

```
import numpy as np # Linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
```

In [136...

```
import warnings
warnings.filterwarnings('ignore')
```

In [137...

```
In [138... data = pd.read_csv(r"C:\Users\satish prasad\Desktop\CAPSTONE PROJECT\ML
PROJECT\cre
```

```
pd.options.display.max_columns = None
```

In [139...

• Display Top 5 Rows of The Dataset

```
data.head()
```

In [140...

Out[140]:

In [141...

	Time	V1	V2	V3	V4	V5	V6	V7	V8	
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.3
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.2
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.5
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.3
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.8

- Check Last 5 Rows of The Dataset

```
data.tail()
```

```
Out[141]:
```

```
In [142]:Out[142]:
```

	Time	V1	V2	V3	V4	V5	V6	V7	
284802	172786.0	-11.881118	10.071785	-9.834783	-2.066656	-5.364473	-2.606837	-4.918215	7.
284803	172787.0	-0.732789	-0.055080	2.035030	-0.738589	0.868229	1.058415	0.024330	0.
284804	172788.0	1.919565	-0.301254	-3.249640	-0.557828	2.630515	3.031260	-0.296827	0.
284805	172788.0	-0.240440	0.530483	0.702510	0.689799	-0.377961	0.623708	-0.686180	0.

284806 172792.0 -0.533413 -0.189733 0.703337 -0.506271 -0.012546 -0.649617 1.577006 -0.

- Find Shape of Our Dataset (Number of Rows And Number of Columns)

data.shape

(284807, 31)

In [143...	<pre>print("Number of Rows",data.shape[0]) print("Number of Columns",data.shape[1])</pre>
	<pre>Number of Rows 284807Number of Columns 31</pre>
	<h2>4. Get Information About Our Dataset Like Total Number Rows, Total Number of Columns, Datatypes of Each Column And Memory Requirement</h2>
In [144...	<pre>data.info()</pre>
	<pre><class 'pandas.core.frame.DataFrame'> RangeIndex: 284807 entries, 0 to 284806Data columns (total 31 columns): # Column Non-Null Count Dtype</pre>

0	T i m e	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1	V 1	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2	V 2	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
3	V 3	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
4	V 4	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4

			l	
5	V 5	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
6	V 6	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
7	V 7	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
8	V 8	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
9	V 9	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 0	V 1 0	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 1	V 1 1	2 8 4 8 0 7	n o n - n u l	f l o a t 6 4

			l	
1 2	V 1 2	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 3	V 1 3	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 4	V 1 4	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 5	V 1 5	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 6	V 1 6	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 7	V 1 7	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
1 8	V 1 8	2 8 4 8 0 7	n o n - n u l	f l o a t 6 4

			l	
1 9	V 1 9	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 0	V 2 0	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 1	V 2 1	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 2	V 2 2	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 3	V 2 3	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 4	V 2 4	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 5	V 2 5	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4

2 6	V 2 6	2 8 4 8 0 7	1 n o n - n u l l	f l o a t 6 4
2 7	V 2 7	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 8	V 2 8	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
2 9	A m o u n t	2 8 4 8 0 7	n o n - n u l l	f l o a t 6 4
3 0	C l a s s	2 8 4 8 0 7	n o n - n u l l	i n t 6 4

```
dtypes: float64(30),
int64(1)memory usage: 67.4
MB
```

• Check Null Values In The Dataset

```
data.isnull().sum()
```

```
In [145...
```


Time	0
V1	0
V2	0
V3	0
V4	0
V5	0
V6	0
V7	0
V8	0
V9	0
V10	0
V11	0
V12	0
V13	0
V14	0
V15	0
V16	0
V17	0
V18	0
V19	0
V20	0
V21	0
V22	0
V23	0
V24	0
V25	0
V26	0
V27	0
V28	0
Amount	0
Class	0
dtype:	int64

Out[145]:

Feature Scaling

```
from sklearn.preprocessing import StandardScaler
```

In [146...

```
sc = StandardScaler()  
data['Amount'] = sc.fit_transform(pd.DataFrame(data['Amount']))
```

In [147...

```
data.head()
```

In [148...

Out[148]:

```
data = data.drop(['Time'],axis=1)
```

In [149...

	Time	V1	V2	V3	V4	V5	V6	V7	V8	
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.3
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.2
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.5
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.3
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.8

```
data.head()
```

In [150...

Out[150]:

In [151...Out[151]:

In [152...Out[152]:

```
data = data.drop_duplicates()
```

In [153...

	V1	V2	V3	V4	V5	V6	V7	V8	V90
	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787
1	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425
2	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654
3	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024
4	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739

```
data.shape
```

```
(284807, 30)
```

```
data.duplicated().any()
```

```
True
```

Remove Duplicated Values

```
In [154...Out[154]:
```

```
In [155...Out[155]:
```

```
In [156...Out[156]:
```

```
In [157...
```

```
data.shape
```

```
(275663, 30)
```

```
284807 - 275663
```

```
9144
```

- Not Handling Imbalanced

```
data['Class'].value_counts()
```

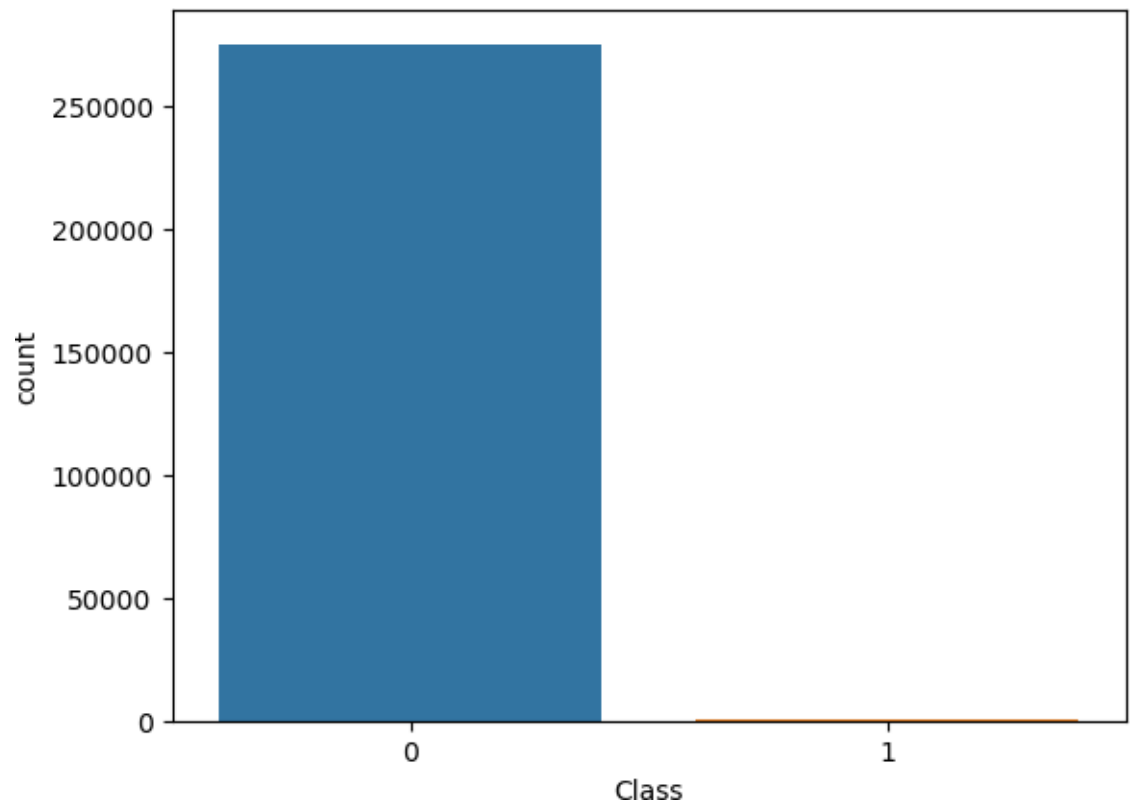
```
0    275190
1      473
```

```
import seaborn as sns
```

```
Name: Class, dtype: int64
```

```
In [158]: Out[158]:
```

```
sns.countplot(data['Class'])
<AxesSubplot:xlabel='Class', ylabel='count'>
```



- Store Feature Matrix In X And Response(Target) In Vector y

```
X = data.drop('Class',axis=1)y =
data['Class']
In [159...
```

- Splitting The Dataset Into The TrainingSet And Test Set

```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.20,
                                                random_state=42)
In [160...
```

		9. Handling Imbalanced Dataset
		Undersampling
In [161...		normal = data[data['Class']==0]fraud = data[data['Class']==1]
In [162...		normal.shape
Out[162]:		(275190, 30)

```
fraud.shape
In [163...
```

```
normal_sample=normal.sample(n=473)
```

```
Out[163]:In [164...
```

```
(473, 30)
```

```
new_data = pd.concat([normal_sample,fraud],ignore_index=True)
```

```
In [165...Out[165]:
```

```
In [166...
```

```
normal_sample.shape
```

```
(473, 30)
```

```
In [167...Out[167]:
```

```
In [168...
```

```
new_data['Class'].value_counts()
```

```
0    473
```

```
1    473
```

```
new_data.head()
```

```
Name: Class, dtype: int64
```

```
Out[168]:
```

```
X = new_data.drop('Class',axis=1)y =  
new_data['Class']
```

```
In [169...
```

	V1	V2	V3	V4	V5	V6	V7	V8	V90
	-0.572319	1.061159	0.579951	0.176227	1.312143	0.289269	1.347943	-0.155775	-0.295242
1	-0.423094	0.769241	2.724661	2.995180	0.327965	0.488804	-0.041867	-0.136883	0.249691

2	-0.271971	-0.560376	0.243264	-3.230231	1.526752	4.024573	-0.869116	0.992072	-2.499889
3	-0.412339	0.173250	0.990650	-1.296951	-0.414505	-0.403992	0.493256	-0.051367	-1.759956
4	1.922093	-0.504093	0.136048	0.348411	-0.714874	0.342636	-1.154919	0.216927	2.418325

```
sns.countplot('Class', data=new_data)
plt.title('Equally Distributed Classes', fontsize=14)plt.show()
```

In [170...



- **Splitting The Dataset Into The TrainingSet And Test Set**

```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test = train_test_split(X,y,test_size=0.20,
                                                random_state=42)
```

In [171...

In [172...

```
from sklearn.ensemble import AdaBoostClassifier, GradientBoostingClassifier, Random
from sklearn.metrics import accuracy_score, confusion_matrix
```

```
from catboost import CatBoostClassifier
from xgboost import XGBClassifier
```

In [173...

- ## ADA Boost

```
# Train and evaluate AdaboostClassifier
clf_adaboost = AdaBoostClassifier()
clf_adaboost.fit(X_train, y_train)
y_pred_adaboost = clf_adaboost.predict(X_test)
```

In [174...

```
accuracy_adaboost = accuracy_score(y_test, y_pred_adaboost)
print('AdaboostClassifier accuracy:', accuracy_adaboost)
```

In [175...

AdaboostClassifier accuracy: 0.9105263157894737

- ## Gradient Boosting

```
# Train and evaluate GradientBoostingClassifier
clf_gradientboosting = GradientBoostingClassifier()
clf_gradientboosting.fit(X_train, y_train)
y_pred_gradientboosting = clf_gradientboosting.predict(X_test)
```

In [176...

```
accuracy_gradientboosting = accuracy_score(y_test, y_pred_gradientboosting)
print('GradientBoostingClassifier accuracy:', accuracy_gradientboosting)
```

In [177...

GradientBoostingClassifier accuracy: 0.9105263157894737

- **XG Boost**

```
# Train and evaluate XGBoostClassifier
```

```
clf_xg = XGBClassifier()
```

```
clf_xg.fit(X_train, y_train)
```

```
y_pred_xg = clf_xg.predict(X_test)
```

```
accuracy_xg = accuracy_score(y_test, y_pred_xg)
```

```
print('XGBoostClassifier accuracy:', accuracy_xg)
```

In [178...

XGBoostClassifier accuracy: 0.9263157894736842

- **CATBoost**

```
# Train and evaluate CatBoostClassifier
```

```
clf_catboost = CatBoostClassifier()clf_catboost.fit(X_train,
```

```
y_train)
```

```
y_pred_catboost = clf_catboost.predict(X_test)
```

```
accuracy_catboost = accuracy_score(y_test, y_pred_catboost)print('CatBoostClassifier  
accuracy:', accuracy_catboost)
```

In [179...

Learning rate set to 0.009142

0:	learn: 0.6808464	total: 5.44ms	remaining: 5.44s
1:	learn: 0.6682156	total: 9.8ms	remaining: 4.89s
2:	learn: 0.6561411	total: 13.9ms	remaining: 4.63s
3:	learn: 0.6426462	total: 18.3ms	remaining: 4.54s
4:	learn: 0.6314678	total: 22.5ms	remaining: 4.47s
5:	learn: 0.6204139	total: 27ms	remaining: 4.47s
6:	learn: 0.6092662	total: 31.3ms	remaining: 4.44s
7:	learn: 0.5999074	total: 35.4ms	remaining: 4.39s
8:	learn: 0.5898495	total: 39.9ms	remaining: 4.4s
9:	learn: 0.5812809	total: 44ms	remaining: 4.36s
10:	learn: 0.5702873	total: 48.4ms	remaining: 4.35s
11:	learn: 0.5596889	total: 52.3ms	remaining: 4.31s

12:	learn:	0.5513202	total:	56.6ms	remaining:	4.29s
13:	learn:	0.5420273	total:	61.3ms	remaining:	4.32s
14:	learn:	0.5320975	total:	65.7ms	remaining:	4.32s
15:	learn:	0.5246215	total:	70.6ms	remaining:	4.34s
16:	learn:	0.5151938	total:	75ms	remaining:	4.34s
17:	learn:	0.5075333	total:	79.4ms	remaining:	4.33s
18:	learn:	0.4997618	total:	83.7ms	remaining:	4.32s
19:	learn:	0.4922384	total:	88.5ms	remaining:	4.34s
20:	learn:	0.4834135	total:	92.6ms	remaining:	4.32s
21:	learn:	0.4766622	total:	96.7ms	remaining:	4.3s
22:	learn:	0.4683529	total:	101ms	remaining:	4.29s
23:	learn:	0.4607714	total:	105ms	remaining:	4.28s
24:	learn:	0.4538052	total:	109ms	remaining:	4.27s
25:	learn:	0.4479519	total:	114ms	remaining:	4.26s
26:	learn:	0.4410196	total:	119ms	remaining:	4.27s
27:	learn:	0.4339675	total:	122ms	remaining:	4.25s
28:	learn:	0.4276858	total:	127ms	remaining:	4.24s
29:	learn:	0.4205062	total:	131ms	remaining:	4.23s
30:	learn:	0.4129729	total:	135ms	remaining:	4.22s
31:	learn:	0.4068427	total:	139ms	remaining:	4.2s
32:	learn:	0.4008141	total:	143ms	remaining:	4.2s
33:	learn:	0.3958208	total:	147ms	remaining:	4.18s
34:	learn:	0.3892814	total:	151ms	remaining:	4.17s
35:	learn:	0.3835878	total:	155ms	remaining:	4.16s
36:	learn:	0.3783277	total:	159ms	remaining:	4.14s
37:	learn:	0.3727763	total:	164ms	remaining:	4.16s
38:	learn:	0.3675610	total:	170ms	remaining:	4.18s
39:	learn:	0.3629948	total:	175ms	remaining:	4.2s
40:	learn:	0.3566263	total:	180ms	remaining:	4.22s
41:	learn:	0.3515229	total:	185ms	remaining:	4.21s
42:	learn:	0.3461718	total:	190ms	remaining:	4.22s
43:	learn:	0.3421028	total:	195ms	remaining:	4.23s
44:	learn:	0.3374239	total:	199ms	remaining:	4.22s
45:	learn:	0.3322483	total:	203ms	remaining:	4.21s
46:	learn:	0.3272358	total:	207ms	remaining:	4.2s
47:	learn:	0.3240236	total:	211ms	remaining:	4.19s
48:	learn:	0.3203895	total:	215ms	remaining:	4.18s
49:	learn:	0.3167359	total:	219ms	remaining:	4.17s
50:	learn:	0.3126567	total:	223ms	remaining:	4.16s
51:	learn:	0.3089721	total:	227ms	remaining:	4.14s
52:	learn:	0.3047958	total:	231ms	remaining:	4.13s
53:	learn:	0.3019292	total:	235ms	remaining:	4.11s
54:	learn:	0.2979468	total:	239ms	remaining:	4.11s
55:	learn:	0.2946203	total:	243ms	remaining:	4.1s
56:	learn:	0.2908752	total:	247ms	remaining:	4.09s
57:	learn:	0.2873967	total:	251ms	remaining:	4.08s
58:	learn:	0.2841542	total:	255ms	remaining:	4.07s
59:	learn:	0.2817708	total:	259ms	remaining:	4.06s
60:	learn:	0.2796120	total:	263ms	remaining:	4.05s
61:	learn:	0.2765570	total:	267ms	remaining:	4.04s
62:	learn:	0.2732675	total:	271ms	remaining:	4.04s
63:	learn:	0.2698553	total:	276ms	remaining:	4.03s
64:	learn:	0.2673977	total:	280ms	remaining:	4.02s
65:	learn:	0.2646671	total:	284ms	remaining:	4.02s
66:	learn:	0.2618608	total:	289ms	remaining:	4.02s
67:	learn:	0.2595810	total:	293ms	remaining:	4.01s
68:	learn:	0.2568420	total:	297ms	remaining:	4s

69:	learn:	0.2542913	total:	301ms	remaining:	4s
70:	learn:	0.2524932	total:	305ms	remaining:	3.99s
71:	learn:	0.2500224	total:	309ms	remaining:	3.98s
72:	learn:	0.2478963	total:	313ms	remaining:	3.98s
73:	learn:	0.2451016	total:	317ms	remaining:	3.97s
74:	learn:	0.2433152	total:	321ms	remaining:	3.96s
75:	learn:	0.2407496	total:	325ms	remaining:	3.96s
76:	learn:	0.2388072	total:	330ms	remaining:	3.95s
77:	learn:	0.2370302	total:	333ms	remaining:	3.94s
78:	learn:	0.2351188	total:	337ms	remaining:	3.93s
79:	learn:	0.2330474	total:	341ms	remaining:	3.93s
80:	learn:	0.2311050	total:	346ms	remaining:	3.92s
81:	learn:	0.2294974	total:	350ms	remaining:	3.92s
82:	learn:	0.2279738	total:	354ms	remaining:	3.91s
83:	learn:	0.2262657	total:	359ms	remaining:	3.91s
84:	learn:	0.2242508	total:	363ms	remaining:	3.91s
85:	learn:	0.2223649	total:	367ms	remaining:	3.9s
86:	learn:	0.2205363	total:	371ms	remaining:	3.9s
87:	learn:	0.2185629	total:	376ms	remaining:	3.9s
88:	learn:	0.2171249	total:	381ms	remaining:	3.9s
89:	learn:	0.2150648	total:	385ms	remaining:	3.89s
90:	learn:	0.2130739	total:	390ms	remaining:	3.89s
91:	learn:	0.2110152	total:	394ms	remaining:	3.89s
92:	learn:	0.2091466	total:	399ms	remaining:	3.89s
93:	learn:	0.2074032	total:	403ms	remaining:	3.88s
94:	learn:	0.2055558	total:	408ms	remaining:	3.88s
95:	learn:	0.2042108	total:	411ms	remaining:	3.87s
96:	learn:	0.2029153	total:	416ms	remaining:	3.87s
97:	learn:	0.2017934	total:	420ms	remaining:	3.86s
98:	learn:	0.2002738	total:	423ms	remaining:	3.85s
99:	learn:	0.1990163	total:	427ms	remaining:	3.84s
100:	learn:	0.1969480	total:	431ms	remaining:	3.83s
101:	learn:	0.1955755	total:	434ms	remaining:	3.82s
102:	learn:	0.1940492	total:	438ms	remaining:	3.81s
103:	learn:	0.1926031	total:	441ms	remaining:	3.8s
104:	learn:	0.1914239	total:	445ms	remaining:	3.79s
105:	learn:	0.1901495	total:	449ms	remaining:	3.78s
106:	learn:	0.1885837	total:	452ms	remaining:	3.78s
107:	learn:	0.1870945	total:	456ms	remaining:	3.77s
108:	learn:	0.1855384	total:	460ms	remaining:	3.76s
109:	learn:	0.1842862	total:	464ms	remaining:	3.75s
110:	learn:	0.1829768	total:	468ms	remaining:	3.74s
111:	learn:	0.1817135	total:	471ms	remaining:	3.74s
112:	learn:	0.1799970	total:	476ms	remaining:	3.73s
113:	learn:	0.1786415	total:	480ms	remaining:	3.73s
114:	learn:	0.1775865	total:	484ms	remaining:	3.73s
115:	learn:	0.1764350	total:	488ms	remaining:	3.72s
116:	learn:	0.1755178	total:	491ms	remaining:	3.71s
117:	learn:	0.1744843	total:	495ms	remaining:	3.7s
118:	learn:	0.1732774	total:	499ms	remaining:	3.69s
119:	learn:	0.1721277	total:	502ms	remaining:	3.68s
120:	learn:	0.1709981	total:	507ms	remaining:	3.68s
121:	learn:	0.1702410	total:	510ms	remaining:	3.67s
122:	learn:	0.1693190	total:	514ms	remaining:	3.66s
123:	learn:	0.1682230	total:	517ms	remaining:	3.65s
124:	learn:	0.1668856	total:	521ms	remaining:	3.65s
125:	learn:	0.1659350	total:	525ms	remaining:	3.64s
126:	learn:	0.1647475	total:	528ms	remaining:	3.63s

127:	learn:	0.1640373	total:	532ms	remaining:	3.62s
128:	learn:	0.1629024	total:	535ms	remaining:	3.61s
129:	learn:	0.1620158	total:	539ms	remaining:	3.61s
130:	learn:	0.1611032	total:	543ms	remaining:	3.6s
131:	learn:	0.1602356	total:	546ms	remaining:	3.59s
132:	learn:	0.1594740	total:	550ms	remaining:	3.58s
133:	learn:	0.1584609	total:	553ms	remaining:	3.58s
134:	learn:	0.1573400	total:	557ms	remaining:	3.57s
135:	learn:	0.1565993	total:	560ms	remaining:	3.56s
136:	learn:	0.1556293	total:	564ms	remaining:	3.55s
137:	learn:	0.1546875	total:	568ms	remaining:	3.55s
138:	learn:	0.1539428	total:	573ms	remaining:	3.55s
139:	learn:	0.1530043	total:	577ms	remaining:	3.54s
140:	learn:	0.1521905	total:	581ms	remaining:	3.54s
141:	learn:	0.1514135	total:	587ms	remaining:	3.54s
142:	learn:	0.1502527	total:	592ms	remaining:	3.55s
143:	learn:	0.1494363	total:	597ms	remaining:	3.55s
144:	learn:	0.1489239	total:	601ms	remaining:	3.54s
145:	learn:	0.1481368	total:	606ms	remaining:	3.54s
146:	learn:	0.1475093	total:	610ms	remaining:	3.54s
147:	learn:	0.1467334	total:	613ms	remaining:	3.53s
148:	learn:	0.1461050	total:	617ms	remaining:	3.52s
149:	learn:	0.1454763	total:	621ms	remaining:	3.52s
150:	learn:	0.1447939	total:	625ms	remaining:	3.51s
151:	learn:	0.1439834	total:	629ms	remaining:	3.51s
152:	learn:	0.1432558	total:	632ms	remaining:	3.5s
153:	learn:	0.1422621	total:	636ms	remaining:	3.49s
154:	learn:	0.1416217	total:	639ms	remaining:	3.48s
155:	learn:	0.1408650	total:	643ms	remaining:	3.48s
156:	learn:	0.1402979	total:	647ms	remaining:	3.47s
157:	learn:	0.1396575	total:	650ms	remaining:	3.46s
158:	learn:	0.1390061	total:	654ms	remaining:	3.46s
159:	learn:	0.1383959	total:	658ms	remaining:	3.45s
160:	learn:	0.1379318	total:	661ms	remaining:	3.44s
161:	learn:	0.1374905	total:	665ms	remaining:	3.44s
162:	learn:	0.1368132	total:	668ms	remaining:	3.43s
163:	learn:	0.1361989	total:	672ms	remaining:	3.42s
164:	learn:	0.1353926	total:	676ms	remaining:	3.42s
165:	learn:	0.1346965	total:	679ms	remaining:	3.41s
166:	learn:	0.1338864	total:	683ms	remaining:	3.4s
167:	learn:	0.1332614	total:	686ms	remaining:	3.4s
168:	learn:	0.1327501	total:	690ms	remaining:	3.39s
169:	learn:	0.1322776	total:	693ms	remaining:	3.38s
170:	learn:	0.1314647	total:	697ms	remaining:	3.38s
171:	learn:	0.1309759	total:	701ms	remaining:	3.37s
172:	learn:	0.1304231	total:	704ms	remaining:	3.37s
173:	learn:	0.1298604	total:	708ms	remaining:	3.36s
174:	learn:	0.1292415	total:	711ms	remaining:	3.35s
175:	learn:	0.1285564	total:	715ms	remaining:	3.35s
176:	learn:	0.1279090	total:	719ms	remaining:	3.34s
177:	learn:	0.1273748	total:	722ms	remaining:	3.34s
178:	learn:	0.1267923	total:	726ms	remaining:	3.33s
179:	learn:	0.1263332	total:	729ms	remaining:	3.32s
180:	learn:	0.1258861	total:	734ms	remaining:	3.32s
181:	learn:	0.1252747	total:	738ms	remaining:	3.31s
182:	learn:	0.1247510	total:	741ms	remaining:	3.31s
183:	learn:	0.1242308	total:	745ms	remaining:	3.3s

184:	learn:	0.1235973	total:	748ms	remaining:	3.3s
185:	learn:	0.1229639	total:	752ms	remaining:	3.29s
186:	learn:	0.1225675	total:	756ms	remaining:	3.29s
187:	learn:	0.1222966	total:	759ms	remaining:	3.28s
188:	learn:	0.1216797	total:	764ms	remaining:	3.28s
189:	learn:	0.1210320	total:	768ms	remaining:	3.27s
190:	learn:	0.1204657	total:	772ms	remaining:	3.27s

191:	learn:	0.1200278	total:	776ms	remaining:	3.27s
192:	learn:	0.1196167	total:	780ms	remaining:	3.26s
193:	learn:	0.1191817	total:	785ms	remaining:	3.26s
194:	learn:	0.1187814	total:	788ms	remaining:	3.25s
195:	learn:	0.1183586	total:	792ms	remaining:	3.25s
196:	learn:	0.1179317	total:	796ms	remaining:	3.25s
197:	learn:	0.1173918	total:	800ms	remaining:	3.24s
198:	learn:	0.1169365	total:	803ms	remaining:	3.23s
199:	learn:	0.1166982	total:	807ms	remaining:	3.23s
200:	learn:	0.1161145	total:	811ms	remaining:	3.22s
201:	learn:	0.1156597	total:	814ms	remaining:	3.22s
202:	learn:	0.1152363	total:	818ms	remaining:	3.21s
203:	learn:	0.1147828	total:	822ms	remaining:	3.21s
204:	learn:	0.1142571	total:	825ms	remaining:	3.2s
205:	learn:	0.1139521	total:	829ms	remaining:	3.19s
206:	learn:	0.1134830	total:	833ms	remaining:	3.19s
207:	learn:	0.1129823	total:	836ms	remaining:	3.18s
208:	learn:	0.1125265	total:	840ms	remaining:	3.18s
209:	learn:	0.1120710	total:	844ms	remaining:	3.17s
210:	learn:	0.1115749	total:	847ms	remaining:	3.17s
211:	learn:	0.1112509	total:	851ms	remaining:	3.16s
212:	learn:	0.1107073	total:	855ms	remaining:	3.16s
213:	learn:	0.1103542	total:	858ms	remaining:	3.15s
214:	learn:	0.1098844	total:	862ms	remaining:	3.15s
215:	learn:	0.1093763	total:	866ms	remaining:	3.14s
216:	learn:	0.1091128	total:	869ms	remaining:	3.14s
217:	learn:	0.1085932	total:	873ms	remaining:	3.13s
218:	learn:	0.1082748	total:	876ms	remaining:	3.12s
219:	learn:	0.1079749	total:	880ms	remaining:	3.12s
220:	learn:	0.1075160	total:	884ms	remaining:	3.12s
221:	learn:	0.1069764	total:	888ms	remaining:	3.11s
222:	learn:	0.1066418	total:	891ms	remaining:	3.11s
223:	learn:	0.1063453	total:	895ms	remaining:	3.1s
224:	learn:	0.1060432	total:	899ms	remaining:	3.1s
225:	learn:	0.1057451	total:	903ms	remaining:	3.09s
226:	learn:	0.1052047	total:	906ms	remaining:	3.09s
227:	learn:	0.1049189	total:	910ms	remaining:	3.08s
228:	learn:	0.1045558	total:	914ms	remaining:	3.08s
229:	learn:	0.1041140	total:	917ms	remaining:	3.07s
230:	learn:	0.1038975	total:	921ms	remaining:	3.06s
231:	learn:	0.1036068	total:	924ms	remaining:	3.06s
232:	learn:	0.1032378	total:	929ms	remaining:	3.06s
233:	learn:	0.1029268	total:	933ms	remaining:	3.05s
234:	learn:	0.1023314	total:	938ms	remaining:	3.05s
235:	learn:	0.1020468	total:	943ms	remaining:	3.05s
236:	learn:	0.1017681	total:	948ms	remaining:	3.05s
237:	learn:	0.1012418	total:	952ms	remaining:	3.05s
238:	learn:	0.1009069	total:	956ms	remaining:	3.04s
239:	learn:	0.1006896	total:	961ms	remaining:	3.04s
240:	learn:	0.1003921	total:	965ms	remaining:	3.04s

241:	learn:	0.1001153	total:	970ms	remaining:	3.04s
242:	learn:	0.0997872	total:	975ms	remaining:	3.04s
243:	learn:	0.0993920	total:	980ms	remaining:	3.04s
244:	learn:	0.0990065	total:	984ms	remaining:	3.03s
245:	learn:	0.0986425	total:	988ms	remaining:	3.03s
246:	learn:	0.0983859	total:	992ms	remaining:	3.02s
247:	learn:	0.0980278	total:	996ms	remaining:	3.02s
248:	learn:	0.0977856	total:	1s	remaining:	3.02s
249:	learn:	0.0975038	total:	1s	remaining:	3.01s
250:	learn:	0.0973408	total:	1.01s	remaining:	3.01s
251:	learn:	0.0969751	total:	1.01s	remaining:	3s
252:	learn:	0.0967069	total:	1.01s	remaining:	3s
253:	learn:	0.0964024	total:	1.02s	remaining:	2.99s
254:	learn:	0.0961161	total:	1.02s	remaining:	2.99s

255:	learn:	0.0958377	total:	1.02s	remaining:	2.98s
256:	learn:	0.0955672	total:	1.03s	remaining:	2.98s
257:	learn:	0.0953399	total:	1.03s	remaining:	2.97s
258:	learn:	0.0952018	total:	1.04s	remaining:	2.97s
259:	learn:	0.0948099	total:	1.04s	remaining:	2.96s
260:	learn:	0.0945711	total:	1.04s	remaining:	2.96s
261:	learn:	0.0943983	total:	1.05s	remaining:	2.95s
262:	learn:	0.0942174	total:	1.05s	remaining:	2.95s
263:	learn:	0.0937817	total:	1.05s	remaining:	2.94s
264:	learn:	0.0934973	total:	1.06s	remaining:	2.94s
265:	learn:	0.0932945	total:	1.06s	remaining:	2.93s
266:	learn:	0.0929881	total:	1.07s	remaining:	2.93s
267:	learn:	0.0927191	total:	1.07s	remaining:	2.92s
268:	learn:	0.0924856	total:	1.07s	remaining:	2.92s
269:	learn:	0.0920628	total:	1.08s	remaining:	2.91s
270:	learn:	0.0918812	total:	1.08s	remaining:	2.91s
271:	learn:	0.0917244	total:	1.08s	remaining:	2.9s
272:	learn:	0.0914201	total:	1.09s	remaining:	2.9s
273:	learn:	0.0911618	total:	1.09s	remaining:	2.89s
274:	learn:	0.0908901	total:	1.09s	remaining:	2.89s
275:	learn:	0.0907841	total:	1.1s	remaining:	2.88s
276:	learn:	0.0905666	total:	1.1s	remaining:	2.88s
277:	learn:	0.0902701	total:	1.11s	remaining:	2.87s
278:	learn:	0.0900312	total:	1.11s	remaining:	2.87s
279:	learn:	0.0897852	total:	1.11s	remaining:	2.86s
280:	learn:	0.0893422	total:	1.12s	remaining:	2.86s
281:	learn:	0.0890368	total:	1.12s	remaining:	2.85s
282:	learn:	0.0887744	total:	1.12s	remaining:	2.85s
283:	learn:	0.0883946	total:	1.13s	remaining:	2.85s
284:	learn:	0.0882380	total:	1.13s	remaining:	2.84s
285:	learn:	0.0878764	total:	1.14s	remaining:	2.84s
286:	learn:	0.0878127	total:	1.14s	remaining:	2.83s
287:	learn:	0.0875245	total:	1.14s	remaining:	2.83s
288:	learn:	0.0871897	total:	1.15s	remaining:	2.82s
289:	learn:	0.0869674	total:	1.15s	remaining:	2.82s
290:	learn:	0.0866906	total:	1.16s	remaining:	2.81s
291:	learn:	0.0863085	total:	1.16s	remaining:	2.81s
292:	learn:	0.0858870	total:	1.16s	remaining:	2.81s
293:	learn:	0.0856186	total:	1.17s	remaining:	2.8s
294:	learn:	0.0853549	total:	1.17s	remaining:	2.8s
295:	learn:	0.0851875	total:	1.18s	remaining:	2.8s
296:	learn:	0.0849376	total:	1.18s	remaining:	2.79s
297:	learn:	0.0846874	total:	1.18s	remaining:	2.79s

298:	learn:	0.0845114	total:	1.19s	remaining:	2.78s
299:	learn:	0.0842954	total:	1.19s	remaining:	2.78s
300:	learn:	0.0840192	total:	1.2s	remaining:	2.77s
301:	learn:	0.0837840	total:	1.2s	remaining:	2.77s
302:	learn:	0.0835335	total:	1.2s	remaining:	2.77s
303:	learn:	0.0832976	total:	1.21s	remaining:	2.76s
304:	learn:	0.0830633	total:	1.21s	remaining:	2.76s
305:	learn:	0.0827733	total:	1.21s	remaining:	2.75s
306:	learn:	0.0823888	total:	1.22s	remaining:	2.75s
307:	learn:	0.0820779	total:	1.22s	remaining:	2.74s
308:	learn:	0.0817965	total:	1.22s	remaining:	2.74s
309:	learn:	0.0816961	total:	1.23s	remaining:	2.73s
310:	learn:	0.0814367	total:	1.23s	remaining:	2.73s
311:	learn:	0.0812060	total:	1.24s	remaining:	2.73s
312:	learn:	0.0810000	total:	1.24s	remaining:	2.72s
313:	learn:	0.0807400	total:	1.24s	remaining:	2.72s
314:	learn:	0.0805850	total:	1.25s	remaining:	2.71s
315:	learn:	0.0804611	total:	1.25s	remaining:	2.71s
316:	learn:	0.0803346	total:	1.25s	remaining:	2.71s
317:	learn:	0.0801155	total:	1.26s	remaining:	2.7s
318:	learn:	0.0798923	total:	1.26s	remaining:	2.7s

319:	learn:	0.0796030	total:	1.27s	remaining:	2.69s
320:	learn:	0.0793426	total:	1.27s	remaining:	2.69s
321:	learn:	0.0792041	total:	1.27s	remaining:	2.68s
322:	learn:	0.0789989	total:	1.28s	remaining:	2.68s
323:	learn:	0.0787470	total:	1.28s	remaining:	2.67s
324:	learn:	0.0784864	total:	1.28s	remaining:	2.67s
325:	learn:	0.0781542	total:	1.29s	remaining:	2.66s
326:	learn:	0.0778438	total:	1.29s	remaining:	2.66s
327:	learn:	0.0776428	total:	1.29s	remaining:	2.65s
328:	learn:	0.0774460	total:	1.3s	remaining:	2.65s
329:	learn:	0.0771395	total:	1.3s	remaining:	2.65s
330:	learn:	0.0768099	total:	1.31s	remaining:	2.64s
331:	learn:	0.0766145	total:	1.31s	remaining:	2.64s
332:	learn:	0.0765368	total:	1.31s	remaining:	2.63s
333:	learn:	0.0763162	total:	1.32s	remaining:	2.63s
334:	learn:	0.0761009	total:	1.32s	remaining:	2.62s
335:	learn:	0.0757831	total:	1.32s	remaining:	2.62s
336:	learn:	0.0754974	total:	1.33s	remaining:	2.61s
337:	learn:	0.0752942	total:	1.33s	remaining:	2.61s
338:	learn:	0.0750538	total:	1.34s	remaining:	2.6s
339:	learn:	0.0749321	total:	1.34s	remaining:	2.6s
340:	learn:	0.0746604	total:	1.34s	remaining:	2.6s
341:	learn:	0.0744117	total:	1.35s	remaining:	2.59s
342:	learn:	0.0742362	total:	1.35s	remaining:	2.59s
343:	learn:	0.0740450	total:	1.35s	remaining:	2.58s
344:	learn:	0.0739383	total:	1.36s	remaining:	2.58s
345:	learn:	0.0737133	total:	1.36s	remaining:	2.58s
346:	learn:	0.0735545	total:	1.37s	remaining:	2.58s
347:	learn:	0.0733604	total:	1.37s	remaining:	2.57s
348:	learn:	0.0732611	total:	1.38s	remaining:	2.57s
349:	learn:	0.0730639	total:	1.38s	remaining:	2.56s
350:	learn:	0.0728237	total:	1.38s	remaining:	2.56s
351:	learn:	0.0726556	total:	1.39s	remaining:	2.56s
352:	learn:	0.0723799	total:	1.39s	remaining:	2.55s
353:	learn:	0.0721220	total:	1.4s	remaining:	2.55s
354:	learn:	0.0719145	total:	1.4s	remaining:	2.54s

355:	learn:	0.0717627	total:	1.4s	remaining:	2.54s
356:	learn:	0.0717414	total:	1.41s	remaining:	2.53s
357:	learn:	0.0715501	total:	1.41s	remaining:	2.53s
358:	learn:	0.0713722	total:	1.41s	remaining:	2.52s
359:	learn:	0.0712098	total:	1.42s	remaining:	2.52s
360:	learn:	0.0709959	total:	1.42s	remaining:	2.52s
361:	learn:	0.0708305	total:	1.43s	remaining:	2.51s
362:	learn:	0.0705647	total:	1.43s	remaining:	2.51s
363:	learn:	0.0703653	total:	1.43s	remaining:	2.5s
364:	learn:	0.0701211	total:	1.44s	remaining:	2.5s
365:	learn:	0.0699990	total:	1.44s	remaining:	2.49s
366:	learn:	0.0699306	total:	1.44s	remaining:	2.49s
367:	learn:	0.0697699	total:	1.45s	remaining:	2.48s
368:	learn:	0.0696408	total:	1.45s	remaining:	2.48s
369:	learn:	0.0695179	total:	1.45s	remaining:	2.48s
370:	learn:	0.0694129	total:	1.46s	remaining:	2.47s
371:	learn:	0.0691558	total:	1.46s	remaining:	2.47s
372:	learn:	0.0689935	total:	1.47s	remaining:	2.47s
373:	learn:	0.0687763	total:	1.47s	remaining:	2.46s
374:	learn:	0.0686597	total:	1.48s	remaining:	2.46s
375:	learn:	0.0684671	total:	1.48s	remaining:	2.45s
376:	learn:	0.0682955	total:	1.48s	remaining:	2.45s
377:	learn:	0.0681459	total:	1.49s	remaining:	2.45s
378:	learn:	0.0680042	total:	1.49s	remaining:	2.44s
379:	learn:	0.0678259	total:	1.49s	remaining:	2.44s
380:	learn:	0.0676391	total:	1.5s	remaining:	2.43s
381:	learn:	0.0675959	total:	1.5s	remaining:	2.43s
382:	learn:	0.0674912	total:	1.5s	remaining:	2.42s

383:	learn:	0.0673074	total:	1.51s	remaining:	2.42s
384:	learn:	0.0671597	total:	1.51s	remaining:	2.42s
385:	learn:	0.0670269	total:	1.51s	remaining:	2.41s
386:	learn:	0.0668800	total:	1.52s	remaining:	2.41s
387:	learn:	0.0666657	total:	1.52s	remaining:	2.4s
388:	learn:	0.0666183	total:	1.53s	remaining:	2.4s
389:	learn:	0.0665662	total:	1.53s	remaining:	2.39s
390:	learn:	0.0664343	total:	1.53s	remaining:	2.39s
391:	learn:	0.0662896	total:	1.54s	remaining:	2.38s
392:	learn:	0.0661410	total:	1.54s	remaining:	2.38s
393:	learn:	0.0659550	total:	1.54s	remaining:	2.38s
394:	learn:	0.0658200	total:	1.55s	remaining:	2.37s
395:	learn:	0.0655439	total:	1.55s	remaining:	2.37s
396:	learn:	0.0653850	total:	1.56s	remaining:	2.37s
397:	learn:	0.0651656	total:	1.56s	remaining:	2.36s
398:	learn:	0.0650372	total:	1.57s	remaining:	2.36s
399:	learn:	0.0648246	total:	1.57s	remaining:	2.35s
400:	learn:	0.0646726	total:	1.57s	remaining:	2.35s
401:	learn:	0.0645994	total:	1.58s	remaining:	2.35s
402:	learn:	0.0644191	total:	1.58s	remaining:	2.34s
403:	learn:	0.0642663	total:	1.58s	remaining:	2.34s
404:	learn:	0.0641280	total:	1.59s	remaining:	2.33s
405:	learn:	0.0639462	total:	1.59s	remaining:	2.33s
406:	learn:	0.0636859	total:	1.59s	remaining:	2.32s
407:	learn:	0.0635082	total:	1.6s	remaining:	2.32s
408:	learn:	0.0634145	total:	1.6s	remaining:	2.31s
409:	learn:	0.0632311	total:	1.61s	remaining:	2.31s
410:	learn:	0.0631184	total:	1.61s	remaining:	2.31s
411:	learn:	0.0628806	total:	1.61s	remaining:	2.3s

412:	learn:	0.0627291	total:	1.62s	remaining:	2.3s
413:	learn:	0.0625837	total:	1.62s	remaining:	2.29s
414:	learn:	0.0625064	total:	1.62s	remaining:	2.29s
415:	learn:	0.0624649	total:	1.63s	remaining:	2.28s
416:	learn:	0.0623926	total:	1.63s	remaining:	2.28s
417:	learn:	0.0623152	total:	1.63s	remaining:	2.27s
418:	learn:	0.0621175	total:	1.64s	remaining:	2.27s
419:	learn:	0.0618743	total:	1.64s	remaining:	2.27s
420:	learn:	0.0617527	total:	1.65s	remaining:	2.26s
421:	learn:	0.0615866	total:	1.65s	remaining:	2.26s
422:	learn:	0.0615388	total:	1.65s	remaining:	2.25s
423:	learn:	0.0613308	total:	1.66s	remaining:	2.25s
424:	learn:	0.0611703	total:	1.66s	remaining:	2.25s
425:	learn:	0.0610181	total:	1.66s	remaining:	2.24s
426:	learn:	0.0609567	total:	1.67s	remaining:	2.24s
427:	learn:	0.0608384	total:	1.67s	remaining:	2.23s
428:	learn:	0.0606661	total:	1.67s	remaining:	2.23s
429:	learn:	0.0605083	total:	1.68s	remaining:	2.22s
430:	learn:	0.0603523	total:	1.68s	remaining:	2.22s
431:	learn:	0.0602806	total:	1.69s	remaining:	2.21s
432:	learn:	0.0601421	total:	1.69s	remaining:	2.21s
433:	learn:	0.0599634	total:	1.69s	remaining:	2.21s
434:	learn:	0.0598599	total:	1.7s	remaining:	2.2s
435:	learn:	0.0597911	total:	1.7s	remaining:	2.2s
436:	learn:	0.0596811	total:	1.7s	remaining:	2.2s
437:	learn:	0.0596066	total:	1.71s	remaining:	2.19s
438:	learn:	0.0595124	total:	1.71s	remaining:	2.19s
439:	learn:	0.0593571	total:	1.72s	remaining:	2.18s
440:	learn:	0.0592326	total:	1.72s	remaining:	2.18s
441:	learn:	0.0591202	total:	1.72s	remaining:	2.17s
442:	learn:	0.0590368	total:	1.73s	remaining:	2.17s
443:	learn:	0.0589783	total:	1.73s	remaining:	2.17s
444:	learn:	0.0588597	total:	1.73s	remaining:	2.16s
445:	learn:	0.0587086	total:	1.74s	remaining:	2.16s
446:	learn:	0.0586583	total:	1.74s	remaining:	2.15s

447:	learn:	0.0585849	total:	1.75s	remaining:	2.15s
448:	learn:	0.0584415	total:	1.75s	remaining:	2.15s
449:	learn:	0.0583902	total:	1.75s	remaining:	2.15s
450:	learn:	0.0582214	total:	1.76s	remaining:	2.14s
451:	learn:	0.0581028	total:	1.76s	remaining:	2.14s
452:	learn:	0.0579541	total:	1.77s	remaining:	2.13s
453:	learn:	0.0579202	total:	1.77s	remaining:	2.13s
454:	learn:	0.0578609	total:	1.77s	remaining:	2.12s
455:	learn:	0.0577224	total:	1.78s	remaining:	2.12s
456:	learn:	0.0575732	total:	1.78s	remaining:	2.12s
457:	learn:	0.0574688	total:	1.78s	remaining:	2.11s
458:	learn:	0.0574252	total:	1.79s	remaining:	2.11s
459:	learn:	0.0573099	total:	1.79s	remaining:	2.1s
460:	learn:	0.0571448	total:	1.79s	remaining:	2.1s
461:	learn:	0.0570021	total:	1.8s	remaining:	2.1s
462:	learn:	0.0568622	total:	1.8s	remaining:	2.09s
463:	learn:	0.0567935	total:	1.81s	remaining:	2.09s
464:	learn:	0.0566150	total:	1.81s	remaining:	2.08s
465:	learn:	0.0564907	total:	1.82s	remaining:	2.08s
466:	learn:	0.0562807	total:	1.82s	remaining:	2.08s
467:	learn:	0.0561714	total:	1.82s	remaining:	2.08s
468:	learn:	0.0559834	total:	1.83s	remaining:	2.07s

469:	learn:	0.0558308	total:	1.83s	remaining:	2.07s
470:	learn:	0.0557355	total:	1.84s	remaining:	2.06s
471:	learn:	0.0555942	total:	1.84s	remaining:	2.06s
472:	learn:	0.0554986	total:	1.85s	remaining:	2.06s
473:	learn:	0.0554263	total:	1.85s	remaining:	2.05s
474:	learn:	0.0553274	total:	1.85s	remaining:	2.05s
475:	learn:	0.0551621	total:	1.86s	remaining:	2.05s
476:	learn:	0.0550358	total:	1.86s	remaining:	2.04s
477:	learn:	0.0548076	total:	1.87s	remaining:	2.04s
478:	learn:	0.0546823	total:	1.87s	remaining:	2.03s
479:	learn:	0.0545425	total:	1.87s	remaining:	2.03s
480:	learn:	0.0543677	total:	1.88s	remaining:	2.03s
481:	learn:	0.0542134	total:	1.88s	remaining:	2.02s
482:	learn:	0.0540554	total:	1.89s	remaining:	2.02s
483:	learn:	0.0539401	total:	1.89s	remaining:	2.02s
484:	learn:	0.0537901	total:	1.89s	remaining:	2.01s
485:	learn:	0.0536904	total:	1.9s	remaining:	2.01s
486:	learn:	0.0535540	total:	1.9s	remaining:	2s
487:	learn:	0.0534306	total:	1.91s	remaining:	2s
488:	learn:	0.0533413	total:	1.91s	remaining:	2s
489:	learn:	0.0532062	total:	1.91s	remaining:	1.99s
490:	learn:	0.0530713	total:	1.92s	remaining:	1.99s
491:	learn:	0.0530184	total:	1.92s	remaining:	1.99s
492:	learn:	0.0529596	total:	1.93s	remaining:	1.98s
493:	learn:	0.0528523	total:	1.93s	remaining:	1.98s
494:	learn:	0.0527248	total:	1.94s	remaining:	1.97s
495:	learn:	0.0525361	total:	1.94s	remaining:	1.97s
496:	learn:	0.0524560	total:	1.94s	remaining:	1.97s
497:	learn:	0.0523712	total:	1.95s	remaining:	1.96s
498:	learn:	0.0523257	total:	1.95s	remaining:	1.96s
499:	learn:	0.0522430	total:	1.96s	remaining:	1.96s
500:	learn:	0.0521920	total:	1.96s	remaining:	1.95s
501:	learn:	0.0521267	total:	1.96s	remaining:	1.95s
502:	learn:	0.0519847	total:	1.97s	remaining:	1.94s
503:	learn:	0.0519213	total:	1.97s	remaining:	1.94s
504:	learn:	0.0518424	total:	1.98s	remaining:	1.94s
505:	learn:	0.0516964	total:	1.98s	remaining:	1.93s
506:	learn:	0.0516737	total:	1.98s	remaining:	1.93s
507:	learn:	0.0516364	total:	1.99s	remaining:	1.92s
508:	learn:	0.0515192	total:	1.99s	remaining:	1.92s
509:	learn:	0.0513584	total:	1.99s	remaining:	1.92s
510:	learn:	0.0513118	total:	2s	remaining:	1.91s

511:	learn:	0.0511756	total:	2s	remaining:	1.91s
512:	learn:	0.0510550	total:	2.01s	remaining:	1.91s
513:	learn:	0.0510339	total:	2.01s	remaining:	1.9s
514:	learn:	0.0508820	total:	2.01s	remaining:	1.9s
515:	learn:	0.0507697	total:	2.02s	remaining:	1.89s
516:	learn:	0.0506716	total:	2.02s	remaining:	1.89s
517:	learn:	0.0506409	total:	2.03s	remaining:	1.89s
518:	learn:	0.0505666	total:	2.03s	remaining:	1.88s
519:	learn:	0.0504618	total:	2.04s	remaining:	1.88s
520:	learn:	0.0503630	total:	2.04s	remaining:	1.88s
521:	learn:	0.0503103	total:	2.04s	remaining:	1.87s
522:	learn:	0.0501881	total:	2.05s	remaining:	1.87s
523:	learn:	0.0500833	total:	2.05s	remaining:	1.86s
524:	learn:	0.0499383	total:	2.06s	remaining:	1.86s
525:	learn:	0.0498178	total:	2.06s	remaining:	1.86s

526:	learn:	0.0497480	total:	2.06s	remaining:	1.85s
527:	learn:	0.0495640	total:	2.07s	remaining:	1.85s
528:	learn:	0.0494871	total:	2.07s	remaining:	1.84s
529:	learn:	0.0493933	total:	2.08s	remaining:	1.84s
530:	learn:	0.0493077	total:	2.08s	remaining:	1.84s
531:	learn:	0.0492252	total:	2.08s	remaining:	1.83s
532:	learn:	0.0491222	total:	2.09s	remaining:	1.83s
533:	learn:	0.0490335	total:	2.09s	remaining:	1.82s
534:	learn:	0.0489789	total:	2.1s	remaining:	1.82s
535:	learn:	0.0488351	total:	2.1s	remaining:	1.82s
536:	learn:	0.0487781	total:	2.1s	remaining:	1.81s
537:	learn:	0.0486328	total:	2.11s	remaining:	1.81s
538:	learn:	0.0484678	total:	2.11s	remaining:	1.81s
539:	learn:	0.0483285	total:	2.12s	remaining:	1.8s
540:	learn:	0.0482485	total:	2.12s	remaining:	1.8s
541:	learn:	0.0481382	total:	2.12s	remaining:	1.79s
542:	learn:	0.0479818	total:	2.13s	remaining:	1.79s
543:	learn:	0.0478126	total:	2.13s	remaining:	1.79s
544:	learn:	0.0477011	total:	2.14s	remaining:	1.78s
545:	learn:	0.0475228	total:	2.14s	remaining:	1.78s
546:	learn:	0.0474055	total:	2.15s	remaining:	1.78s
547:	learn:	0.0473017	total:	2.15s	remaining:	1.77s
548:	learn:	0.0472100	total:	2.16s	remaining:	1.77s
549:	learn:	0.0471519	total:	2.16s	remaining:	1.77s
550:	learn:	0.0470860	total:	2.16s	remaining:	1.76s
551:	learn:	0.0469841	total:	2.17s	remaining:	1.76s
552:	learn:	0.0469024	total:	2.17s	remaining:	1.76s
553:	learn:	0.0467579	total:	2.18s	remaining:	1.75s
554:	learn:	0.0466411	total:	2.18s	remaining:	1.75s
555:	learn:	0.0465195	total:	2.18s	remaining:	1.74s
556:	learn:	0.0463668	total:	2.19s	remaining:	1.74s
557:	learn:	0.0462551	total:	2.19s	remaining:	1.74s
558:	learn:	0.0460703	total:	2.2s	remaining:	1.73s
559:	learn:	0.0459245	total:	2.2s	remaining:	1.73s
560:	learn:	0.0459022	total:	2.21s	remaining:	1.73s
561:	learn:	0.0458294	total:	2.21s	remaining:	1.72s
562:	learn:	0.0457408	total:	2.21s	remaining:	1.72s
563:	learn:	0.0457237	total:	2.22s	remaining:	1.71s
564:	learn:	0.0456331	total:	2.22s	remaining:	1.71s
565:	learn:	0.0455610	total:	2.23s	remaining:	1.71s
566:	learn:	0.0455047	total:	2.23s	remaining:	1.7s
567:	learn:	0.0454424	total:	2.23s	remaining:	1.7s
568:	learn:	0.0452739	total:	2.24s	remaining:	1.7s
569:	learn:	0.0451488	total:	2.24s	remaining:	1.69s
570:	learn:	0.0450429	total:	2.25s	remaining:	1.69s
571:	learn:	0.0449081	total:	2.25s	remaining:	1.68s
572:	learn:	0.0448559	total:	2.25s	remaining:	1.68s
573:	learn:	0.0447115	total:	2.26s	remaining:	1.68s
574:	learn:	0.0446698	total:	2.26s	remaining:	1.67s

575:	learn:	0.0445747	total:	2.27s	remaining:	1.67s
576:	learn:	0.0444393	total:	2.27s	remaining:	1.67s
577:	learn:	0.0443233	total:	2.27s	remaining:	1.66s
578:	learn:	0.0442472	total:	2.28s	remaining:	1.66s
579:	learn:	0.0441680	total:	2.28s	remaining:	1.65s
580:	learn:	0.0440536	total:	2.29s	remaining:	1.65s
581:	learn:	0.0439663	total:	2.29s	remaining:	1.65s
582:	learn:	0.0438712	total:	2.29s	remaining:	1.64s

583:	learn:	0.0437808	total:	2.3s	remaining:	1.64s
584:	learn:	0.0437003	total:	2.3s	remaining:	1.63s
585:	learn:	0.0436115	total:	2.31s	remaining:	1.63s
586:	learn:	0.0434561	total:	2.31s	remaining:	1.63s
587:	learn:	0.0433180	total:	2.31s	remaining:	1.62s
588:	learn:	0.0431514	total:	2.32s	remaining:	1.62s
589:	learn:	0.0431283	total:	2.32s	remaining:	1.61s
590:	learn:	0.0430263	total:	2.33s	remaining:	1.61s
591:	learn:	0.0428800	total:	2.33s	remaining:	1.61s
592:	learn:	0.0427608	total:	2.34s	remaining:	1.6s
593:	learn:	0.0426285	total:	2.34s	remaining:	1.6s
594:	learn:	0.0425492	total:	2.34s	remaining:	1.6s
595:	learn:	0.0424635	total:	2.35s	remaining:	1.59s
596:	learn:	0.0423168	total:	2.35s	remaining:	1.59s
597:	learn:	0.0422411	total:	2.36s	remaining:	1.58s
598:	learn:	0.0421993	total:	2.36s	remaining:	1.58s
599:	learn:	0.0421850	total:	2.37s	remaining:	1.58s
600:	learn:	0.0420633	total:	2.37s	remaining:	1.57s
601:	learn:	0.0419848	total:	2.38s	remaining:	1.57s
602:	learn:	0.0418612	total:	2.38s	remaining:	1.57s
603:	learn:	0.0417910	total:	2.38s	remaining:	1.56s
604:	learn:	0.0417177	total:	2.39s	remaining:	1.56s
605:	learn:	0.0416699	total:	2.39s	remaining:	1.55s
606:	learn:	0.0415934	total:	2.4s	remaining:	1.55s
607:	learn:	0.0415289	total:	2.4s	remaining:	1.55s
608:	learn:	0.0414526	total:	2.4s	remaining:	1.54s
609:	learn:	0.0414369	total:	2.41s	remaining:	1.54s
610:	learn:	0.0413449	total:	2.41s	remaining:	1.54s
611:	learn:	0.0412506	total:	2.42s	remaining:	1.53s
612:	learn:	0.0411443	total:	2.42s	remaining:	1.53s
613:	learn:	0.0410144	total:	2.42s	remaining:	1.52s
614:	learn:	0.0409323	total:	2.43s	remaining:	1.52s
615:	learn:	0.0409018	total:	2.43s	remaining:	1.52s
616:	learn:	0.0407996	total:	2.44s	remaining:	1.51s
617:	learn:	0.0407148	total:	2.44s	remaining:	1.51s
618:	learn:	0.0406451	total:	2.45s	remaining:	1.5s
619:	learn:	0.0406115	total:	2.45s	remaining:	1.5s
620:	learn:	0.0405024	total:	2.45s	remaining:	1.5s
621:	learn:	0.0404669	total:	2.46s	remaining:	1.49s
622:	learn:	0.0404067	total:	2.46s	remaining:	1.49s
623:	learn:	0.0403193	total:	2.46s	remaining:	1.49s
624:	learn:	0.0402611	total:	2.47s	remaining:	1.48s
625:	learn:	0.0401582	total:	2.47s	remaining:	1.48s
626:	learn:	0.0400581	total:	2.48s	remaining:	1.47s
627:	learn:	0.0399885	total:	2.48s	remaining:	1.47s
628:	learn:	0.0399351	total:	2.48s	remaining:	1.47s
629:	learn:	0.0399071	total:	2.49s	remaining:	1.46s
630:	learn:	0.0398015	total:	2.49s	remaining:	1.46s
631:	learn:	0.0397781	total:	2.5s	remaining:	1.45s
632:	learn:	0.0396838	total:	2.5s	remaining:	1.45s
633:	learn:	0.0396232	total:	2.51s	remaining:	1.45s
634:	learn:	0.0395661	total:	2.51s	remaining:	1.44s
635:	learn:	0.0394591	total:	2.51s	remaining:	1.44s
636:	learn:	0.0393906	total:	2.52s	remaining:	1.43s
637:	learn:	0.0392769	total:	2.52s	remaining:	1.43s
638:	learn:	0.0392414	total:	2.52s	remaining:	1.43s
639:	learn:	0.0392181	total:	2.53s	remaining:	1.42s

640:	learn:	0.0391527	total:	2.53s	remaining:	1.42s
641:	learn:	0.0391360	total:	2.54s	remaining:	1.41s
642:	learn:	0.0390896	total:	2.54s	remaining:	1.41s
643:	learn:	0.0390372	total:	2.54s	remaining:	1.41s
644:	learn:	0.0389483	total:	2.55s	remaining:	1.4s
645:	learn:	0.0388501	total:	2.55s	remaining:	1.4s
646:	learn:	0.0388278	total:	2.56s	remaining:	1.39s
647:	learn:	0.0387331	total:	2.56s	remaining:	1.39s
648:	learn:	0.0386352	total:	2.56s	remaining:	1.39s
649:	learn:	0.0385920	total:	2.57s	remaining:	1.38s
650:	learn:	0.0385448	total:	2.57s	remaining:	1.38s
651:	learn:	0.0384532	total:	2.57s	remaining:	1.37s
652:	learn:	0.0384323	total:	2.58s	remaining:	1.37s
653:	learn:	0.0383629	total:	2.58s	remaining:	1.37s
654:	learn:	0.0383055	total:	2.58s	remaining:	1.36s
655:	learn:	0.0382917	total:	2.59s	remaining:	1.36s
656:	learn:	0.0381952	total:	2.59s	remaining:	1.35s
657:	learn:	0.0380920	total:	2.6s	remaining:	1.35s
658:	learn:	0.0380182	total:	2.6s	remaining:	1.34s
659:	learn:	0.0379397	total:	2.6s	remaining:	1.34s
660:	learn:	0.0378607	total:	2.61s	remaining:	1.34s
661:	learn:	0.0377566	total:	2.61s	remaining:	1.33s
662:	learn:	0.0376928	total:	2.62s	remaining:	1.33s
663:	learn:	0.0376685	total:	2.62s	remaining:	1.32s
664:	learn:	0.0375835	total:	2.62s	remaining:	1.32s
665:	learn:	0.0375128	total:	2.63s	remaining:	1.32s
666:	learn:	0.0374543	total:	2.63s	remaining:	1.31s
667:	learn:	0.0373899	total:	2.63s	remaining:	1.31s
668:	learn:	0.0373070	total:	2.64s	remaining:	1.3s
669:	learn:	0.0372636	total:	2.64s	remaining:	1.3s
670:	learn:	0.0372503	total:	2.64s	remaining:	1.3s
671:	learn:	0.0372423	total:	2.65s	remaining:	1.29s
672:	learn:	0.0372353	total:	2.65s	remaining:	1.29s
673:	learn:	0.0371957	total:	2.66s	remaining:	1.28s
674:	learn:	0.0371355	total:	2.66s	remaining:	1.28s
675:	learn:	0.0370823	total:	2.66s	remaining:	1.28s
676:	learn:	0.0369529	total:	2.67s	remaining:	1.27s
677:	learn:	0.0368962	total:	2.67s	remaining:	1.27s
678:	learn:	0.0368612	total:	2.68s	remaining:	1.26s
679:	learn:	0.0367870	total:	2.68s	remaining:	1.26s
680:	learn:	0.0366929	total:	2.68s	remaining:	1.26s
681:	learn:	0.0365984	total:	2.69s	remaining:	1.25s
682:	learn:	0.0365786	total:	2.69s	remaining:	1.25s
683:	learn:	0.0365047	total:	2.69s	remaining:	1.25s
684:	learn:	0.0364851	total:	2.7s	remaining:	1.24s
685:	learn:	0.0364102	total:	2.7s	remaining:	1.24s
686:	learn:	0.0363755	total:	2.71s	remaining:	1.23s
687:	learn:	0.0363366	total:	2.71s	remaining:	1.23s
688:	learn:	0.0362883	total:	2.71s	remaining:	1.23s
689:	learn:	0.0362564	total:	2.72s	remaining:	1.22s
690:	learn:	0.0362131	total:	2.72s	remaining:	1.22s
691:	learn:	0.0361484	total:	2.73s	remaining:	1.21s
692:	learn:	0.0360497	total:	2.73s	remaining:	1.21s
693:	learn:	0.0359810	total:	2.74s	remaining:	1.21s
694:	learn:	0.0359596	total:	2.74s	remaining:	1.2s
695:	learn:	0.0358937	total:	2.75s	remaining:	1.2s
696:	learn:	0.0358803	total:	2.75s	remaining:	1.2s
697:	learn:	0.0358225	total:	2.75s	remaining:	1.19s

698:	learn:	0.0357308	total:	2.76s	remaining:	1.19s
699:	learn:	0.0356147	total:	2.76s	remaining:	1.18s
700:	learn:	0.0355548	total:	2.77s	remaining:	1.18s
701:	learn:	0.0354483	total:	2.77s	remaining:	1.18s
702:	learn:	0.0352953	total:	2.77s	remaining:	1.17s

703:	learn:	0.0352642	total:	2.78s	remaining:	1.17s
704:	learn:	0.0352034	total:	2.78s	remaining:	1.16s
705:	learn:	0.0351097	total:	2.79s	remaining:	1.16s
706:	learn:	0.0349997	total:	2.79s	remaining:	1.16s
707:	learn:	0.0349458	total:	2.79s	remaining:	1.15s
708:	learn:	0.0349211	total:	2.8s	remaining:	1.15s
709:	learn:	0.0349096	total:	2.8s	remaining:	1.15s
710:	learn:	0.0348306	total:	2.81s	remaining:	1.14s
711:	learn:	0.0347205	total:	2.81s	remaining:	1.14s
712:	learn:	0.0346633	total:	2.81s	remaining:	1.13s
713:	learn:	0.0345952	total:	2.82s	remaining:	1.13s
714:	learn:	0.0345749	total:	2.82s	remaining:	1.13s
715:	learn:	0.0345200	total:	2.83s	remaining:	1.12s
716:	learn:	0.0344381	total:	2.83s	remaining:	1.12s
717:	learn:	0.0343910	total:	2.83s	remaining:	1.11s
718:	learn:	0.0342762	total:	2.84s	remaining:	1.11s
719:	learn:	0.0342292	total:	2.84s	remaining:	1.1s
720:	learn:	0.0342043	total:	2.85s	remaining:	1.1s
721:	learn:	0.0341982	total:	2.85s	remaining:	1.1s
722:	learn:	0.0341924	total:	2.85s	remaining:	1.09s
723:	learn:	0.0341701	total:	2.86s	remaining:	1.09s
724:	learn:	0.0340737	total:	2.86s	remaining:	1.09s
725:	learn:	0.0340372	total:	2.87s	remaining:	1.08s
726:	learn:	0.0340029	total:	2.87s	remaining:	1.08s
727:	learn:	0.0339287	total:	2.88s	remaining:	1.07s
728:	learn:	0.0338435	total:	2.88s	remaining:	1.07s
729:	learn:	0.0337513	total:	2.88s	remaining:	1.07s
730:	learn:	0.0337189	total:	2.89s	remaining:	1.06s
731:	learn:	0.0336801	total:	2.89s	remaining:	1.06s
732:	learn:	0.0336455	total:	2.9s	remaining:	1.05s
733:	learn:	0.0335762	total:	2.9s	remaining:	1.05s
734:	learn:	0.0335155	total:	2.9s	remaining:	1.05s
735:	learn:	0.0334715	total:	2.91s	remaining:	1.04s
736:	learn:	0.0334341	total:	2.91s	remaining:	1.04s
737:	learn:	0.0333605	total:	2.92s	remaining:	1.03s
738:	learn:	0.0333183	total:	2.92s	remaining:	1.03s
739:	learn:	0.0333103	total:	2.93s	remaining:	1.03s
740:	learn:	0.0332401	total:	2.93s	remaining:	1.02s
741:	learn:	0.0331896	total:	2.94s	remaining:	1.02s
742:	learn:	0.0331096	total:	2.94s	remaining:	1.02s
743:	learn:	0.0330368	total:	2.94s	remaining:	1.01s
744:	learn:	0.0329445	total:	2.95s	remaining:	1.01s
745:	learn:	0.0329121	total:	2.95s	remaining:	1s
746:	learn:	0.0328855	total:	2.96s	remaining:	1s
747:	learn:	0.0328612	total:	2.96s	remaining:	997ms
748:	learn:	0.0327785	total:	2.96s	remaining:	993ms
749:	learn:	0.0327110	total:	2.97s	remaining:	990ms
750:	learn:	0.0326301	total:	2.97s	remaining:	985ms
751:	learn:	0.0325650	total:	2.98s	remaining:	982ms
752:	learn:	0.0325250	total:	2.98s	remaining:	978ms
753:	learn:	0.0324483	total:	2.98s	remaining:	974ms
754:	learn:	0.0323871	total:	2.99s	remaining:	970ms

755:	learn:	0.0323134	total:	2.99s	remaining:	966ms
756:	learn:	0.0322844	total:	3s	remaining:	962ms
757:	learn:	0.0322313	total:	3s	remaining:	958ms
758:	learn:	0.0321588	total:	3s	remaining:	954ms
759:	learn:	0.0320985	total:	3.01s	remaining:	950ms
760:	learn:	0.0320555	total:	3.01s	remaining:	946ms
761:	learn:	0.0319728	total:	3.02s	remaining:	942ms
762:	learn:	0.0318792	total:	3.02s	remaining:	938ms
763:	learn:	0.0318139	total:	3.02s	remaining:	934ms
764:	learn:	0.0317306	total:	3.03s	remaining:	931ms
765:	learn:	0.0316600	total:	3.03s	remaining:	927ms
766:	learn:	0.0315984	total:	3.04s	remaining:	923ms

767:	learn:	0.0315179	total:	3.04s	remaining:	919ms
768:	learn:	0.0314931	total:	3.04s	remaining:	915ms
769:	learn:	0.0314260	total:	3.05s	remaining:	911ms
770:	learn:	0.0314204	total:	3.05s	remaining:	907ms
771:	learn:	0.0314102	total:	3.06s	remaining:	903ms
772:	learn:	0.0313451	total:	3.06s	remaining:	899ms
773:	learn:	0.0312987	total:	3.06s	remaining:	895ms
774:	learn:	0.0311878	total:	3.07s	remaining:	891ms
775:	learn:	0.0311331	total:	3.07s	remaining:	887ms
776:	learn:	0.0310702	total:	3.08s	remaining:	883ms
777:	learn:	0.0309974	total:	3.08s	remaining:	879ms
778:	learn:	0.0309750	total:	3.08s	remaining:	874ms
779:	learn:	0.0308858	total:	3.09s	remaining:	870ms
780:	learn:	0.0308478	total:	3.09s	remaining:	866ms
781:	learn:	0.0308347	total:	3.09s	remaining:	862ms
782:	learn:	0.0307646	total:	3.1s	remaining:	858ms
783:	learn:	0.0306897	total:	3.1s	remaining:	855ms
784:	learn:	0.0306285	total:	3.1s	remaining:	850ms
785:	learn:	0.0305808	total:	3.11s	remaining:	846ms
786:	learn:	0.0305599	total:	3.11s	remaining:	843ms
787:	learn:	0.0305466	total:	3.12s	remaining:	839ms
788:	learn:	0.0304738	total:	3.12s	remaining:	835ms
789:	learn:	0.0304324	total:	3.13s	remaining:	831ms
790:	learn:	0.0304002	total:	3.13s	remaining:	827ms
791:	learn:	0.0303747	total:	3.13s	remaining:	823ms
792:	learn:	0.0302722	total:	3.14s	remaining:	819ms
793:	learn:	0.0302176	total:	3.14s	remaining:	815ms
794:	learn:	0.0301777	total:	3.15s	remaining:	811ms
795:	learn:	0.0301599	total:	3.15s	remaining:	807ms
796:	learn:	0.0301028	total:	3.15s	remaining:	803ms
797:	learn:	0.0300573	total:	3.16s	remaining:	799ms
798:	learn:	0.0300133	total:	3.16s	remaining:	795ms
799:	learn:	0.0299184	total:	3.16s	remaining:	791ms
800:	learn:	0.0298370	total:	3.17s	remaining:	787ms
801:	learn:	0.0297945	total:	3.17s	remaining:	783ms
802:	learn:	0.0297288	total:	3.17s	remaining:	779ms
803:	learn:	0.0296291	total:	3.18s	remaining:	775ms
804:	learn:	0.0295478	total:	3.18s	remaining:	771ms
805:	learn:	0.0295103	total:	3.19s	remaining:	767ms
806:	learn:	0.0294657	total:	3.19s	remaining:	764ms
807:	learn:	0.0294562	total:	3.2s	remaining:	760ms
808:	learn:	0.0294088	total:	3.2s	remaining:	756ms
809:	learn:	0.0293698	total:	3.2s	remaining:	751ms
810:	learn:	0.0293033	total:	3.21s	remaining:	748ms
811:	learn:	0.0292670	total:	3.21s	remaining:	744ms

812:	learn:	0.0292139	total:	3.21s	remaining:	740ms
813:	learn:	0.0292024	total:	3.22s	remaining:	736ms
814:	learn:	0.0291501	total:	3.22s	remaining:	732ms
815:	learn:	0.0290673	total:	3.23s	remaining:	728ms
816:	learn:	0.0289772	total:	3.23s	remaining:	724ms
817:	learn:	0.0289343	total:	3.23s	remaining:	720ms
818:	learn:	0.0289157	total:	3.24s	remaining:	716ms
819:	learn:	0.0288484	total:	3.24s	remaining:	712ms
820:	learn:	0.0288182	total:	3.25s	remaining:	708ms
821:	learn:	0.0287519	total:	3.25s	remaining:	704ms
822:	learn:	0.0286860	total:	3.25s	remaining:	700ms
823:	learn:	0.0286468	total:	3.26s	remaining:	696ms
824:	learn:	0.0285811	total:	3.26s	remaining:	692ms
825:	learn:	0.0285266	total:	3.26s	remaining:	688ms
826:	learn:	0.0284750	total:	3.27s	remaining:	684ms
827:	learn:	0.0284584	total:	3.27s	remaining:	680ms
828:	learn:	0.0283862	total:	3.27s	remaining:	676ms
829:	learn:	0.0283387	total:	3.28s	remaining:	672ms
830:	learn:	0.0282762	total:	3.28s	remaining:	668ms

831:	learn:	0.0282355	total:	3.29s	remaining:	663ms
832:	learn:	0.0281767	total:	3.29s	remaining:	659ms
833:	learn:	0.0281667	total:	3.29s	remaining:	655ms
834:	learn:	0.0281407	total:	3.3s	remaining:	651ms
835:	learn:	0.0280865	total:	3.3s	remaining:	647ms
836:	learn:	0.0280671	total:	3.3s	remaining:	643ms
837:	learn:	0.0280413	total:	3.31s	remaining:	639ms
838:	learn:	0.0280305	total:	3.31s	remaining:	636ms
839:	learn:	0.0279897	total:	3.32s	remaining:	632ms
840:	learn:	0.0279705	total:	3.32s	remaining:	628ms
841:	learn:	0.0279645	total:	3.33s	remaining:	624ms
842:	learn:	0.0279190	total:	3.33s	remaining:	620ms
843:	learn:	0.0278521	total:	3.33s	remaining:	616ms
844:	learn:	0.0278238	total:	3.34s	remaining:	612ms
845:	learn:	0.0278105	total:	3.34s	remaining:	608ms
846:	learn:	0.0277741	total:	3.35s	remaining:	604ms
847:	learn:	0.0276984	total:	3.35s	remaining:	600ms
848:	learn:	0.0276782	total:	3.35s	remaining:	596ms
849:	learn:	0.0276586	total:	3.36s	remaining:	592ms
850:	learn:	0.0276079	total:	3.36s	remaining:	588ms
851:	learn:	0.0275561	total:	3.36s	remaining:	584ms
852:	learn:	0.0275226	total:	3.37s	remaining:	580ms
853:	learn:	0.0275000	total:	3.37s	remaining:	576ms
854:	learn:	0.0274091	total:	3.37s	remaining:	572ms
855:	learn:	0.0273721	total:	3.38s	remaining:	568ms
856:	learn:	0.0273040	total:	3.38s	remaining:	564ms
857:	learn:	0.0272754	total:	3.38s	remaining:	560ms
858:	learn:	0.0272462	total:	3.39s	remaining:	556ms
859:	learn:	0.0271974	total:	3.39s	remaining:	552ms
860:	learn:	0.0271550	total:	3.4s	remaining:	548ms
861:	learn:	0.0271111	total:	3.4s	remaining:	544ms
862:	learn:	0.0270503	total:	3.4s	remaining:	540ms
863:	learn:	0.0270235	total:	3.41s	remaining:	536ms
864:	learn:	0.0270123	total:	3.41s	remaining:	532ms
865:	learn:	0.0269677	total:	3.41s	remaining:	528ms
866:	learn:	0.0269294	total:	3.42s	remaining:	524ms
867:	learn:	0.0268809	total:	3.42s	remaining:	520ms
868:	learn:	0.0268183	total:	3.42s	remaining:	516ms

869:	learn:	0.0267698	total:	3.43s	remaining:	512ms
870:	learn:	0.0267489	total:	3.43s	remaining:	508ms
871:	learn:	0.0267094	total:	3.44s	remaining:	504ms
872:	learn:	0.0266548	total:	3.44s	remaining:	500ms
873:	learn:	0.0266357	total:	3.44s	remaining:	496ms
874:	learn:	0.0265839	total:	3.45s	remaining:	492ms
875:	learn:	0.0265134	total:	3.45s	remaining:	488ms
876:	learn:	0.0264524	total:	3.45s	remaining:	484ms
877:	learn:	0.0264430	total:	3.46s	remaining:	480ms
878:	learn:	0.0264182	total:	3.46s	remaining:	476ms
879:	learn:	0.0263457	total:	3.46s	remaining:	473ms
880:	learn:	0.0262725	total:	3.47s	remaining:	469ms
881:	learn:	0.0262562	total:	3.47s	remaining:	465ms
882:	learn:	0.0261967	total:	3.48s	remaining:	461ms
883:	learn:	0.0261852	total:	3.48s	remaining:	457ms
884:	learn:	0.0261753	total:	3.48s	remaining:	453ms
885:	learn:	0.0261336	total:	3.49s	remaining:	449ms
886:	learn:	0.0260739	total:	3.49s	remaining:	445ms
887:	learn:	0.0260301	total:	3.49s	remaining:	441ms
888:	learn:	0.0259888	total:	3.5s	remaining:	437ms
889:	learn:	0.0259325	total:	3.5s	remaining:	433ms
890:	learn:	0.0259107	total:	3.5s	remaining:	429ms
891:	learn:	0.0258816	total:	3.51s	remaining:	425ms
892:	learn:	0.0258317	total:	3.51s	remaining:	421ms
893:	learn:	0.0257860	total:	3.52s	remaining:	417ms
894:	learn:	0.0257749	total:	3.52s	remaining:	413ms

895:	learn:	0.0257028	total:	3.53s	remaining:	409ms
896:	learn:	0.0256622	total:	3.53s	remaining:	405ms
897:	learn:	0.0255964	total:	3.53s	remaining:	401ms
898:	learn:	0.0255362	total:	3.54s	remaining:	397ms
899:	learn:	0.0254693	total:	3.54s	remaining:	393ms
900:	learn:	0.0254266	total:	3.54s	remaining:	390ms
901:	learn:	0.0253828	total:	3.55s	remaining:	386ms
902:	learn:	0.0253442	total:	3.55s	remaining:	382ms
903:	learn:	0.0253191	total:	3.56s	remaining:	378ms
904:	learn:	0.0252506	total:	3.56s	remaining:	374ms
905:	learn:	0.0251982	total:	3.56s	remaining:	370ms
906:	learn:	0.0251671	total:	3.57s	remaining:	366ms
907:	learn:	0.0251296	total:	3.57s	remaining:	362ms
908:	learn:	0.0250918	total:	3.57s	remaining:	358ms
909:	learn:	0.0250259	total:	3.58s	remaining:	354ms
910:	learn:	0.0250143	total:	3.58s	remaining:	350ms
911:	learn:	0.0249318	total:	3.58s	remaining:	346ms
912:	learn:	0.0249087	total:	3.59s	remaining:	342ms
913:	learn:	0.0248978	total:	3.59s	remaining:	338ms
914:	learn:	0.0248746	total:	3.6s	remaining:	334ms
915:	learn:	0.0248432	total:	3.6s	remaining:	330ms
916:	learn:	0.0248035	total:	3.6s	remaining:	326ms
917:	learn:	0.0247807	total:	3.61s	remaining:	322ms
918:	learn:	0.0247375	total:	3.61s	remaining:	318ms
919:	learn:	0.0246954	total:	3.61s	remaining:	314ms
920:	learn:	0.0246474	total:	3.62s	remaining:	310ms
921:	learn:	0.0246118	total:	3.62s	remaining:	306ms
922:	learn:	0.0245666	total:	3.62s	remaining:	302ms
923:	learn:	0.0245096	total:	3.63s	remaining:	298ms
924:	learn:	0.0245047	total:	3.63s	remaining:	294ms
925:	learn:	0.0244958	total:	3.63s	remaining:	290ms

926:	learn:	0.0244383	total:	3.64s	remaining:	287ms
927:	learn:	0.0244112	total:	3.64s	remaining:	283ms
928:	learn:	0.0243805	total:	3.65s	remaining:	279ms
929:	learn:	0.0243293	total:	3.65s	remaining:	275ms
930:	learn:	0.0242987	total:	3.65s	remaining:	271ms
931:	learn:	0.0242420	total:	3.66s	remaining:	267ms
932:	learn:	0.0242024	total:	3.66s	remaining:	263ms
933:	learn:	0.0241686	total:	3.66s	remaining:	259ms
934:	learn:	0.0241445	total:	3.67s	remaining:	255ms
935:	learn:	0.0241027	total:	3.67s	remaining:	251ms
936:	learn:	0.0240520	total:	3.67s	remaining:	247ms
937:	learn:	0.0240134	total:	3.68s	remaining:	243ms
938:	learn:	0.0240088	total:	3.68s	remaining:	239ms
939:	learn:	0.0239704	total:	3.69s	remaining:	235ms
940:	learn:	0.0239103	total:	3.69s	remaining:	231ms
941:	learn:	0.0238409	total:	3.69s	remaining:	227ms
942:	learn:	0.0238039	total:	3.7s	remaining:	223ms
943:	learn:	0.0237823	total:	3.7s	remaining:	219ms
944:	learn:	0.0237565	total:	3.7s	remaining:	216ms
945:	learn:	0.0237163	total:	3.71s	remaining:	212ms
946:	learn:	0.0236667	total:	3.71s	remaining:	208ms
947:	learn:	0.0236457	total:	3.72s	remaining:	204ms
948:	learn:	0.0235838	total:	3.72s	remaining:	200ms
949:	learn:	0.0235463	total:	3.73s	remaining:	196ms
950:	learn:	0.0235173	total:	3.73s	remaining:	192ms
951:	learn:	0.0234544	total:	3.73s	remaining:	188ms
952:	learn:	0.0234302	total:	3.74s	remaining:	184ms
953:	learn:	0.0233702	total:	3.74s	remaining:	180ms
954:	learn:	0.0233302	total:	3.75s	remaining:	176ms
955:	learn:	0.0233026	total:	3.75s	remaining:	173ms
956:	learn:	0.0232593	total:	3.75s	remaining:	169ms
957:	learn:	0.0232097	total:	3.76s	remaining:	165ms
958:	learn:	0.0232063	total:	3.76s	remaining:	161ms

959:	learn:	0.0231698	total:	3.76s	remaining:	157ms
960:	learn:	0.0231247	total:	3.77s	remaining:	153ms
961:	learn:	0.0230932	total:	3.77s	remaining:	149ms
962:	learn:	0.0230548	total:	3.77s	remaining:	145ms
963:	learn:	0.0229969	total:	3.78s	remaining:	141ms
964:	learn:	0.0229695	total:	3.78s	remaining:	137ms
965:	learn:	0.0229270	total:	3.79s	remaining:	133ms
966:	learn:	0.0228692	total:	3.79s	remaining:	129ms
967:	learn:	0.0228121	total:	3.79s	remaining:	125ms
968:	learn:	0.0227850	total:	3.8s	remaining:	122ms
969:	learn:	0.0227214	total:	3.8s	remaining:	118ms
970:	learn:	0.0226850	total:	3.81s	remaining:	114ms
971:	learn:	0.0226424	total:	3.81s	remaining:	110ms
972:	learn:	0.0225854	total:	3.81s	remaining:	106ms
973:	learn:	0.0225584	total:	3.82s	remaining:	102ms
974:	learn:	0.0225283	total:	3.82s	remaining:	97.9ms
975:	learn:	0.0225029	total:	3.82s	remaining:	94ms
976:	learn:	0.0224748	total:	3.83s	remaining:	90.1ms
977:	learn:	0.0224376	total:	3.83s	remaining:	86.2ms
978:	learn:	0.0224078	total:	3.83s	remaining:	82.3ms
979:	learn:	0.0223814	total:	3.84s	remaining:	78.3ms
980:	learn:	0.0223549	total:	3.84s	remaining:	74.4ms
981:	learn:	0.0223013	total:	3.85s	remaining:	70.5ms
982:	learn:	0.0222823	total:	3.85s	remaining:	66.6ms

983:	learn:	0.0222439	total:	3.85s	remaining:	62.7ms
984:	learn:	0.0221962	total:	3.86s	remaining:	58.7ms
985:	learn:	0.0221739	total:	3.86s	remaining:	54.8ms
986:	learn:	0.0221427	total:	3.86s	remaining:	50.9ms
987:	learn:	0.0220991	total:	3.87s	remaining:	47ms
988:	learn:	0.0220733	total:	3.87s	remaining:	43.1ms
989:	learn:	0.0220196	total:	3.88s	remaining:	39.1ms
990:	learn:	0.0219805	total:	3.88s	remaining:	35.2ms
991:	learn:	0.0219323	total:	3.88s	remaining:	31.3ms
992:	learn:	0.0219030	total:	3.89s	remaining:	27.4ms
993:	learn:	0.0218695	total:	3.89s	remaining:	23.5ms
994:	learn:	0.0218120	total:	3.89s	remaining:	19.6ms
995:	learn:	0.0217625	total:	3.9s	remaining:	15.6ms
996:	learn:	0.0217516	total:	3.9s	remaining:	11.7ms
997:	learn:	0.0217322	total:	3.9s	remaining:	7.82ms
998:	learn:	0.0217057	total:	3.91s	remaining:	3.91ms
999:	learn:	0.0216454	total:	3.91s	remaining:	0us

CatBoostClassifier accuracy: 0.9263157894736842

```
# Confusion matrix for each model
print('\nConfusion Matrix for AdaboostClassifier:')
print(confusion_matrix(y_test, y_pred_adaboost))

print('\nConfusion Matrix for GradientBoostingClassifier:')
print(confusion_matrix(y_test, y_pred_gradientboosting))

print('\nConfusion Matrix for XGBoostClassifier:')
print(confusion_matrix(y_test, y_pred_xg))

print('\nConfusion Matrix for CatBoostClassifier:')
print(confusion_matrix(y_test, y_pred_catboost))
```

In [180...

```
Confusion Matrix for
AdaboostClassifier: [[79  9]
 [ 8 94]]

Confusion Matrix for
GradientBoostingClassifier: [[81  7]
 [10 92]]

Confusion Matrix for
XGBoostClassifier: [[82  6]
 [ 8 94]]

Confusion Matrix for
CatBoostClassifier: [[82  6]
 [ 8 94]]
```

In []: