.31s	remaining: 596ms
795:	learn: 0.0035188	total: 2.32s	remaining: 594ms
796:	learn: 0.0035131	total: 2.32s	remaining: 591ms
797:	learn: 0.0035094	total: 2.33s	remaining: 589ms
798:	learn: 0.0034982	total: 2.33s	remaining: 586ms
799:	learn: 0.0034939	total: 2.33s	remaining: 583ms
800:	learn: 0.0034866	total: 2.33s	remaining: 580ms
801:	learn: 0.0034813	total: 2.33s	remaining: 577ms
802:	learn: 0.0034761	total: 2.34s	remaining: 574ms
803:	learn: 0.0034724	total: 2.34s	remaining: 570ms
804:	learn: 0.0034649	total: 2.34s	remaining: 567ms
805:	learn: 0.0034495	total: 2.34s	remaining: 564ms
806:	learn: 0.0034438	total: 2.34s	remaining: 561ms
807:	learn: 0.0034382	total: 2.35s	remaining: 558ms
808:	learn: 0.0034355	total: 2.35s	remaining: 555ms
809:	learn: 0.0034265	total: 2.35s	remaining: 552ms
810:	learn: 0.0034241	total: 2.35s	remaining: 549ms
811:	learn: 0.0034202	total: 2.36s	remaining: 546ms
812:	learn: 0.0034141	total: 2.36s	remaining: 543ms
813:	learn: 0.0034092	total: 2.36s	remaining: 539ms
814:	learn: 0.0033993	total: 2.36s	remaining: 537ms
815:	learn: 0.0033949	total: 2.37s	remaining: 534ms
816:	learn: 0.0033882	total: 2.37s	remaining: 531ms
817:	learn: 0.0033830	total: 2.37s	remaining: 528ms
818:	learn: 0.0033752	total: 2.37s	remaining: 524ms
819:	learn: 0.0033703	total: 2.38s	remaining: 521ms
820:	learn: 0.0033626	total: 2.38s	remaining: 518ms
821:	learn: 0.0033585	total: 2.38s	remaining: 515ms
822:	learn: 0.0033514	total: 2.38s	remaining: 512ms
823:	learn: 0.0033485	total: 2.38s	remaining: 509ms
824:	learn: 0.0033451	total: 2.39s	remaining: 507ms
825:	learn: 0.0033336	total: 2.39s	remaining: 503ms
826:	learn: 0.0033279	total: 2.39s	remaining: 501ms
827:	learn: 0.0033245	total: 2.4s	remaining: 498ms
828:	learn: 0.0033185	total: 2.4s	remaining: 495ms
829:	learn: 0.0033156	total: 2.4s	remaining: 492ms
830:	learn: 0.0033092	total: 2.4s	remaining: 489ms
831:	learn: 0.0033050	total: 2.41s	remaining: 486ms
832:	learn: 0.0033007	total: 2.41s	remaining: 483ms
833:	learn: 0.0032953	total: 2.41s	remaining: 480ms
834:	learn: 0.0032905	total: 2.42s	remaining: 477ms
835:	learn: 0.0032849	total: 2.42s	remaining: 475ms
836:	learn: 0.0032782	total: 2.42s	remaining: 472ms

837:	learn: 0.0032760	total: 2.42s	remaining: 469ms
838:	learn: 0.0032698	total: 2.43s	remaining: 466ms
839:	learn: 0.0032644	total: 2.43s	remaining: 463ms
840:	learn: 0.0032569	total: 2.43s	remaining: 460ms
841:	learn: 0.0032536	total: 2.44s	remaining: 458ms
842:	learn: 0.0032502	total: 2.44s	remaining: 455ms
843:	learn: 0.0032425	total: 2.44s	remaining: 452ms
844:	learn: 0.0032289	total: 2.45s	remaining: 449ms
845:	learn: 0.0032251	total: 2.45s	remaining: 446ms
846:	learn: 0.0032200	total: 2.45s	remaining: 443ms
847:	learn: 0.0032146	total: 2.46s	remaining: 440ms
848:	learn: 0.0032038	total: 2.46s	remaining: 437ms
849:	learn: 0.0031980	total: 2.46s	remaining: 435ms
850:	learn: 0.0031949	total: 2.46s	remaining: 432ms
851:	learn: 0.0031926	total: 2.47s	remaining: 429ms
852:	learn: 0.0031862	total: 2.47s	remaining: 426ms
853:	learn: 0.0031790	total: 2.47s	remaining: 423ms
854:	learn: 0.0031737	total: 2.48s	remaining: 420ms
855:	learn: 0.0031605	total: 2.48s	remaining: 417ms
856:	learn: 0.0031568	total: 2.48s	remaining: 414ms
857:	learn: 0.0031537	total: 2.49s	remaining: 412ms
858:	learn: 0.0031478	total: 2.49s	remaining: 409ms
859:	learn: 0.0031400	total: 2.49s	remaining: 406ms
860:	learn: 0.0031376	total: 2.5s	remaining: 403ms
861:	learn: 0.0031339	total: 2.5s	remaining: 400ms
862:	learn: 0.0031211	total: 2.5s	remaining: 397ms
863:	learn: 0.0031181	total: 2.51s	remaining: 395ms
864:	learn: 0.0031148	total: 2.51s	remaining: 392ms
865:	learn: 0.0031093	total: 2.51s	remaining: 389ms
866:	learn: 0.0031058	total: 2.52s	remaining: 386ms
867:	learn: 0.0031023	total: 2.52s	remaining: 383ms
868:	learn: 0.0030981	total: 2.52s	remaining: 380ms
869:	learn: 0.0030958	total: 2.53s	remaining: 378ms
870:	learn: 0.0030920	total: 2.53s	remaining: 375ms
871:	learn: 0.0030868	total: 2.53s	remaining: 372ms
872:	learn: 0.0030837	total: 2.54s	remaining: 369ms
873:	learn: 0.0030737	total: 2.54s	remaining: 366ms
874:	learn: 0.0030676	total: 2.55s	remaining: 364ms
875:	learn: 0.0030619	total: 2.61s	remaining: 370ms
876:	learn: 0.0030553	total: 2.61s	remaining: 367ms
877:	learn: 0.0030480	total: 2.62s	remaining: 364ms
878:	learn: 0.0030455	total: 2.62s	remaining: 361ms
879:	learn: 0.0030419	total: 2.62s	remaining: 358ms
880:	learn: 0.0030297	total: 2.63s	remaining: 355ms
881:	learn: 0.0030256	total: 2.63s	remaining: 352ms
882:	learn: 0.0030214	total: 2.63s	remaining: 349ms
883:	learn: 0.0030172	total: 2.63s	remaining: 346ms

884:	learn: 0.0030117	total: 2.64s	remaining: 343ms
885:	learn: 0.0030054	total: 2.64s	remaining: 340ms
886:	learn: 0.0030010	total: 2.64s	remaining: 337ms
887:	learn: 0.0029950	total: 2.65s	remaining: 334ms
888:	learn: 0.0029915	total: 2.65s	remaining: 331ms
889:	learn: 0.0029889	total: 2.65s	remaining: 328ms
890:	learn: 0.0029814	total: 2.65s	remaining: 325ms
891:	learn: 0.0029779	total: 2.66s	remaining: 322ms
892:	learn: 0.0029702	total: 2.66s	remaining: 319ms
893:	learn: 0.0029597	total: 2.66s	remaining: 316ms
894:	learn: 0.0029549	total: 2.67s	remaining: 313ms
895:	learn: 0.0029480	total: 2.67s	remaining: 310ms
896:	learn: 0.0029441	total: 2.67s	remaining: 307ms
897:	learn: 0.0029384	total: 2.68s	remaining: 304ms
898:	learn: 0.0029338	total: 2.68s	remaining: 301ms
899:	learn: 0.0029308	total: 2.68s	remaining: 298ms
900:	learn: 0.0029275	total: 2.69s	remaining: 295ms
901:	learn: 0.0029233	total: 2.69s	remaining: 292ms
902:	learn: 0.0029191	total: 2.69s	remaining: 289ms
903:	learn: 0.0029151	total: 2.7s	remaining: 286ms
904:	learn: 0.0029087	total: 2.7s	remaining: 283ms
905:	learn: 0.0029046	total: 2.7s	remaining: 280ms
906:	learn: 0.0028958	total: 2.71s	remaining: 277ms
907:	learn: 0.0028929	total: 2.71s	remaining: 274ms
908:	learn: 0.0028895	total: 2.71s	remaining: 272ms
909:	learn: 0.0028834	total: 2.71s	remaining: 269ms
910:	learn: 0.0028791	total: 2.72s	remaining: 266ms
911:	learn: 0.0028745	total: 2.74s	remaining: 265ms
912:	learn: 0.0028693	total: 2.75s	remaining: 262ms
913:	learn: 0.0028623	total: 2.75s	remaining: 259ms
914:	learn: 0.0028538	total: 2.76s	remaining: 256ms
915:	learn: 0.0028473	total: 2.76s	remaining: 253ms
916:	learn: 0.0028429	total: 2.76s	remaining: 250ms
917:	learn: 0.0028398	total: 2.77s	remaining: 247ms
918:	learn: 0.0028372	total: 2.77s	remaining: 244ms
919:	learn: 0.0028331	total: 2.77s	remaining: 241ms
920:	learn: 0.0028300	total: 2.78s	remaining: 238ms
921:	learn: 0.0028265	total: 2.78s	remaining: 235ms
922:	learn: 0.0028210	total: 2.78s	remaining: 232ms
923:	learn: 0.0028183	total: 2.79s	remaining: 229ms
924:	learn: 0.0028100	total: 2.79s	remaining: 226ms
925:	learn: 0.0028036	total: 2.79s	remaining: 223ms
926:	learn: 0.0028008	total: 2.79s	remaining: 220ms
927:	learn: 0.0027938	total: 2.79s	remaining: 217ms
928:	learn: 0.0027914	total: 2.8s	remaining: 214ms
929:	learn: 0.0027861	total: 2.8s	remaining: 211ms
930:	learn: 0.0027818	total: 2.8s	remaining: 208ms



931:	learn: 0.0027781	total: 2.81s	remaining: 205ms
932:	learn: 0.0027720	total: 2.81s	remaining: 202ms
933:	learn: 0.0027667	total: 2.81s	remaining: 199ms
934:	learn: 0.0027629	total: 2.82s	remaining: 196ms
935:	learn: 0.0027589	total: 2.82s	remaining: 193ms
936:	learn: 0.0027492	total: 2.82s	remaining: 190ms
937:	learn: 0.0027452	total: 2.82s	remaining: 187ms
938:	learn: 0.0027385	total: 2.83s	remaining: 184ms
939:	learn: 0.0027346	total: 2.83s	remaining: 181ms
940:	learn: 0.0027296	total: 2.83s	remaining: 178ms
941:	learn: 0.0027245	total: 2.84s	remaining: 175ms
942:	learn: 0.0027211	total: 2.84s	remaining: 172ms
943:	learn: 0.0027113	total: 2.84s	remaining: 169ms
944:	learn: 0.0027074	total: 2.85s	remaining: 166ms
945:	learn: 0.0027040	total: 2.85s	remaining: 163ms
946:	learn: 0.0027015	total: 2.85s	remaining: 160ms
947:	learn: 0.0026979	total: 2.85s	remaining: 157ms
948:	learn: 0.0026922	total: 2.86s	remaining: 154ms
949:	learn: 0.0026900	total: 2.86s	remaining: 151ms
950:	learn: 0.0026820	total: 2.86s	remaining: 148ms
951:	learn: 0.0026805	total: 2.87s	remaining: 145ms
952:	learn: 0.0026768	total: 2.87s	remaining: 141ms
953:	learn: 0.0026726	total: 2.87s	remaining: 138ms
954:	learn: 0.0026680	total: 2.88s	remaining: 135ms
955:	learn: 0.0026605	total: 2.88s	remaining: 132ms
956:	learn: 0.0026510	total: 2.88s	remaining: 129ms
957:	learn: 0.0026471	total: 2.88s	remaining: 126ms
958:	learn: 0.0026423	total: 2.88s	remaining: 123ms
959:	learn: 0.0026407	total: 2.89s	remaining: 120ms
960:	learn: 0.0026378	total: 2.89s	remaining: 117ms
961:	learn: 0.0026344	total: 2.9s	remaining: 114ms
962:	learn: 0.0026322	total: 2.9s	remaining: 111ms
963:	learn: 0.0026304	total: 2.9s	remaining: 108ms
964:	learn: 0.0026286	total: 2.91s	remaining: 105ms
965:	learn: 0.0026267	total: 2.91s	remaining: 102ms
966:	learn: 0.0026237	total: 2.91s	remaining: 99.4ms
967:	learn: 0.0026215	total: 2.92s	remaining: 96.4ms
968:	learn: 0.0026169	total: 2.92s	remaining: 93.4ms
969:	learn: 0.0026146	total: 2.92s	remaining: 90.4ms
970:	learn: 0.0026122	total: 2.93s	remaining: 87.4ms
971:	learn: 0.0026099	total: 2.93s	remaining: 84.4ms
972:	learn: 0.0026068	total: 2.93s	remaining: 81.4ms
973:	learn: 0.0026012	total: 2.94s	remaining: 78.4ms
974:	learn: 0.0025962	total: 2.94s	remaining: 75.4ms
975:	learn: 0.0025922	total: 2.94s	remaining: 72.4ms
976:	learn: 0.0025896	total: 2.95s	remaining: 69.4ms
977:	learn: 0.0025849	total: 2.95s	remaining: 66.3ms

978:	learn: 0.0025812	total: 2.95s	remaining: 63.3ms
979:	learn: 0.0025775	total: 2.95s	remaining: 60.3ms
980:	learn: 0.0025748	total: 2.96s	remaining: 57.3ms
981:	learn: 0.0025720	total: 2.96s	remaining: 54.3ms
982:	learn: 0.0025701	total: 2.96s	remaining: 51.3ms
983:	learn: 0.0025675	total: 2.97s	remaining: 48.2ms
984:	learn: 0.0025653	total: 2.97s	remaining: 45.2ms
985:	learn: 0.0025632	total: 2.97s	remaining: 42.2ms
986:	learn: 0.0025605	total: 2.98s	remaining: 39.2ms
987:	learn: 0.0025586	total: 2.98s	remaining: 36.2ms
988:	learn: 0.0025565	total: 2.98s	remaining: 33.2ms
989:	learn: 0.0025507	total: 2.98s	remaining: 30.1ms
990:	learn: 0.0025486	total: 2.99s	remaining: 27.1ms
991:	learn: 0.0025465	total: 2.99s	remaining: 24.1ms
992:	learn: 0.0025426	total: 3s	remaining: 21.1ms
993:	learn: 0.0025403	total: 3s	remaining: 18.1ms
994:	learn: 0.0025364	total: 3s	remaining: 15.1ms
995:	learn: 0.0025339	total: 3s	remaining: 12.1ms
996:	learn: 0.0025308	total: 3.01s	remaining: 9.05ms
997:	learn: 0.0025278	total: 3.01s	remaining: 6.04ms
998:	learn: 0.0025236	total: 3.01s	remaining: 3.02ms
999:	learn: 0.0025212	total: 3.02s	remaining: 0us

```
In [17]: # 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: 0.6184157	test: 0.6185120	best: 0.6185120 (0)
1:	learn: 0.5707445	test: 0.5726022	best: 0.5726022 (1)
2:	learn: 0.5200090	test: 0.5224881	best: 0.5224881 (2)
3:	learn: 0.4749633	test: 0.4778209	best: 0.4778209 (3)

4:	learn: 0.4352955	test: 0.4387039	best: 0.4387039 (4)
5:	learn: 0.4029146	test: 0.4072601	best: 0.4072601 (5)
6:	learn: 0.3660084	test: 0.3702360	best: 0.3702360 (6)
7:	learn: 0.3410258	test: 0.3459471	best: 0.3459471 (7)
8:	learn: 0.3140595	test: 0.3192137	best: 0.3192137 (8)
9:	learn: 0.2909044	test: 0.2963685	best: 0.2963685 (9)
10:	learn: 0.2694388	test: 0.2752281	best: 0.2752281 (10)
11:	learn: 0.2515869	test: 0.2576468	best: 0.2576468 (11)
12:	learn: 0.2299523	test: 0.2356787	best: 0.2356787 (12)
13:	learn: 0.2148655	test: 0.2211362	best: 0.2211362 (13)
14:	learn: 0.1961838	test: 0.2021465	best: 0.2021465 (14)
15:	learn: 0.1779330	test: 0.1835667	best: 0.1835667 (15)
16:	learn: 0.1666044	test: 0.1724121	best: 0.1724121 (16)
17:	learn: 0.1526241	test: 0.1581739	best: 0.1581739 (17)
18:	learn: 0.1423001	test: 0.1477322	best: 0.1477322 (18)
19:	learn: 0.1349729	test: 0.1405933	best: 0.1405933 (19)
20:	learn: 0.1255250	test: 0.1310413	best: 0.1310413 (20)
21:	learn: 0.1169262	test: 0.1223038	best: 0.1223038 (21)
22:	learn: 0.1082866	test: 0.1134263	best: 0.1134263 (22)
23:	learn: 0.0998004	test: 0.1045746	best: 0.1045746 (23)
24:	learn: 0.0922199	test: 0.0968246	best: 0.0968246 (24)
25:	learn: 0.0872081	test: 0.0916460	best: 0.0916460 (25)
26:	learn: 0.0816782	test: 0.0859798	best: 0.0859798 (26)
27:	learn: 0.0782251	test: 0.0825648	best: 0.0825648 (27)
28:	learn: 0.0741611	test: 0.0784029	best: 0.0784029 (28)
29:	learn: 0.0694072	test: 0.0733731	best: 0.0733731 (29)
30:	learn: 0.0656183	test: 0.0694235	best: 0.0694235 (30)
31:	learn: 0.0619325	test: 0.0656241	best: 0.0656241 (31)
32:	learn: 0.0584717	test: 0.0620629	best: 0.0620629 (32)
33:	learn: 0.0560978	test: 0.0597270	best: 0.0597270 (33)
34:	learn: 0.0537531	test: 0.0573203	best: 0.0573203 (34)
35:	learn: 0.0517122	test: 0.0552412	best: 0.0552412 (35)
36:	learn: 0.0487314	test: 0.0520907	best: 0.0520907 (36)
37:	learn: 0.0468609	test: 0.0501820	best: 0.0501820 (37)
38:	learn: 0.0454180	test: 0.0487022	best: 0.0487022 (38)
39:	learn: 0.0434842	test: 0.0466640	best: 0.0466640 (39)
40:	learn: 0.0415717	test: 0.0447013	best: 0.0447013 (40)
41:	learn: 0.0399403	test: 0.0430313	best: 0.0430313 (41)
42:	learn: 0.0381763	test: 0.0412013	best: 0.0412013 (42)
43:	learn: 0.0363271	test: 0.0393121	best: 0.0393121 (43)
44:	learn: 0.0350988	test: 0.0380285	best: 0.0380285 (44)
45:	learn: 0.0339168	test: 0.0368208	best: 0.0368208 (45)
46:	learn: 0.0327678	test: 0.0356362	best: 0.0356362 (46)
47:	learn: 0.0316947	test: 0.0344975	best: 0.0344975 (47)
48:	learn: 0.0307911	test: 0.0335708	best: 0.0335708 (48)
49:	learn: 0.0300507	test: 0.0328131	best: 0.0328131 (49)
50:	learn: 0.0281535	test: 0.0307668	best: 0.0307668 (50)

51:	learn: 0.0270235	test: 0.0295964	best: 0.0295964 (51)
52:	learn: 0.0259818	test: 0.0284889	best: 0.0284889 (52)
53:	learn: 0.0249616	test: 0.0273992	best: 0.0273992 (53)
54:	learn: 0.0242839	test: 0.0266620	best: 0.0266620 (54)
55:	learn: 0.0236653	test: 0.0260159	best: 0.0260159 (55)
56:	learn: 0.0230870	test: 0.0253924	best: 0.0253924 (56)
57:	learn: 0.0225109	test: 0.0247785	best: 0.0247785 (57)
58:	learn: 0.0219416	test: 0.0241633	best: 0.0241633 (58)
59:	learn: 0.0214885	test: 0.0237063	best: 0.0237063 (59)
60:	learn: 0.0208199	test: 0.0229900	best: 0.0229900 (60)
61:	learn: 0.0202405	test: 0.0223899	best: 0.0223899 (61)
62:	learn: 0.0195965	test: 0.0217114	best: 0.0217114 (62)
63:	learn: 0.0190293	test: 0.0211140	best: 0.0211140 (63)
64:	learn: 0.0185231	test: 0.0205775	best: 0.0205775 (64)
65:	learn: 0.0180533	test: 0.0200745	best: 0.0200745 (65)
66:	learn: 0.0174198	test: 0.0193942	best: 0.0193942 (66)
67:	learn: 0.0169642	test: 0.0188928	best: 0.0188928 (67)
68:	learn: 0.0165840	test: 0.0184789	best: 0.0184789 (68)
69:	learn: 0.0160596	test: 0.0179247	best: 0.0179247 (69)
70:	learn: 0.0156617	test: 0.0175252	best: 0.0175252 (70)
71:	learn: 0.0151771	test: 0.0169731	best: 0.0169731 (71)
72:	learn: 0.0148442	test: 0.0166240	best: 0.0166240 (72)
73:	learn: 0.0145054	test: 0.0162518	best: 0.0162518 (73)
74:	learn: 0.0142532	test: 0.0159782	best: 0.0159782 (74)
75:	learn: 0.0140053	test: 0.0157055	best: 0.0157055 (75)
76:	learn: 0.0137679	test: 0.0154725	best: 0.0154725 (76)
77:	learn: 0.0135131	test: 0.0151997	best: 0.0151997 (77)
78:	learn: 0.0131320	test: 0.0147789	best: 0.0147789 (78)
79:	learn: 0.0127963	test: 0.0144021	best: 0.0144021 (79)
80:	learn: 0.0125713	test: 0.0141634	best: 0.0141634 (80)
81:	learn: 0.0122206	test: 0.0137870	best: 0.0137870 (81)
82:	learn: 0.0119641	test: 0.0135231	best: 0.0135231 (82)
83:	learn: 0.0117693	test: 0.0133106	best: 0.0133106 (83)
84:	learn: 0.0113840	test: 0.0128751	best: 0.0128751 (84)
85:	learn: 0.0111642	test: 0.0126362	best: 0.0126362 (85)
86:	learn: 0.0109359	test: 0.0123921	best: 0.0123921 (86)
87:	learn: 0.0107402	test: 0.0121893	best: 0.0121893 (87)
88:	learn: 0.0106006	test: 0.0120349	best: 0.0120349 (88)
89:	learn: 0.0104387	test: 0.0118534	best: 0.0118534 (89)
90:	learn: 0.0102171	test: 0.0116026	best: 0.0116026 (90)
91:	learn: 0.0100290	test: 0.0113943	best: 0.0113943 (91)
92:	learn: 0.0098330	test: 0.0111745	best: 0.0111745 (92)
93:	learn: 0.0096859	test: 0.0110156	best: 0.0110156 (93)
94:	learn: 0.0094986	test: 0.0108182	best: 0.0108182 (94)
95:	learn: 0.0093419	test: 0.0106519	best: 0.0106519 (95)
96:	learn: 0.0092103	test: 0.0105151	best: 0.0105151 (96)
97:	learn: 0.0089928	test: 0.0102736	best: 0.0102736 (97)

98:	learn: 0.0088058	test: 0.0100687	best: 0.0100687 (98)
99:	learn: 0.0086827	test: 0.0099356	best: 0.0099356 (99)
100:	learn: 0.0084720	test: 0.0096876	best: 0.0096876 (100)
101:	learn: 0.0083530	test: 0.0095633	best: 0.0095633 (101)
102:	learn: 0.0082100	test: 0.0094087	best: 0.0094087 (102)
103:	learn: 0.0081199	test: 0.0093143	best: 0.0093143 (103)
104:	learn: 0.0080006	test: 0.0091852	best: 0.0091852 (104)
105:	learn: 0.0079020	test: 0.0090788	best: 0.0090788 (105)
106:	learn: 0.0078202	test: 0.0089847	best: 0.0089847 (106)
107:	learn: 0.0076997	test: 0.0088522	best: 0.0088522 (107)
108:	learn: 0.0075388	test: 0.0086819	best: 0.0086819 (108)
109:	learn: 0.0074198	test: 0.0085523	best: 0.0085523 (109)
110:	learn: 0.0072801	test: 0.0083997	best: 0.0083997 (110)
111:	learn: 0.0071597	test: 0.0082698	best: 0.0082698 (111)
112:	learn: 0.0070484	test: 0.0081488	best: 0.0081488 (112)
113:	learn: 0.0069408	test: 0.0080290	best: 0.0080290 (113)
114:	learn: 0.0068443	test: 0.0079248	best: 0.0079248 (114)
115:	learn: 0.0067425	test: 0.0078176	best: 0.0078176 (115)
116:	learn: 0.0066446	test: 0.0076987	best: 0.0076987 (116)
117:	learn: 0.0065617	test: 0.0076061	best: 0.0076061 (117)
118:	learn: 0.0064842	test: 0.0075187	best: 0.0075187 (118)
119:	learn: 0.0063957	test: 0.0074244	best: 0.0074244 (119)
120:	learn: 0.0063351	test: 0.0073602	best: 0.0073602 (120)
121:	learn: 0.0062385	test: 0.0072565	best: 0.0072565 (121)
122:	learn: 0.0061672	test: 0.0071829	best: 0.0071829 (122)
123:	learn: 0.0060978	test: 0.0071051	best: 0.0071051 (123)
124:	learn: 0.0060297	test: 0.0070382	best: 0.0070382 (124)
125:	learn: 0.0059701	test: 0.0069722	best: 0.0069722 (125)
126:	learn: 0.0059227	test: 0.0069228	best: 0.0069228 (126)
127:	learn: 0.0058744	test: 0.0068702	best: 0.0068702 (127)
128:	learn: 0.0058201	test: 0.0068093	best: 0.0068093 (128)
129:	learn: 0.0057599	test: 0.0067449	best: 0.0067449 (129)
130:	learn: 0.0057033	test: 0.0066793	best: 0.0066793 (130)
131:	learn: 0.0056314	test: 0.0066027	best: 0.0066027 (131)
132:	learn: 0.0055693	test: 0.0065358	best: 0.0065358 (132)
133:	learn: 0.0055136	test: 0.0064705	best: 0.0064705 (133)
134:	learn: 0.0054536	test: 0.0064017	best: 0.0064017 (134)
135:	learn: 0.0053958	test: 0.0063354	best: 0.0063354 (135)
136:	learn: 0.0053079	test: 0.0062310	best: 0.0062310 (136)
137:	learn: 0.0052397	test: 0.0061599	best: 0.0061599 (137)
138:	learn: 0.0051833	test: 0.0060981	best: 0.0060981 (138)
139:	learn: 0.0051321	test: 0.0060377	best: 0.0060377 (139)
140:	learn: 0.0050695	test: 0.0059632	best: 0.0059632 (140)
141:	learn: 0.0050199	test: 0.0059087	best: 0.0059087 (141)
142:	learn: 0.0049685	test: 0.0058569	best: 0.0058569 (142)
143:	learn: 0.0049296	test: 0.0058156	best: 0.0058156 (143)
144:	learn: 0.0048660	test: 0.0057398	best: 0.0057398 (144)

145:	learn: 0.0048133	test: 0.0056829	best: 0.0056829	(145)
146:	learn: 0.0047687	test: 0.0056366	best: 0.0056366	(146)
147:	learn: 0.0047265	test: 0.0055866	best: 0.0055866	(147)
148:	learn: 0.0046816	test: 0.0055427	best: 0.0055427	(148)
149:	learn: 0.0046470	test: 0.0055070	best: 0.0055070	(149)
150:	learn: 0.0046095	test: 0.0054622	best: 0.0054622	(150)
151:	learn: 0.0045615	test: 0.0054066	best: 0.0054066	(151)
152:	learn: 0.0045152	test: 0.0053497	best: 0.0053497	(152)
153:	learn: 0.0044784	test: 0.0053100	best: 0.0053100	(153)
154:	learn: 0.0044388	test: 0.0052639	best: 0.0052639	(154)
155:	learn: 0.0043965	test: 0.0052170	best: 0.0052170	(155)
156:	learn: 0.0043620	test: 0.0051797	best: 0.0051797	(156)
157:	learn: 0.0043233	test: 0.0051369	best: 0.0051369	(157)
158:	learn: 0.0042851	test: 0.0050925	best: 0.0050925	(158)
159:	learn: 0.0042541	test: 0.0050563	best: 0.0050563	(159)
160:	learn: 0.0042180	test: 0.0050133	best: 0.0050133	(160)
161:	learn: 0.0041824	test: 0.0049727	best: 0.0049727	(161)
162:	learn: 0.0041459	test: 0.0049327	best: 0.0049327	(162)
163:	learn: 0.0041082	test: 0.0048871	best: 0.0048871	(163)
164:	learn: 0.0040776	test: 0.0048530	best: 0.0048530	(164)
165:	learn: 0.0040448	test: 0.0048173	best: 0.0048173	(165)
166:	learn: 0.0040126	test: 0.0047818	best: 0.0047818	(166)
167:	learn: 0.0039787	test: 0.0047438	best: 0.0047438	(167)
168:	learn: 0.0039459	test: 0.0047099	best: 0.0047099	(168)
169:	learn: 0.0039039	test: 0.0046613	best: 0.0046613	(169)
170:	learn: 0.0038723	test: 0.0046271	best: 0.0046271	(170)
171:	learn: 0.0038391	test: 0.0045883	best: 0.0045883	(171)
172:	learn: 0.0037977	test: 0.0045404	best: 0.0045404	(172)
173:	learn: 0.0037664	test: 0.0045065	best: 0.0045065	(173)
174:	learn: 0.0037343	test: 0.0044689	best: 0.0044689	(174)
175:	learn: 0.0037119	test: 0.0044422	best: 0.0044422	(175)
176:	learn: 0.0036833	test: 0.0044075	best: 0.0044075	(176)
177:	learn: 0.0036499	test: 0.0043684	best: 0.0043684	(177)
178:	learn: 0.0036139	test: 0.0043262	best: 0.0043262	(178)
179:	learn: 0.0035884	test: 0.0042982	best: 0.0042982	(179)
180:	learn: 0.0035594	test: 0.0042677	best: 0.0042677	(180)
181:	learn: 0.0035293	test: 0.0042327	best: 0.0042327	(181)
182:	learn: 0.0035031	test: 0.0042043	best: 0.0042043	(182)
183:	learn: 0.0034768	test: 0.0041737	best: 0.0041737	(183)
184:	learn: 0.0034436	test: 0.0041391	best: 0.0041391	(184)
185:	learn: 0.0034199	test: 0.0041093	best: 0.0041093	(185)
186:	learn: 0.0033970	test: 0.0040821	best: 0.0040821	(186)
187:	learn: 0.0033708	test: 0.0040517	best: 0.0040517	(187)
188:	learn: 0.0033526	test: 0.0040313	best: 0.0040313	(188)
189:	learn: 0.0033328	test: 0.0040111	best: 0.0040111	(189)
190:	learn: 0.0033098	test: 0.0039854	best: 0.0039854	(190)
191:	learn: 0.0032949	test: 0.0039700	best: 0.0039700	(191)

192:	learn: 0.0032736	test: 0.0039466	best: 0.0039466	(192)
193:	learn: 0.0032520	test: 0.0039240	best: 0.0039240	(193)
194:	learn: 0.0032281	test: 0.0038963	best: 0.0038963	(194)
195:	learn: 0.0032033	test: 0.0038662	best: 0.0038662	(195)
196:	learn: 0.0031868	test: 0.0038477	best: 0.0038477	(196)
197:	learn: 0.0031600	test: 0.0038169	best: 0.0038169	(197)
198:	learn: 0.0031364	test: 0.0037914	best: 0.0037914	(198)
199:	learn: 0.0031209	test: 0.0037734	best: 0.0037734	(199)
200:	learn: 0.0031042	test: 0.0037549	best: 0.0037549	(200)
201:	learn: 0.0030792	test: 0.0037274	best: 0.0037274	(201)
202:	learn: 0.0030622	test: 0.0037087	best: 0.0037087	(202)
203:	learn: 0.0030404	test: 0.0036824	best: 0.0036824	(203)
204:	learn: 0.0030169	test: 0.0036574	best: 0.0036574	(204)
205:	learn: 0.0029843	test: 0.0036207	best: 0.0036207	(205)
206:	learn: 0.0029583	test: 0.0035907	best: 0.0035907	(206)
207:	learn: 0.0029350	test: 0.0035652	best: 0.0035652	(207)
208:	learn: 0.0029157	test: 0.0035412	best: 0.0035412	(208)
209:	learn: 0.0028932	test: 0.0035135	best: 0.0035135	(209)
210:	learn: 0.0028762	test: 0.0034957	best: 0.0034957	(210)
211:	learn: 0.0028571	test: 0.0034743	best: 0.0034743	(211)
212:	learn: 0.0028400	test: 0.0034554	best: 0.0034554	(212)
213:	learn: 0.0028249	test: 0.0034385	best: 0.0034385	(213)
214:	learn: 0.0028066	test: 0.0034158	best: 0.0034158	(214)
215:	learn: 0.0027917	test: 0.0033989	best: 0.0033989	(215)
216:	learn: 0.0027732	test: 0.0033771	best: 0.0033771	(216)
217:	learn: 0.0027585	test: 0.0033605	best: 0.0033605	(217)
218:	learn: 0.0027384	test: 0.0033356	best: 0.0033356	(218)
219:	learn: 0.0027237	test: 0.0033197	best: 0.0033197	(219)
220:	learn: 0.0027098	test: 0.0033043	best: 0.0033043	(220)
221:	learn: 0.0026963	test: 0.0032903	best: 0.0032903	(221)
222:	learn: 0.0026808	test: 0.0032720	best: 0.0032720	(222)
223:	learn: 0.0026649	test: 0.0032545	best: 0.0032545	(223)
224:	learn: 0.0026468	test: 0.0032341	best: 0.0032341	(224)
225:	learn: 0.0026318	test: 0.0032164	best: 0.0032164	(225)
226:	learn: 0.0026122	test: 0.0031941	best: 0.0031941	(226)
227:	learn: 0.0025984	test: 0.0031787	best: 0.0031787	(227)
228:	learn: 0.0025838	test: 0.0031613	best: 0.0031613	(228)
229:	learn: 0.0025689	test: 0.0031444	best: 0.0031444	(229)
230:	learn: 0.0025557	test: 0.0031295	best: 0.0031295	(230)
231:	learn: 0.0025419	test: 0.0031140	best: 0.0031140	(231)
232:	learn: 0.0025275	test: 0.0030987	best: 0.0030987	(232)
233:	learn: 0.0025144	test: 0.0030835	best: 0.0030835	(233)
234:	learn: 0.0025023	test: 0.0030711	best: 0.0030711	(234)
235:	learn: 0.0024906	test: 0.0030583	best: 0.0030583	(235)
236:	learn: 0.0024792	test: 0.0030456	best: 0.0030456	(236)
237:	learn: 0.0024657	test: 0.0030305	best: 0.0030305	(237)
238:	learn: 0.0024529	test: 0.0030164	best: 0.0030164	(238)

239:	learn: 0.0024373	test: 0.0029985	best: 0.0029985	(239)		
240:	learn: 0.0024262	test: 0.0029862	best: 0.0029862	(240)		
241:	learn: 0.0024103	test: 0.0029676	best: 0.0029676	(241)		
242:	learn: 0.0023974	test: 0.0029534	best: 0.0029534	(242)		
243:	learn: 0.0023855	test: 0.0029391	best: 0.0029391	(243)		
244:	learn: 0.0023725	test: 0.0029248	best: 0.0029248	(244)	total: 11.4s	remaining: 35s
245:	learn: 0.0023597	test: 0.0029111	best: 0.0029111	(245)		
246:	learn: 0.0023472	test: 0.0028963	best: 0.0028963	(246)		
247:	learn: 0.0023355	test: 0.0028827	best: 0.0028827	(247)		
248:	learn: 0.0023260	test: 0.0028721	best: 0.0028721	(248)		
249:	learn: 0.0023140	test: 0.0028580	best: 0.0028580	(249)		
250:	learn: 0.0023023	test: 0.0028453	best: 0.0028453	(250)		
251:	learn: 0.0022891	test: 0.0028306	best: 0.0028306	(251)		
252:	learn: 0.0022796	test: 0.0028202	best: 0.0028202	(252)		
253:	learn: 0.0022671	test: 0.0028060	best: 0.0028060	(253)		
254:	learn: 0.0022574	test: 0.0027955	best: 0.0027955	(254)		
255:	learn: 0.0022460	test: 0.0027827	best: 0.0027827	(255)		
256:	learn: 0.0022326	test: 0.0027679	best: 0.0027679	(256)		
257:	learn: 0.0022231	test: 0.0027567	best: 0.0027567	(257)		
258:	learn: 0.0022132	test: 0.0027458	best: 0.0027458	(258)		
259:	learn: 0.0022021	test: 0.0027330	best: 0.0027330	(259)		
260:	learn: 0.0021897	test: 0.0027188	best: 0.0027188	(260)		
261:	learn: 0.0021797	test: 0.0027080	best: 0.0027080	(261)		
262:	learn: 0.0021693	test: 0.0026965	best: 0.0026965	(262)		
263:	learn: 0.0021600	test: 0.0026866	best: 0.0026866	(263)		
264:	learn: 0.0021499	test: 0.0026745	best: 0.0026745	(264)		
265:	learn: 0.0021410	test: 0.0026650	best: 0.0026650	(265)		
266:	learn: 0.0021323	test: 0.0026561	best: 0.0026561	(266)		
267:	learn: 0.0021236	test: 0.0026469	best: 0.0026469	(267)		
268:	learn: 0.0021148	test: 0.0026374	best: 0.0026374	(268)		
269:	learn: 0.0021066	test: 0.0026286	best: 0.0026286	(269)		
270:	learn: 0.0020976	test: 0.0026184	best: 0.0026184	(270)		
271:	learn: 0.0020895	test: 0.0026090	best: 0.0026090	(271)		
272:	learn: 0.0020809	test: 0.0025998	best: 0.0025998	(272)		
273:	learn: 0.0020737	test: 0.0025918	best: 0.0025918	(273)		
274:	learn: 0.0020650	test: 0.0025822	best: 0.0025822	(274)		
275:	learn: 0.0020574	test: 0.0025737	best: 0.0025737	(275)		
276:	learn: 0.0020495	test: 0.0025645	best: 0.0025645	(276)		
277:	learn: 0.0020400	test: 0.0025543	best: 0.0025543	(277)		
278:	learn: 0.0020327	test: 0.0025465	best: 0.0025465	(278)		
279:	learn: 0.0020241	test: 0.0025372	best: 0.0025372	(279)		
280:	learn: 0.0020160	test: 0.0025279	best: 0.0025279	(280)		
281:	learn: 0.0020076	test: 0.0025187	best: 0.0025187	(281)		
282:	learn: 0.0019995	test: 0.0025095	best: 0.0025095	(282)		
283:	learn: 0.0019921	test: 0.0025016	best: 0.0025016	(283)		
284:	learn: 0.0019847	test: 0.0024937	best: 0.0024937	(284)		
285:	learn: 0.0019773	test: 0.0024862	best: 0.0024862	(285)		



286:	learn: 0.0019701	test: 0.0024782	best: 0.0024782 (286)
287:	learn: 0.0019630	test: 0.0024695	best: 0.0024695 (287)
288:	learn: 0.0019556	test: 0.0024615	best: 0.0024615 (288)
289:	learn: 0.0019483	test: 0.0024540	best: 0.0024540 (289)
290:	learn: 0.0019412	test: 0.0024464	best: 0.0024464 (290)
291:	learn: 0.0019349	test: 0.0024399	best: 0.0024399 (291)
292:	learn: 0.0019283	test: 0.0024333	best: 0.0024333 (292)
293:	learn: 0.0019216	test: 0.0024259	best: 0.0024259 (293)
294:	learn: 0.0019141	test: 0.0024175	best: 0.0024175 (294)
295:	learn: 0.0019080	test: 0.0024111	best: 0.0024111 (295)
296:	learn: 0.0019014	test: 0.0024035	best: 0.0024035 (296)
297:	learn: 0.0018947	test: 0.0023964	best: 0.0023964 (297)
298:	learn: 0.0018886	test: 0.0023899	best: 0.0023899 (298)
299:	learn: 0.0018818	test: 0.0023819	best: 0.0023819 (299)
300:	learn: 0.0018761	test: 0.0023762	best: 0.0023762 (300)
301:	learn: 0.0018705	test: 0.0023699	best: 0.0023699 (301)
302:	learn: 0.0018654	test: 0.0023647	best: 0.0023647 (302)
303:	learn: 0.0018598	test: 0.0023588	best: 0.0023588 (303)
304:	learn: 0.0018536	test: 0.0023516	best: 0.0023516 (304)
305:	learn: 0.0018482	test: 0.0023457	best: 0.0023457 (305)
306:	learn: 0.0018422	test: 0.0023392	best: 0.0023392 (306)
307:	learn: 0.0018365	test: 0.0023331	best: 0.0023331 (307)
308:	learn: 0.0018310	test: 0.0023272	best: 0.0023272 (308)
309:	learn: 0.0018257	test: 0.0023214	best: 0.0023214 (309)
310:	learn: 0.0018202	test: 0.0023150	best: 0.0023150 (310)
311:	learn: 0.0018150	test: 0.0023095	best: 0.0023095 (311)
312:	learn: 0.0018095	test: 0.0023033	best: 0.0023033 (312)
313:	learn: 0.0018042	test: 0.0022980	best: 0.0022980 (313)
314:	learn: 0.0017988	test: 0.0022924	best: 0.0022924 (314)
315:	learn: 0.0017940	test: 0.0022875	best: 0.0022875 (315)
316:	learn: 0.0017893	test: 0.0022821	best: 0.0022821 (316)
317:	learn: 0.0017842	test: 0.0022764	best: 0.0022764 (317)
318:	learn: 0.0017786	test: 0.0022703	best: 0.0022703 (318)
319:	learn: 0.0017737	test: 0.0022654	best: 0.0022654 (319)
320:	learn: 0.0017688	test: 0.0022600	best: 0.0022600 (320)
321:	learn: 0.0017639	test: 0.0022548	best: 0.0022548 (321)
322:	learn: 0.0017586	test: 0.0022493	best: 0.0022493 (322)
323:	learn: 0.0017538	test: 0.0022443	best: 0.0022443 (323)
324:	learn: 0.0017488	test: 0.0022392	best: 0.0022392 (324)
325:	learn: 0.0017439	test: 0.0022342	best: 0.0022342 (325)
326:	learn: 0.0017392	test: 0.0022291	best: 0.0022291 (326)
327:	learn: 0.0017347	test: 0.0022244	best: 0.0022244 (327)
328:	learn: 0.0017302	test: 0.0022196	best: 0.0022196 (328)
329:	learn: 0.0017261	test: 0.0022152	best: 0.0022152 (329)
330:	learn: 0.0017215	test: 0.0022102	best: 0.0022102 (330)
331:	learn: 0.0017170	test: 0.0022052	best: 0.0022052 (331)
332:	learn: 0.0017131	test: 0.0022011	best: 0.0022011 (332)

333:	learn: 0.0017086	test: 0.0021964	best: 0.0021964	(333)
334:	learn: 0.0017042	test: 0.0021916	best: 0.0021916	(334)
335:	learn: 0.0017003	test: 0.0021875	best: 0.0021875	(335)
336:	learn: 0.0016960	test: 0.0021829	best: 0.0021829	(336)
337:	learn: 0.0016917	test: 0.0021784	best: 0.0021784	(337)
338:	learn: 0.0016875	test: 0.0021738	best: 0.0021738	(338)
339:	learn: 0.0016830	test: 0.0021692	best: 0.0021692	(339)
340:	learn: 0.0016787	test: 0.0021644	best: 0.0021644	(340)
341:	learn: 0.0016750	test: 0.0021604	best: 0.0021604	(341)
342:	learn: 0.0016714	test: 0.0021565	best: 0.0021565	(342)
343:	learn: 0.0016672	test: 0.0021521	best: 0.0021521	(343)
344:	learn: 0.0016628	test: 0.0021474	best: 0.0021474	(344)
345:	learn: 0.0016591	test: 0.0021435	best: 0.0021435	(345)
346:	learn: 0.0016549	test: 0.0021391	best: 0.0021391	(346)
347:	learn: 0.0016508	test: 0.0021349	best: 0.0021349	(347)
348:	learn: 0.0016473	test: 0.0021312	best: 0.0021312	(348)
349:	learn: 0.0016432	test: 0.0021270	best: 0.0021270	(349)
350:	learn: 0.0016392	test: 0.0021225	best: 0.0021225	(350)
351:	learn: 0.0016363	test: 0.0021196	best: 0.0021196	(351)
352:	learn: 0.0016323	test: 0.0021152	best: 0.0021152	(352)
353:	learn: 0.0016288	test: 0.0021116	best: 0.0021116	(353)
354:	learn: 0.0016252	test: 0.0021079	best: 0.0021079	(354)
355:	learn: 0.0016213	test: 0.0021038	best: 0.0021038	(355)
356:	learn: 0.0016175	test: 0.0020995	best: 0.0020995	(356)
357:	learn: 0.0016147	test: 0.0020965	best: 0.0020965	(357)
358:	learn: 0.0016116	test: 0.0020934	best: 0.0020934	(358)
359:	learn: 0.0016082	test: 0.0020897	best: 0.0020897	(359)
360:	learn: 0.0016049	test: 0.0020860	best: 0.0020860	(360)
361:	learn: 0.0016017	test: 0.0020826	best: 0.0020826	(361)
362:	learn: 0.0015988	test: 0.0020795	best: 0.0020795	(362)
363:	learn: 0.0015955	test: 0.0020762	best: 0.0020762	(363)
364:	learn: 0.0015923	test: 0.0020729	best: 0.0020729	(364)
365:	learn: 0.0015890	test: 0.0020694	best: 0.0020694	(365)
366:	learn: 0.0015861	test: 0.0020662	best: 0.0020662	(366)
367:	learn: 0.0015832	test: 0.0020631	best: 0.0020631	(367)
368:	learn: 0.0015800	test: 0.0020597	best: 0.0020597	(368)
369:	learn: 0.0015775	test: 0.0020570	best: 0.0020570	(369)
370:	learn: 0.0015745	test: 0.0020538	best: 0.0020538	(370)
371:	learn: 0.0015715	test: 0.0020504	best: 0.0020504	(371)
372:	learn: 0.0015694	test: 0.0020481	best: 0.0020481	(372)
373:	learn: 0.0015672	test: 0.0020459	best: 0.0020459	(373)
374:	learn: 0.0015650	test: 0.0020436	best: 0.0020436	(374)
375:	learn: 0.0015624	test: 0.0020409	best: 0.0020409	(375)
376:	learn: 0.0015601	test: 0.0020386	best: 0.0020386	(376)
377:	learn: 0.0015577	test: 0.0020361	best: 0.0020361	(377)
378:	learn: 0.0015551	test: 0.0020332	best: 0.0020332	(378)
379:	learn: 0.0015527	test: 0.0020307	best: 0.0020307	(379)

380:	learn: 0.0015494	test: 0.0020273	best: 0.0020273	(380)		
381:	learn: 0.0015463	test: 0.0020240	best: 0.0020240	(381)		
382:	learn: 0.0015437	test: 0.0020214	best: 0.0020214	(382)		
383:	learn: 0.0015410	test: 0.0020186	best: 0.0020186	(383)		
384:	learn: 0.0015387	test: 0.0020162	best: 0.0020162	(384)		
385:	learn: 0.0015356	test: 0.0020129	best: 0.0020129	(385)		
386:	learn: 0.0015331	test: 0.0020102	best: 0.0020102	(386)		
387:	learn: 0.0015307	test: 0.0020077	best: 0.0020077	(387)		
388:	learn: 0.0015279	test: 0.0020048	best: 0.0020048	(388)		
389:	learn: 0.0015252	test: 0.0020020	best: 0.0020020	(389)		
390:	learn: 0.0015230	test: 0.0019996	best: 0.0019996	(390)		
391:	learn: 0.0015209	test: 0.0019974	best: 0.0019974	(391)		
392:	learn: 0.0015188	test: 0.0019953	best: 0.0019953	(392)		
393:	learn: 0.0015163	test: 0.0019926	best: 0.0019926	(393)		
394:	learn: 0.0015140	test: 0.0019903	best: 0.0019903	(394)	total: 18.2s	remaining: 27.8s
395:	learn: 0.0015119	test: 0.0019882	best: 0.0019882	(395)		
396:	learn: 0.0015094	test: 0.0019856	best: 0.0019856	(396)		
397:	learn: 0.0015075	test: 0.0019835	best: 0.0019835	(397)		
398:	learn: 0.0015054	test: 0.0019812	best: 0.0019812	(398)		
399:	learn: 0.0015035	test: 0.0019790	best: 0.0019790	(399)		
400:	learn: 0.0015015	test: 0.0019769	best: 0.0019769	(400)		
401:	learn: 0.0014993	test: 0.0019745	best: 0.0019745	(401)		
402:	learn: 0.0014974	test: 0.0019727	best: 0.0019727	(402)		
403:	learn: 0.0014957	test: 0.0019707	best: 0.0019707	(403)		
404:	learn: 0.0014937	test: 0.0019685	best: 0.0019685	(404)		
405:	learn: 0.0014914	test: 0.0019662	best: 0.0019662	(405)		
406:	learn: 0.0014900	test: 0.0019646	best: 0.0019646	(406)		
407:	learn: 0.0014882	test: 0.0019626	best: 0.0019626	(407)		
408:	learn: 0.0014857	test: 0.0019600	best: 0.0019600	(408)		
409:	learn: 0.0014836	test: 0.0019578	best: 0.0019578	(409)		
410:	learn: 0.0014821	test: 0.0019563	best: 0.0019563	(410)		
411:	learn: 0.0014808	test: 0.0019549	best: 0.0019549	(411)		
412:	learn: 0.0014787	test: 0.0019527	best: 0.0019527	(412)		
413:	learn: 0.0014767	test: 0.0019507	best: 0.0019507	(413)		
414:	learn: 0.0014753	test: 0.0019492	best: 0.0019492	(414)		
415:	learn: 0.0014728	test: 0.0019466	best: 0.0019466	(415)		
416:	learn: 0.0014710	test: 0.0019449	best: 0.0019449	(416)		
417:	learn: 0.0014695	test: 0.0019433	best: 0.0019433	(417)		
418:	learn: 0.0014681	test: 0.0019419	best: 0.0019419	(418)		
419:	learn: 0.0014667	test: 0.0019403	best: 0.0019403	(419)		
420:	learn: 0.0014654	test: 0.0019388	best: 0.0019388	(420)		
421:	learn: 0.0014642	test: 0.0019376	best: 0.0019376	(421)		
422:	learn: 0.0014623	test: 0.0019355	best: 0.0019355	(422)		
423:	learn: 0.0014608	test: 0.0019338	best: 0.0019338	(423)		
424:	learn: 0.0014595	test: 0.0019325	best: 0.0019325	(424)		
425:	learn: 0.0014583	test: 0.0019312	best: 0.0019312	(425)		
426:	learn: 0.0014567	test: 0.0019295	best: 0.0019295	(426)		

427:	learn: 0.0014551	test: 0.0019276	best: 0.0019276	(427)
428:	learn: 0.0014532	test: 0.0019256	best: 0.0019256	(428)
429:	learn: 0.0014516	test: 0.0019240	best: 0.0019240	(429)
430:	learn: 0.0014499	test: 0.0019221	best: 0.0019221	(430)
431:	learn: 0.0014487	test: 0.0019207	best: 0.0019207	(431)
432:	learn: 0.0014472	test: 0.0019192	best: 0.0019192	(432)
433:	learn: 0.0014454	test: 0.0019173	best: 0.0019173	(433)
434:	learn: 0.0014440	test: 0.0019158	best: 0.0019158	(434)
435:	learn: 0.0014427	test: 0.0019145	best: 0.0019145	(435)
436:	learn: 0.0014412	test: 0.0019129	best: 0.0019129	(436)
437:	learn: 0.0014399	test: 0.0019117	best: 0.0019117	(437)
438:	learn: 0.0014383	test: 0.0019100	best: 0.0019100	(438)
439:	learn: 0.0014366	test: 0.0019082	best: 0.0019082	(439)
440:	learn: 0.0014349	test: 0.0019065	best: 0.0019065	(440)
441:	learn: 0.0014335	test: 0.0019051	best: 0.0019051	(441)
442:	learn: 0.0014321	test: 0.0019036	best: 0.0019036	(442)
443:	learn: 0.0014304	test: 0.0019018	best: 0.0019018	(443)
444:	learn: 0.0014285	test: 0.0018999	best: 0.0018999	(444)
445:	learn: 0.0014263	test: 0.0018976	best: 0.0018976	(445)
446:	learn: 0.0014245	test: 0.0018957	best: 0.0018957	(446)
447:	learn: 0.0014227	test: 0.0018937	best: 0.0018937	(447)
448:	learn: 0.0014212	test: 0.0018920	best: 0.0018920	(448)
449:	learn: 0.0014199	test: 0.0018905	best: 0.0018905	(449)
450:	learn: 0.0014184	test: 0.0018890	best: 0.0018890	(450)
451:	learn: 0.0014170	test: 0.0018876	best: 0.0018876	(451)
452:	learn: 0.0014158	test: 0.0018863	best: 0.0018863	(452)
453:	learn: 0.0014139	test: 0.0018844	best: 0.0018844	(453)
454:	learn: 0.0014125	test: 0.0018829	best: 0.0018829	(454)
455:	learn: 0.0014110	test: 0.0018814	best: 0.0018814	(455)
456:	learn: 0.0014096	test: 0.0018800	best: 0.0018800	(456)
457:	learn: 0.0014079	test: 0.0018782	best: 0.0018782	(457)
458:	learn: 0.0014063	test: 0.0018766	best: 0.0018766	(458)
459:	learn: 0.0014047	test: 0.0018750	best: 0.0018750	(459)
460:	learn: 0.0014031	test: 0.0018734	best: 0.0018734	(460)
461:	learn: 0.0014015	test: 0.0018717	best: 0.0018717	(461)
462:	learn: 0.0014006	test: 0.0018708	best: 0.0018708	(462)
463:	learn: 0.0013994	test: 0.0018694	best: 0.0018694	(463)
464:	learn: 0.0013978	test: 0.0018678	best: 0.0018678	(464)
465:	learn: 0.0013969	test: 0.0018668	best: 0.0018668	(465)
466:	learn: 0.0013958	test: 0.0018657	best: 0.0018657	(466)
467:	learn: 0.0013950	test: 0.0018648	best: 0.0018648	(467)
468:	learn: 0.0013934	test: 0.0018632	best: 0.0018632	(468)
469:	learn: 0.0013920	test: 0.0018617	best: 0.0018617	(469)
470:	learn: 0.0013909	test: 0.0018604	best: 0.0018604	(470)
471:	learn: 0.0013897	test: 0.0018591	best: 0.0018591	(471)
472:	learn: 0.0013885	test: 0.0018578	best: 0.0018578	(472)
473:	learn: 0.0013878	test: 0.0018570	best: 0.0018570	(473)

474:	learn: 0.0013867	test: 0.0018558	best: 0.0018558	(474)		
475:	learn: 0.0013859	test: 0.0018549	best: 0.0018549	(475)		
476:	learn: 0.0013847	test: 0.0018536	best: 0.0018536	(476)		
477:	learn: 0.0013835	test: 0.0018522	best: 0.0018522	(477)		
478:	learn: 0.0013823	test: 0.0018508	best: 0.0018508	(478)		
479:	learn: 0.0013807	test: 0.0018490	best: 0.0018490	(479)		
480:	learn: 0.0013796	test: 0.0018479	best: 0.0018479	(480)		
481:	learn: 0.0013787	test: 0.0018467	best: 0.0018467	(481)		
482:	learn: 0.0013779	test: 0.0018459	best: 0.0018459	(482)		
483:	learn: 0.0013766	test: 0.0018445	best: 0.0018445	(483)		
484:	learn: 0.0013756	test: 0.0018435	best: 0.0018435	(484)		
485:	learn: 0.0013742	test: 0.0018419	best: 0.0018419	(485)		
486:	learn: 0.0013731	test: 0.0018408	best: 0.0018408	(486)		
487:	learn: 0.0013716	test: 0.0018391	best: 0.0018391	(487)		
488:	learn: 0.0013703	test: 0.0018377	best: 0.0018377	(488)		
489:	learn: 0.0013691	test: 0.0018365	best: 0.0018365	(489)		
490:	learn: 0.0013675	test: 0.0018349	best: 0.0018349	(490)		
491:	learn: 0.0013665	test: 0.0018338	best: 0.0018338	(491)		
492:	learn: 0.0013655	test: 0.0018327	best: 0.0018327	(492)		
493:	learn: 0.0013649	test: 0.0018320	best: 0.0018320	(493)		
494:	learn: 0.0013636	test: 0.0018307	best: 0.0018307	(494)		
495:	learn: 0.0013625	test: 0.0018295	best: 0.0018295	(495)		
496:	learn: 0.0013613	test: 0.0018282	best: 0.0018282	(496)		
497:	learn: 0.0013604	test: 0.0018273	best: 0.0018273	(497)		
498:	learn: 0.0013595	test: 0.0018262	best: 0.0018262	(498)		
499:	learn: 0.0013583	test: 0.0018250	best: 0.0018250	(499)		
500:	learn: 0.0013572	test: 0.0018239	best: 0.0018239	(500)		
501:	learn: 0.0013563	test: 0.0018228	best: 0.0018228	(501)	total: 23.5s	remaining: 23.3s
502:	learn: 0.0013554	test: 0.0018219	best: 0.0018219	(502)		
503:	learn: 0.0013544	test: 0.0018209	best: 0.0018209	(503)		
504:	learn: 0.0013532	test: 0.0018196	best: 0.0018196	(504)		
505:	learn: 0.0013519	test: 0.0018182	best: 0.0018182	(505)		
506:	learn: 0.0013511	test: 0.0018173	best: 0.0018173	(506)		
507:	learn: 0.0013501	test: 0.0018161	best: 0.0018161	(507)		
508:	learn: 0.0013489	test: 0.0018149	best: 0.0018149	(508)		
509:	learn: 0.0013475	test: 0.0018135	best: 0.0018135	(509)		
510:	learn: 0.0013469	test: 0.0018127	best: 0.0018127	(510)		
511:	learn: 0.0013457	test: 0.0018114	best: 0.0018114	(511)		
512:	learn: 0.0013444	test: 0.0018098	best: 0.0018098	(512)		
513:	learn: 0.0013433	test: 0.0018085	best: 0.0018085	(513)		
514:	learn: 0.0013425	test: 0.0018075	best: 0.0018075	(514)		
515:	learn: 0.0013412	test: 0.0018061	best: 0.0018061	(515)		
516:	learn: 0.0013407	test: 0.0018055	best: 0.0018055	(516)		
517:	learn: 0.0013396	test: 0.0018043	best: 0.0018043	(517)		
518:	learn: 0.0013387	test: 0.0018033	best: 0.0018033	(518)		
519:	learn: 0.0013377	test: 0.0018023	best: 0.0018023	(519)		
520:	learn: 0.0013370	test: 0.0018015	best: 0.0018015	(520)		

521:	learn: 0.0013358	test: 0.0018003	best: 0.0018003 (521)
522:	learn: 0.0013352	test: 0.0017997	best: 0.0017997 (522)
523:	learn: 0.0013345	test: 0.0017988	best: 0.0017988 (523)
524:	learn: 0.0013338	test: 0.0017981	best: 0.0017981 (524)
525:	learn: 0.0013330	test: 0.0017972	best: 0.0017972 (525)
526:	learn: 0.0013320	test: 0.0017961	best: 0.0017961 (526)
527:	learn: 0.0013310	test: 0.0017950	best: 0.0017950 (527)
528:	learn: 0.0013302	test: 0.0017941	best: 0.0017941 (528)
529:	learn: 0.0013296	test: 0.0017935	best: 0.0017935 (529)
530:	learn: 0.0013284	test: 0.0017923	best: 0.0017923 (530)
531:	learn: 0.0013276	test: 0.0017913	best: 0.0017913 (531)
532:	learn: 0.0013266	test: 0.0017901	best: 0.0017901 (532)
533:	learn: 0.0013261	test: 0.0017896	best: 0.0017896 (533)
534:	learn: 0.0013255	test: 0.0017889	best: 0.0017889 (534)
535:	learn: 0.0013246	test: 0.0017879	best: 0.0017879 (535)
536:	learn: 0.0013241	test: 0.0017874	best: 0.0017874 (536)
537:	learn: 0.0013233	test: 0.0017865	best: 0.0017865 (537)
538:	learn: 0.0013224	test: 0.0017855	best: 0.0017855 (538)
539:	learn: 0.0013222	test: 0.0017852	best: 0.0017852 (539)
540:	learn: 0.0013216	test: 0.0017846	best: 0.0017846 (540)
541:	learn: 0.0013208	test: 0.0017837	best: 0.0017837 (541)
542:	learn: 0.0013202	test: 0.0017830	best: 0.0017830 (542)
543:	learn: 0.0013192	test: 0.0017819	best: 0.0017819 (543)
544:	learn: 0.0013186	test: 0.0017812	best: 0.0017812 (544)
545:	learn: 0.0013179	test: 0.0017805	best: 0.0017805 (545)
546:	learn: 0.0013172	test: 0.0017797	best: 0.0017797 (546)
547:	learn: 0.0013165	test: 0.0017789	best: 0.0017789 (547)
548:	learn: 0.0013156	test: 0.0017781	best: 0.0017781 (548)
549:	learn: 0.0013149	test: 0.0017773	best: 0.0017773 (549)
550:	learn: 0.0013143	test: 0.0017765	best: 0.0017765 (550)
551:	learn: 0.0013134	test: 0.0017756	best: 0.0017756 (551)
552:	learn: 0.0013127	test: 0.0017749	best: 0.0017749 (552)
553:	learn: 0.0013120	test: 0.0017741	best: 0.0017741 (553)
554:	learn: 0.0013114	test: 0.0017734	best: 0.0017734 (554)
555:	learn: 0.0013105	test: 0.0017725	best: 0.0017725 (555)
556:	learn: 0.0013097	test: 0.0017718	best: 0.0017718 (556)
557:	learn: 0.0013089	test: 0.0017709	best: 0.0017709 (557)
558:	learn: 0.0013081	test: 0.0017700	best: 0.0017700 (558)
559:	learn: 0.0013074	test: 0.0017693	best: 0.0017693 (559)
560:	learn: 0.0013068	test: 0.0017688	best: 0.0017688 (560)
561:	learn: 0.0013062	test: 0.0017681	best: 0.0017681 (561)
562:	learn: 0.0013055	test: 0.0017673	best: 0.0017673 (562)
563:	learn: 0.0013048	test: 0.0017666	best: 0.0017666 (563)
564:	learn: 0.0013041	test: 0.0017658	best: 0.0017658 (564)
565:	learn: 0.0013037	test: 0.0017653	best: 0.0017653 (565)
566:	learn: 0.0013031	test: 0.0017646	best: 0.0017646 (566)
567:	learn: 0.0013025	test: 0.0017639	best: 0.0017639 (567)

568:	learn: 0.0013019	test: 0.0017632	best: 0.0017632	(568)	
569:	learn: 0.0013014	test: 0.0017626	best: 0.0017626	(569)	
570:	learn: 0.0013009	test: 0.0017620	best: 0.0017620	(570)	
571:	learn: 0.0012998	test: 0.0017608	best: 0.0017608	(571)	
572:	learn: 0.0012988	test: 0.0017597	best: 0.0017597	(572)	
573:	learn: 0.0012984	test: 0.0017592	best: 0.0017592	(573)	
574:	learn: 0.0012979	test: 0.0017587	best: 0.0017587	(574)	
575:	learn: 0.0012973	test: 0.0017580	best: 0.0017580	(575)	
576:	learn: 0.0012968	test: 0.0017575	best: 0.0017575	(576)	
577:	learn: 0.0012960	test: 0.0017566	best: 0.0017566	(577)	
578:	learn: 0.0012950	test: 0.0017556	best: 0.0017556	(578)	
579:	learn: 0.0012943	test: 0.0017548	best: 0.0017548	(579)	
580:	learn: 0.0012934	test: 0.0017538	best: 0.0017538	(580)	
581:	learn: 0.0012928	test: 0.0017531	best: 0.0017531	(581)	
582:	learn: 0.0012919	test: 0.0017522	best: 0.0017522	(582)	
583:	learn: 0.0012909	test: 0.0017511	best: 0.0017511	(583)	
584:	learn: 0.0012899	test: 0.0017500	best: 0.0017500	(584)	
585:	learn: 0.0012890	test: 0.0017491	best: 0.0017491	(585)	
586:	learn: 0.0012883	test: 0.0017484	best: 0.0017484	(586)	
587:	learn: 0.0012876	test: 0.0017476	best: 0.0017476	(587)	
588:	learn: 0.0012874	test: 0.0017473	best: 0.0017473	(588)	
589:	learn: 0.0012869	test: 0.0017467	best: 0.0017467	(589)	
590:	learn: 0.0012860	test: 0.0017458	best: 0.0017458	(590)	
591:	learn: 0.0012852	test: 0.0017450	best: 0.0017450	(591)	
592:	learn: 0.0012846	test: 0.0017443	best: 0.0017443	(592)	
593:	learn: 0.0012839	test: 0.0017436	best: 0.0017436	(593)	
594:	learn: 0.0012837	test: 0.0017433	best: 0.0017433	(594)	
595:	learn: 0.0012825	test: 0.0017421	best: 0.0017421	(595)	
596:	learn: 0.0012819	test: 0.0017414	best: 0.0017414	(596)	
597:	learn: 0.0012810	test: 0.0017404	best: 0.0017404	(597)	
598:	learn: 0.0012805	test: 0.0017398	best: 0.0017398	(598)	
599:	learn: 0.0012800	test: 0.0017391	best: 0.0017391	(599)	
600:	learn: 0.0012791	test: 0.0017381	best: 0.0017381	(600)	
601:	learn: 0.0012786	test: 0.0017376	best: 0.0017376	(601)	
602:	learn: 0.0012782	test: 0.0017371	best: 0.0017371	(602)	
603:	learn: 0.0012776	test: 0.0017365	best: 0.0017365	(603)	total: 28.6s
604:	learn: 0.0012768	test: 0.0017357	best: 0.0017357	(604)	remaining: 18.8s
605:	learn: 0.0012763	test: 0.0017351	best: 0.0017351	(605)	
606:	learn: 0.0012754	test: 0.0017341	best: 0.0017341	(606)	
607:	learn: 0.0012746	test: 0.0017332	best: 0.0017332	(607)	
608:	learn: 0.0012741	test: 0.0017326	best: 0.0017326	(608)	
609:	learn: 0.0012734	test: 0.0017319	best: 0.0017319	(609)	
610:	learn: 0.0012728	test: 0.0017312	best: 0.0017312	(610)	
611:	learn: 0.0012721	test: 0.0017304	best: 0.0017304	(611)	
612:	learn: 0.0012714	test: 0.0017296	best: 0.0017296	(612)	
613:	learn: 0.0012701	test: 0.0017284	best: 0.0017284	(613)	
614:	learn: 0.0012696	test: 0.0017278	best: 0.0017278	(614)	

615:	learn: 0.0012688	test: 0.0017270	best: 0.0017270	(615)
616:	learn: 0.0012685	test: 0.0017267	best: 0.0017267	(616)
617:	learn: 0.0012682	test: 0.0017263	best: 0.0017263	(617)
618:	learn: 0.0012677	test: 0.0017258	best: 0.0017258	(618)
619:	learn: 0.0012672	test: 0.0017252	best: 0.0017252	(619)
620:	learn: 0.0012669	test: 0.0017248	best: 0.0017248	(620)
621:	learn: 0.0012662	test: 0.0017241	best: 0.0017241	(621)
622:	learn: 0.0012656	test: 0.0017234	best: 0.0017234	(622)
623:	learn: 0.0012649	test: 0.0017226	best: 0.0017226	(623)
624:	learn: 0.0012639	test: 0.0017216	best: 0.0017216	(624)
625:	learn: 0.0012629	test: 0.0017206	best: 0.0017206	(625)
626:	learn: 0.0012621	test: 0.0017196	best: 0.0017196	(626)
627:	learn: 0.0012613	test: 0.0017188	best: 0.0017188	(627)
628:	learn: 0.0012604	test: 0.0017178	best: 0.0017178	(628)
629:	learn: 0.0012597	test: 0.0017170	best: 0.0017170	(629)
630:	learn: 0.0012592	test: 0.0017165	best: 0.0017165	(630)
631:	learn: 0.0012586	test: 0.0017158	best: 0.0017158	(631)
632:	learn: 0.0012577	test: 0.0017149	best: 0.0017149	(632)
633:	learn: 0.0012569	test: 0.0017141	best: 0.0017141	(633)
634:	learn: 0.0012563	test: 0.0017134	best: 0.0017134	(634)
635:	learn: 0.0012555	test: 0.0017126	best: 0.0017126	(635)
636:	learn: 0.0012549	test: 0.0017120	best: 0.0017120	(636)
637:	learn: 0.0012543	test: 0.0017112	best: 0.0017112	(637)
638:	learn: 0.0012536	test: 0.0017106	best: 0.0017106	(638)
639:	learn: 0.0012528	test: 0.0017097	best: 0.0017097	(639)
640:	learn: 0.0012520	test: 0.0017089	best: 0.0017089	(640)
641:	learn: 0.0012510	test: 0.0017077	best: 0.0017077	(641)
642:	learn: 0.0012503	test: 0.0017069	best: 0.0017069	(642)
643:	learn: 0.0012498	test: 0.0017064	best: 0.0017064	(643)
644:	learn: 0.0012492	test: 0.0017057	best: 0.0017057	(644)
645:	learn: 0.0012487	test: 0.0017052	best: 0.0017052	(645)
646:	learn: 0.0012483	test: 0.0017047	best: 0.0017047	(646)
647:	learn: 0.0012475	test: 0.0017038	best: 0.0017038	(647)
648:	learn: 0.0012469	test: 0.0017032	best: 0.0017032	(648)
649:	learn: 0.0012466	test: 0.0017028	best: 0.0017028	(649)
650:	learn: 0.0012457	test: 0.0017018	best: 0.0017018	(650)
651:	learn: 0.0012449	test: 0.0017010	best: 0.0017010	(651)
652:	learn: 0.0012441	test: 0.0017002	best: 0.0017002	(652)
653:	learn: 0.0012435	test: 0.0016995	best: 0.0016995	(653)
654:	learn: 0.0012426	test: 0.0016985	best: 0.0016985	(654)
655:	learn: 0.0012416	test: 0.0016976	best: 0.0016976	(655)
656:	learn: 0.0012408	test: 0.0016967	best: 0.0016967	(656)
657:	learn: 0.0012398	test: 0.0016958	best: 0.0016958	(657)
658:	learn: 0.0012394	test: 0.0016953	best: 0.0016953	(658)
659:	learn: 0.0012390	test: 0.0016949	best: 0.0016949	(659)
660:	learn: 0.0012383	test: 0.0016942	best: 0.0016942	(660)
661:	learn: 0.0012379	test: 0.0016936	best: 0.0016936	(661)



662:	learn: 0.0012374	test: 0.0016930	best: 0.0016930 (662)
663:	learn: 0.0012372	test: 0.0016929	best: 0.0016929 (663)
664:	learn: 0.0012367	test: 0.0016924	best: 0.0016924 (664)
665:	learn: 0.0012361	test: 0.0016916	best: 0.0016916 (665)
666:	learn: 0.0012359	test: 0.0016915	best: 0.0016915 (666)
667:	learn: 0.0012354	test: 0.0016909	best: 0.0016909 (667)
668:	learn: 0.0012348	test: 0.0016902	best: 0.0016902 (668)
669:	learn: 0.0012345	test: 0.0016899	best: 0.0016899 (669)
670:	learn: 0.0012342	test: 0.0016895	best: 0.0016895 (670)
671:	learn: 0.0012339	test: 0.0016892	best: 0.0016892 (671)
672:	learn: 0.0012334	test: 0.0016888	best: 0.0016888 (672)
673:	learn: 0.0012325	test: 0.0016878	best: 0.0016878 (673)
674:	learn: 0.0012317	test: 0.0016870	best: 0.0016870 (674)
675:	learn: 0.0012309	test: 0.0016862	best: 0.0016862 (675)
676:	learn: 0.0012304	test: 0.0016856	best: 0.0016856 (676)
677:	learn: 0.0012297	test: 0.0016848	best: 0.0016848 (677)
678:	learn: 0.0012290	test: 0.0016842	best: 0.0016842 (678)
679:	learn: 0.0012282	test: 0.0016834	best: 0.0016834 (679)
680:	learn: 0.0012275	test: 0.0016825	best: 0.0016825 (680)
681:	learn: 0.0012270	test: 0.0016820	best: 0.0016820 (681)
682:	learn: 0.0012265	test: 0.0016813	best: 0.0016813 (682)
683:	learn: 0.0012260	test: 0.0016807	best: 0.0016807 (683)
684:	learn: 0.0012255	test: 0.0016802	best: 0.0016802 (684)
685:	learn: 0.0012249	test: 0.0016796	best: 0.0016796 (685)
686:	learn: 0.0012245	test: 0.0016791	best: 0.0016791 (686)
687:	learn: 0.0012241	test: 0.0016786	best: 0.0016786 (687)
688:	learn: 0.0012236	test: 0.0016781	best: 0.0016781 (688)
689:	learn: 0.0012234	test: 0.0016778	best: 0.0016778 (689)
690:	learn: 0.0012227	test: 0.0016772	best: 0.0016772 (690)
691:	learn: 0.0012224	test: 0.0016768	best: 0.0016768 (691)
692:	learn: 0.0012216	test: 0.0016760	best: 0.0016760 (692)
693:	learn: 0.0012210	test: 0.0016753	best: 0.0016753 (693)
694:	learn: 0.0012204	test: 0.0016748	best: 0.0016748 (694)
695:	learn: 0.0012200	test: 0.0016743	best: 0.0016743 (695)
696:	learn: 0.0012195	test: 0.0016739	best: 0.0016739 (696)
697:	learn: 0.0012189	test: 0.0016732	best: 0.0016732 (697)
698:	learn: 0.0012183	test: 0.0016725	best: 0.0016725 (698)
699:	learn: 0.0012176	test: 0.0016718	best: 0.0016718 (699)
700:	learn: 0.0012172	test: 0.0016713	best: 0.0016713 (700)
701:	learn: 0.0012165	test: 0.0016706	best: 0.0016706 (701)
702:	learn: 0.0012160	test: 0.0016701	best: 0.0016701 (702)
703:	learn: 0.0012152	test: 0.0016692	best: 0.0016692 (703)
704:	learn: 0.0012150	test: 0.0016689	best: 0.0016689 (704)
705:	learn: 0.0012147	test: 0.0016686	best: 0.0016686 (705)
706:	learn: 0.0012141	test: 0.0016681	best: 0.0016681 (706)
707:	learn: 0.0012137	test: 0.0016676	best: 0.0016676 (707)
708:	learn: 0.0012135	test: 0.0016674	best: 0.0016674 (708)

709:	learn: 0.0012131	test: 0.0016670	best: 0.0016670 (709)		
710:	learn: 0.0012126	test: 0.0016664	best: 0.0016664 (710)		
711:	learn: 0.0012118	test: 0.0016657	best: 0.0016657 (711)		
712:	learn: 0.0012113	test: 0.0016652	best: 0.0016652 (712)		
713:	learn: 0.0012109	test: 0.0016647	best: 0.0016647 (713)		
714:	learn: 0.0012103	test: 0.0016641	best: 0.0016641 (714)		
715:	learn: 0.0012100	test: 0.0016637	best: 0.0016637 (715)		
716:	learn: 0.0012096	test: 0.0016633	best: 0.0016633 (716)		
717:	learn: 0.0012092	test: 0.0016628	best: 0.0016628 (717)		
718:	learn: 0.0012088	test: 0.0016624	best: 0.0016624 (718)		
719:	learn: 0.0012084	test: 0.0016619	best: 0.0016619 (719)		
720:	learn: 0.0012078	test: 0.0016612	best: 0.0016612 (720)		
721:	learn: 0.0012073	test: 0.0016607	best: 0.0016607 (721)		
722:	learn: 0.0012069	test: 0.0016603	best: 0.0016603 (722)		
723:	learn: 0.0012065	test: 0.0016598	best: 0.0016598 (723)		
724:	learn: 0.0012060	test: 0.0016593	best: 0.0016593 (724)		
725:	learn: 0.0012055	test: 0.0016588	best: 0.0016588 (725)		
726:	learn: 0.0012049	test: 0.0016582	best: 0.0016582 (726)		
727:	learn: 0.0012041	test: 0.0016573	best: 0.0016573 (727)		
728:	learn: 0.0012035	test: 0.0016567	best: 0.0016567 (728)		
729:	learn: 0.0012028	test: 0.0016559	best: 0.0016559 (729)		
730:	learn: 0.0012025	test: 0.0016556	best: 0.0016556 (730)		
731:	learn: 0.0012016	test: 0.0016546	best: 0.0016546 (731)		
732:	learn: 0.0012011	test: 0.0016540	best: 0.0016540 (732)		
733:	learn: 0.0012005	test: 0.0016534	best: 0.0016534 (733)		
734:	learn: 0.0012004	test: 0.0016532	best: 0.0016532 (734)		
735:	learn: 0.0011998	test: 0.0016526	best: 0.0016526 (735)		
736:	learn: 0.0011994	test: 0.0016523	best: 0.0016523 (736)		
737:	learn: 0.0011992	test: 0.0016520	best: 0.0016520 (737)		
738:	learn: 0.0011987	test: 0.0016516	best: 0.0016516 (738)		
739:	learn: 0.0011983	test: 0.0016511	best: 0.0016511 (739)		
740:	learn: 0.0011979	test: 0.0016507	best: 0.0016507 (740)		
741:	learn: 0.0011973	test: 0.0016501	best: 0.0016501 (741)		
742:	learn: 0.0011968	test: 0.0016496	best: 0.0016496 (742)		
743:	learn: 0.0011967	test: 0.0016494	best: 0.0016494 (743)		
744:	learn: 0.0011961	test: 0.0016488	best: 0.0016488 (744)		
745:	learn: 0.0011958	test: 0.0016485	best: 0.0016485 (745)		
746:	learn: 0.0011953	test: 0.0016480	best: 0.0016480 (746)		
747:	learn: 0.0011947	test: 0.0016473	best: 0.0016473 (747)		
748:	learn: 0.0011942	test: 0.0016468	best: 0.0016468 (748)		
749:	learn: 0.0011937	test: 0.0016463	best: 0.0016463 (749)		
750:	learn: 0.0011934	test: 0.0016460	best: 0.0016460 (750)		
751:	learn: 0.0011932	test: 0.0016457	best: 0.0016457 (751)		
752:	learn: 0.0011928	test: 0.0016453	best: 0.0016453 (752)		
753:	learn: 0.0011925	test: 0.0016449	best: 0.0016449 (753)		
754:	learn: 0.0011920	test: 0.0016444	best: 0.0016444 (754)	total: 35.7s	remaining: 11.6s
755:	learn: 0.0011919	test: 0.0016442	best: 0.0016442 (755)		

756:	learn: 0.0011918	test: 0.0016441	best: 0.0016441	(756)
757:	learn: 0.0011915	test: 0.0016438	best: 0.0016438	(757)
758:	learn: 0.0011912	test: 0.0016435	best: 0.0016435	(758)
759:	learn: 0.0011906	test: 0.0016429	best: 0.0016429	(759)
760:	learn: 0.0011904	test: 0.0016427	best: 0.0016427	(760)
761:	learn: 0.0011899	test: 0.0016422	best: 0.0016422	(761)
762:	learn: 0.0011896	test: 0.0016419	best: 0.0016419	(762)
763:	learn: 0.0011893	test: 0.0016416	best: 0.0016416	(763)
764:	learn: 0.0011890	test: 0.0016412	best: 0.0016412	(764)
765:	learn: 0.0011884	test: 0.0016405	best: 0.0016405	(765)
766:	learn: 0.0011883	test: 0.0016405	best: 0.0016405	(766)
767:	learn: 0.0011882	test: 0.0016404	best: 0.0016404	(767)
768:	learn: 0.0011879	test: 0.0016400	best: 0.0016400	(768)
769:	learn: 0.0011876	test: 0.0016397	best: 0.0016397	(769)
770:	learn: 0.0011873	test: 0.0016394	best: 0.0016394	(770)
771:	learn: 0.0011872	test: 0.0016392	best: 0.0016392	(771)
772:	learn: 0.0011869	test: 0.0016390	best: 0.0016390	(772)
773:	learn: 0.0011868	test: 0.0016388	best: 0.0016388	(773)
774:	learn: 0.0011867	test: 0.0016387	best: 0.0016387	(774)
775:	learn: 0.0011863	test: 0.0016382	best: 0.0016382	(775)
776:	learn: 0.0011860	test: 0.0016379	best: 0.0016379	(776)
777:	learn: 0.0011858	test: 0.0016377	best: 0.0016377	(777)
778:	learn: 0.0011856	test: 0.0016375	best: 0.0016375	(778)
779:	learn: 0.0011853	test: 0.0016371	best: 0.0016371	(779)
780:	learn: 0.0011848	test: 0.0016366	best: 0.0016366	(780)
781:	learn: 0.0011843	test: 0.0016362	best: 0.0016362	(781)
782:	learn: 0.0011841	test: 0.0016358	best: 0.0016358	(782)
783:	learn: 0.0011839	test: 0.0016357	best: 0.0016357	(783)
784:	learn: 0.0011837	test: 0.0016354	best: 0.0016354	(784)
785:	learn: 0.0011835	test: 0.0016353	best: 0.0016353	(785)
786:	learn: 0.0011833	test: 0.0016350	best: 0.0016350	(786)
787:	learn: 0.0011830	test: 0.0016347	best: 0.0016347	(787)
788:	learn: 0.0011826	test: 0.0016342	best: 0.0016342	(788)
789:	learn: 0.0011824	test: 0.0016340	best: 0.0016340	(789)
790:	learn: 0.0011821	test: 0.0016337	best: 0.0016337	(790)
791:	learn: 0.0011819	test: 0.0016334	best: 0.0016334	(791)
792:	learn: 0.0011817	test: 0.0016333	best: 0.0016333	(792)
793:	learn: 0.0011814	test: 0.0016329	best: 0.0016329	(793)
794:	learn: 0.0011811	test: 0.0016327	best: 0.0016327	(794)
795:	learn: 0.0011807	test: 0.0016323	best: 0.0016323	(795)
796:	learn: 0.0011806	test: 0.0016321	best: 0.0016321	(796)
797:	learn: 0.0011801	test: 0.0016317	best: 0.0016317	(797)
798:	learn: 0.0011796	test: 0.0016311	best: 0.0016311	(798)
799:	learn: 0.0011789	test: 0.0016304	best: 0.0016304	(799)
800:	learn: 0.0011786	test: 0.0016301	best: 0.0016301	(800)
801:	learn: 0.0011780	test: 0.0016295	best: 0.0016295	(801)
802:	learn: 0.0011775	test: 0.0016290	best: 0.0016290	(802)

803:	learn: 0.0011771	test: 0.0016285	best: 0.0016285 (803)
804:	learn: 0.0011771	test: 0.0016285	best: 0.0016285 (804)
805:	learn: 0.0011768	test: 0.0016282	best: 0.0016282 (805)
806:	learn: 0.0011766	test: 0.0016280	best: 0.0016280 (806)
807:	learn: 0.0011765	test: 0.0016279	best: 0.0016279 (807)
808:	learn: 0.0011763	test: 0.0016277	best: 0.0016277 (808)
809:	learn: 0.0011762	test: 0.0016276	best: 0.0016276 (809)
810:	learn: 0.0011760	test: 0.0016274	best: 0.0016274 (810)
811:	learn: 0.0011756	test: 0.0016270	best: 0.0016270 (811)
812:	learn: 0.0011751	test: 0.0016264	best: 0.0016264 (812)
813:	learn: 0.0011747	test: 0.0016260	best: 0.0016260 (813)
814:	learn: 0.0011742	test: 0.0016255	best: 0.0016255 (814)
815:	learn: 0.0011740	test: 0.0016252	best: 0.0016252 (815)
816:	learn: 0.0011736	test: 0.0016248	best: 0.0016248 (816)
817:	learn: 0.0011733	test: 0.0016245	best: 0.0016245 (817)
818:	learn: 0.0011729	test: 0.0016241	best: 0.0016241 (818)
819:	learn: 0.0011724	test: 0.0016236	best: 0.0016236 (819)
820:	learn: 0.0011723	test: 0.0016234	best: 0.0016234 (820)
821:	learn: 0.0011720	test: 0.0016231	best: 0.0016231 (821)
822:	learn: 0.0011716	test: 0.0016227	best: 0.0016227 (822)
823:	learn: 0.0011712	test: 0.0016222	best: 0.0016222 (823)
824:	learn: 0.0011710	test: 0.0016219	best: 0.0016219 (824)
825:	learn: 0.0011706	test: 0.0016215	best: 0.0016215 (825)
826:	learn: 0.0011703	test: 0.0016212	best: 0.0016212 (826)
827:	learn: 0.0011701	test: 0.0016210	best: 0.0016210 (827)
828:	learn: 0.0011700	test: 0.0016209	best: 0.0016209 (828)
829:	learn: 0.0011698	test: 0.0016206	best: 0.0016206 (829)
830:	learn: 0.0011696	test: 0.0016204	best: 0.0016204 (830)
831:	learn: 0.0011692	test: 0.0016199	best: 0.0016199 (831)
832:	learn: 0.0011689	test: 0.0016196	best: 0.0016196 (832)
833:	learn: 0.0011687	test: 0.0016194	best: 0.0016194 (833)
834:	learn: 0.0011682	test: 0.0016188	best: 0.0016188 (834)
835:	learn: 0.0011677	test: 0.0016184	best: 0.0016184 (835)
836:	learn: 0.0011673	test: 0.0016179	best: 0.0016179 (836)
837:	learn: 0.0011670	test: 0.0016176	best: 0.0016176 (837)
838:	learn: 0.0011668	test: 0.0016173	best: 0.0016173 (838)
839:	learn: 0.0011664	test: 0.0016170	best: 0.0016170 (839)
840:	learn: 0.0011663	test: 0.0016168	best: 0.0016168 (840)
841:	learn: 0.0011662	test: 0.0016167	best: 0.0016167 (841)
842:	learn: 0.0011658	test: 0.0016164	best: 0.0016164 (842)
843:	learn: 0.0011656	test: 0.0016161	best: 0.0016161 (843)
844:	learn: 0.0011653	test: 0.0016157	best: 0.0016157 (844)
845:	learn: 0.0011651	test: 0.0016155	best: 0.0016155 (845)
846:	learn: 0.0011647	test: 0.0016151	best: 0.0016151 (846)
847:	learn: 0.0011641	test: 0.0016145	best: 0.0016145 (847)
848:	learn: 0.0011636	test: 0.0016140	best: 0.0016140 (848)
849:	learn: 0.0011633	test: 0.0016137	best: 0.0016137 (849)

850:	learn: 0.0011630	test: 0.0016133	best: 0.0016133	(850)
851:	learn: 0.0011628	test: 0.0016130	best: 0.0016130	(851)
852:	learn: 0.0011623	test: 0.0016126	best: 0.0016126	(852)
853:	learn: 0.0011619	test: 0.0016122	best: 0.0016122	(853)
854:	learn: 0.0011617	test: 0.0016120	best: 0.0016120	(854)
855:	learn: 0.0011614	test: 0.0016116	best: 0.0016116	(855)
856:	learn: 0.0011610	test: 0.0016112	best: 0.0016112	(856)
857:	learn: 0.0011605	test: 0.0016107	best: 0.0016107	(857)
858:	learn: 0.0011601	test: 0.0016102	best: 0.0016102	(858)
859:	learn: 0.0011599	test: 0.0016100	best: 0.0016100	(859)
860:	learn: 0.0011595	test: 0.0016095	best: 0.0016095	(860)
861:	learn: 0.0011594	test: 0.0016094	best: 0.0016094	(861)
862:	learn: 0.0011592	test: 0.0016092	best: 0.0016092	(862)
863:	learn: 0.0011589	test: 0.0016089	best: 0.0016089	(863)
864:	learn: 0.0011587	test: 0.0016087	best: 0.0016087	(864)
865:	learn: 0.0011584	test: 0.0016084	best: 0.0016084	(865)
866:	learn: 0.0011583	test: 0.0016083	best: 0.0016083	(866)
867:	learn: 0.0011579	test: 0.0016079	best: 0.0016079	(867)
868:	learn: 0.0011576	test: 0.0016075	best: 0.0016075	(868)
869:	learn: 0.0011572	test: 0.0016071	best: 0.0016071	(869)
870:	learn: 0.0011569	test: 0.0016068	best: 0.0016068	(870)
871:	learn: 0.0011566	test: 0.0016065	best: 0.0016065	(871)
872:	learn: 0.0011565	test: 0.0016063	best: 0.0016063	(872)
873:	learn: 0.0011563	test: 0.0016061	best: 0.0016061	(873)
874:	learn: 0.0011562	test: 0.0016059	best: 0.0016059	(874)
875:	learn: 0.0011558	test: 0.0016056	best: 0.0016056	(875)
876:	learn: 0.0011556	test: 0.0016054	best: 0.0016054	(876)
877:	learn: 0.0011553	test: 0.0016050	best: 0.0016050	(877)
878:	learn: 0.0011550	test: 0.0016047	best: 0.0016047	(878)
879:	learn: 0.0011548	test: 0.0016045	best: 0.0016045	(879)
880:	learn: 0.0011546	test: 0.0016043	best: 0.0016043	(880)
881:	learn: 0.0011544	test: 0.0016041	best: 0.0016041	(881)
882:	learn: 0.0011544	test: 0.0016040	best: 0.0016040	(882)
883:	learn: 0.0011540	test: 0.0016037	best: 0.0016037	(883)
884:	learn: 0.0011538	test: 0.0016034	best: 0.0016034	(884)
885:	learn: 0.0011533	test: 0.0016029	best: 0.0016029	(885)
886:	learn: 0.0011530	test: 0.0016027	best: 0.0016027	(886)
887:	learn: 0.0011527	test: 0.0016023	best: 0.0016023	(887)
888:	learn: 0.0011524	test: 0.0016020	best: 0.0016020	(888)
889:	learn: 0.0011520	test: 0.0016016	best: 0.0016016	(889)
890:	learn: 0.0011515	test: 0.0016010	best: 0.0016010	(890)
891:	learn: 0.0011514	test: 0.0016010	best: 0.0016010	(891)
892:	learn: 0.0011513	test: 0.0016008	best: 0.0016008	(892)
893:	learn: 0.0011511	test: 0.0016006	best: 0.0016006	(893)
894:	learn: 0.0011510	test: 0.0016005	best: 0.0016005	(894)
895:	learn: 0.0011510	test: 0.0016004	best: 0.0016004	(895)
896:	learn: 0.0011509	test: 0.0016004	best: 0.0016004	(896)

897:	learn: 0.0011508	test: 0.0016003	best: 0.0016003	(897)		
898:	learn: 0.0011508	test: 0.0016003	best: 0.0016003	(898)		
899:	learn: 0.0011506	test: 0.0016000	best: 0.0016000	(899)		
900:	learn: 0.0011504	test: 0.0015998	best: 0.0015998	(900)		
901:	learn: 0.0011500	test: 0.0015994	best: 0.0015994	(901)		
902:	learn: 0.0011497	test: 0.0015991	best: 0.0015991	(902)		
903:	learn: 0.0011494	test: 0.0015987	best: 0.0015987	(903)		
904:	learn: 0.0011489	test: 0.0015983	best: 0.0015983	(904)		
905:	learn: 0.0011488	test: 0.0015982	best: 0.0015982	(905)		
906:	learn: 0.0011486	test: 0.0015979	best: 0.0015979	(906)		
907:	learn: 0.0011485	test: 0.0015977	best: 0.0015977	(907)		
908:	learn: 0.0011483	test: 0.0015975	best: 0.0015975	(908)		
909:	learn: 0.0011481	test: 0.0015973	best: 0.0015973	(909)		
910:	learn: 0.0011478	test: 0.0015970	best: 0.0015970	(910)		
911:	learn: 0.0011476	test: 0.0015967	best: 0.0015967	(911)		
912:	learn: 0.0011475	test: 0.0015966	best: 0.0015966	(912)		
913:	learn: 0.0011473	test: 0.0015963	best: 0.0015963	(913)		
914:	learn: 0.0011470	test: 0.0015960	best: 0.0015960	(914)	total: 44s	remaining: 4.08s
915:	learn: 0.0011469	test: 0.0015959	best: 0.0015959	(915)		
916:	learn: 0.0011468	test: 0.0015957	best: 0.0015957	(916)		
917:	learn: 0.0011467	test: 0.0015956	best: 0.0015956	(917)		
918:	learn: 0.0011466	test: 0.0015956	best: 0.0015956	(918)		
919:	learn: 0.0011465	test: 0.0015955	best: 0.0015955	(919)		
920:	learn: 0.0011464	test: 0.0015953	best: 0.0015953	(920)		
921:	learn: 0.0011462	test: 0.0015951	best: 0.0015951	(921)		
922:	learn: 0.0011461	test: 0.0015950	best: 0.0015950	(922)		
923:	learn: 0.0011459	test: 0.0015947	best: 0.0015947	(923)		
924:	learn: 0.0011458	test: 0.0015946	best: 0.0015946	(924)		
925:	learn: 0.0011457	test: 0.0015945	best: 0.0015945	(925)		
926:	learn: 0.0011455	test: 0.0015942	best: 0.0015942	(926)		
927:	learn: 0.0011453	test: 0.0015940	best: 0.0015940	(927)		
928:	learn: 0.0011450	test: 0.0015937	best: 0.0015937	(928)		
929:	learn: 0.0011447	test: 0.0015934	best: 0.0015934	(929)		
930:	learn: 0.0011444	test: 0.0015930	best: 0.0015930	(930)		
931:	learn: 0.0011440	test: 0.0015926	best: 0.0015926	(931)		
932:	learn: 0.0011436	test: 0.0015923	best: 0.0015923	(932)		
933:	learn: 0.0011435	test: 0.0015920	best: 0.0015920	(933)		
934:	learn: 0.0011433	test: 0.0015919	best: 0.0015919	(934)		
935:	learn: 0.0011433	test: 0.0015918	best: 0.0015918	(935)		
936:	learn: 0.0011432	test: 0.0015917	best: 0.0015917	(936)		
937:	learn: 0.0011430	test: 0.0015914	best: 0.0015914	(937)		
938:	learn: 0.0011428	test: 0.0015912	best: 0.0015912	(938)		
939:	learn: 0.0011428	test: 0.0015911	best: 0.0015911	(939)		
940:	learn: 0.0011427	test: 0.0015910	best: 0.0015910	(940)		
941:	learn: 0.0011425	test: 0.0015908	best: 0.0015908	(941)		
942:	learn: 0.0011423	test: 0.0015905	best: 0.0015905	(942)		
943:	learn: 0.0011421	test: 0.0015903	best: 0.0015903	(943)		

944:	learn: 0.0011418	test: 0.0015900	best: 0.0015900 (944)
945:	learn: 0.0011416	test: 0.0015897	best: 0.0015897 (945)
946:	learn: 0.0011414	test: 0.0015895	best: 0.0015895 (946)
947:	learn: 0.0011412	test: 0.0015893	best: 0.0015893 (947)
948:	learn: 0.0011410	test: 0.0015889	best: 0.0015889 (948)
949:	learn: 0.0011409	test: 0.0015889	best: 0.0015889 (949)
950:	learn: 0.0011407	test: 0.0015887	best: 0.0015887 (950)
951:	learn: 0.0011406	test: 0.0015885	best: 0.0015885 (951)
952:	learn: 0.0011406	test: 0.0015884	best: 0.0015884 (952)
953:	learn: 0.0011404	test: 0.0015882	best: 0.0015882 (953)
954:	learn: 0.0011402	test: 0.0015880	best: 0.0015880 (954)
955:	learn: 0.0011399	test: 0.0015877	best: 0.0015877 (955)
956:	learn: 0.0011396	test: 0.0015874	best: 0.0015874 (956)
957:	learn: 0.0011393	test: 0.0015870	best: 0.0015870 (957)
958:	learn: 0.0011390	test: 0.0015867	best: 0.0015867 (958)
959:	learn: 0.0011388	test: 0.0015865	best: 0.0015865 (959)
960:	learn: 0.0011386	test: 0.0015863	best: 0.0015863 (960)
961:	learn: 0.0011385	test: 0.0015862	best: 0.0015862 (961)
962:	learn: 0.0011383	test: 0.0015859	best: 0.0015859 (962)
963:	learn: 0.0011382	test: 0.0015858	best: 0.0015858 (963)
964:	learn: 0.0011379	test: 0.0015855	best: 0.0015855 (964)
965:	learn: 0.0011378	test: 0.0015854	best: 0.0015854 (965)
966:	learn: 0.0011374	test: 0.0015849	best: 0.0015849 (966)
967:	learn: 0.0011369	test: 0.0015844	best: 0.0015844 (967)
968:	learn: 0.0011367	test: 0.0015842	best: 0.0015842 (968)
969:	learn: 0.0011363	test: 0.0015838	best: 0.0015838 (969)
970:	learn: 0.0011360	test: 0.0015835	best: 0.0015835 (970)
971:	learn: 0.0011358	test: 0.0015833	best: 0.0015833 (971)
972:	learn: 0.0011356	test: 0.0015831	best: 0.0015831 (972)
973:	learn: 0.0011354	test: 0.0015828	best: 0.0015828 (973)
974:	learn: 0.0011353	test: 0.0015827	best: 0.0015827 (974)
975:	learn: 0.0011352	test: 0.0015827	best: 0.0015827 (975)
976:	learn: 0.0011351	test: 0.0015825	best: 0.0015825 (976)
977:	learn: 0.0011350	test: 0.0015824	best: 0.0015824 (977)
978:	learn: 0.0011349	test: 0.0015823	best: 0.0015823 (978)
979:	learn: 0.0011348	test: 0.0015822	best: 0.0015822 (979)
980:	learn: 0.0011346	test: 0.0015820	best: 0.0015820 (980)
981:	learn: 0.0011341	test: 0.0015815	best: 0.0015815 (981)
982:	learn: 0.0011339	test: 0.0015813	best: 0.0015813 (982)
983:	learn: 0.0011336	test: 0.0015810	best: 0.0015810 (983)
984:	learn: 0.0011336	test: 0.0015810	best: 0.0015810 (984)
985:	learn: 0.0011335	test: 0.0015810	best: 0.0015810 (985)
986:	learn: 0.0011333	test: 0.0015808	best: 0.0015808 (986)
987:	learn: 0.0011331	test: 0.0015806	best: 0.0015806 (987)
988:	learn: 0.0011331	test: 0.0015806	best: 0.0015806 (988)
989:	learn: 0.0011329	test: 0.0015803	best: 0.0015803 (989)
990:	learn: 0.0011329	test: 0.0015803	best: 0.0015803 (990)

```

991:   learn: 0.0011328      test: 0.0015802 best: 0.0015802 (991)
992:   learn: 0.0011325      test: 0.0015800 best: 0.0015800 (992)
993:   learn: 0.0011325      test: 0.0015799 best: 0.0015799 (993)
994:   learn: 0.0011322      test: 0.0015797 best: 0.0015797 (994)
995:   learn: 0.0011322      test: 0.0015797 best: 0.0015797 (995)
996:   learn: 0.0011320      test: 0.0015794 best: 0.0015794 (996)
997:   learn: 0.0011318      test: 0.0015793 best: 0.0015793 (997)
998:   learn: 0.0011316      test: 0.0015790 best: 0.0015790 (998)
999:   learn: 0.0011313      test: 0.0015786 best: 0.0015786 (999)  total: 48.5s   remaining: 0us

```

```

In [18]: 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: 0:00:49.547263

```

```

In [19]: 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("---Regular Accuracy Scores---")
models.sort_values(by='Score', ascending=False)

```

```

---Regular Accuracy Scores---

```

```

Out[19]:

```

	Model	Score
1	Logistic Regression	100.00
2	Naive Bayes	100.00
5	Decision Tree	100.00



	Model	Score
6	Gradient Boosting Trees	100.00
7	CatBoost	100.00
4	Linear SVC	96.04
0	KNN	76.57
3	Stochastic Gradient Decent	52.48

```
In [20]: 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[20]:
```

	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	74.59

	Model	Score
0	KNN	65.35
3	Stochastic Gradient Decent	62.05

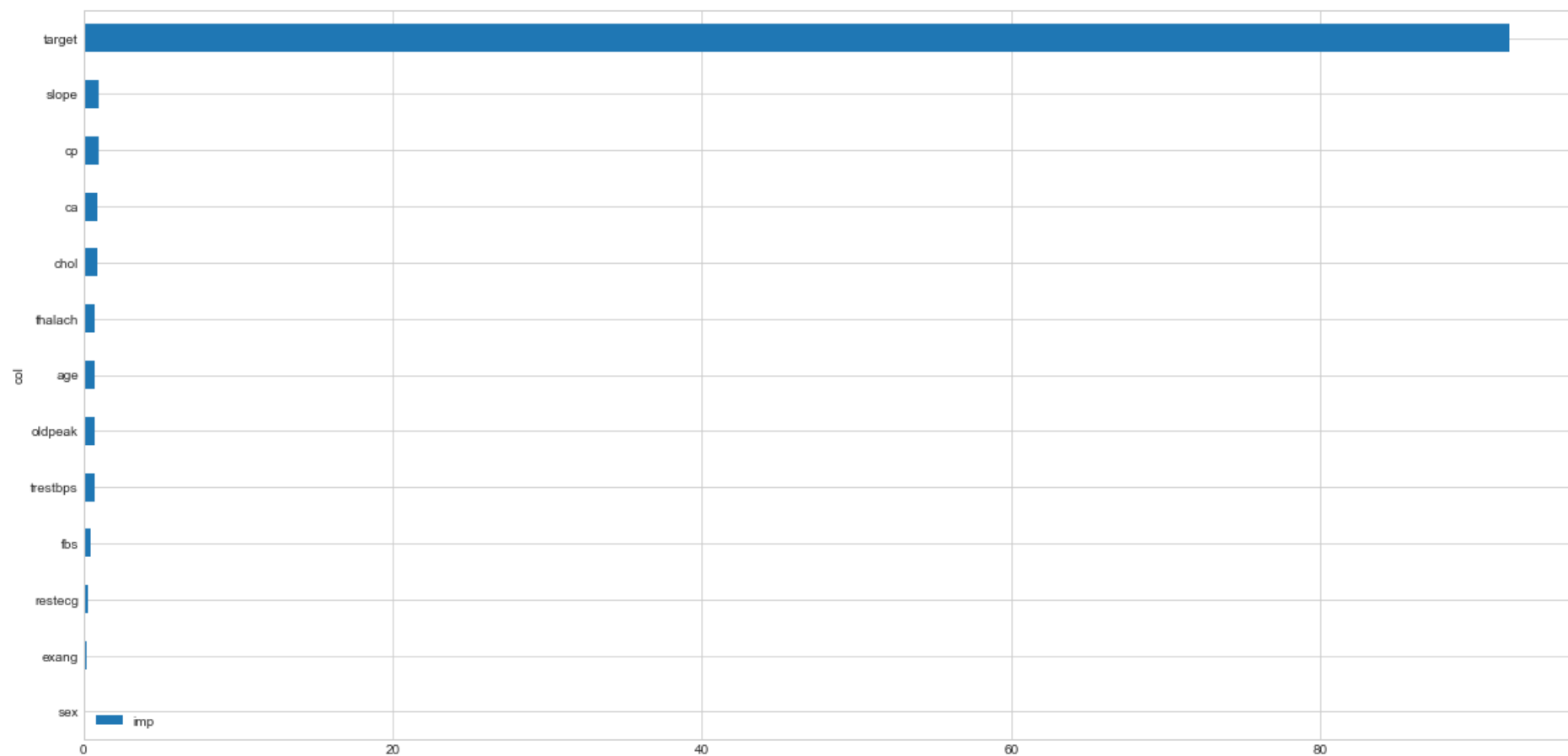
```
In [21]: # Feature Importance
def feature_importance(model, data):
    """
    Function to show which features are most important in the model.
    ::param_model:: Which model to use?
    ::param_data:: What data to use?
    """
    fea_imp = pd.DataFrame({'imp': model.feature_importances_, 'col': data.columns})
    fea_imp = fea_imp.sort_values(['imp', 'col'], ascending=[True, False]).iloc[-30:]
    _ = fea_imp.plot(kind='barh', x='col', y='imp', figsize=(20, 10))
    return fea_imp
plt.savefig('catboost_feature_importance.png')
```

```
In [22]: # Plot the feature importance scores
feature_importance(catboost_model, X_train)
```

```
Out[22]:
```

	imp	col
1	0.146061	sex
8	0.247319	exang
6	0.285544	restecg
5	0.431096	fbs
3	0.717464	trestbps
9	0.730202	oldpeak
0	0.731199	age
7	0.743558	thalach
4	0.902200	chol
11	0.910925	ca
2	0.948990	cp

	imp	col
10	0.960128	slope
12	92.245312	target



```
In [23]: metrics = ['Precision', 'Recall', 'F1', 'AUC']

eval_metrics = catboost_model.eval_metrics(train_pool,
                                           metrics=metrics,
                                           plot=True)

for metric in metrics:
    print(str(metric)+" : {}".format(np.mean(eval_metrics[metric])))
```

```
Precision: 1.0  
Recall: 1.0  
F1: 1.0  
AUC: 1.0
```

In [ ]: