Q. Does user's demographic(location, age, gender) impact type of anime(genre, episodes, anime type(OVA, movie), Rank) they are prefer? For solving this question, I am trying to determine the rating of an anime based on user's demographic(Age, Location, Gender) and anime's features(genre, type and episodes)

The second algorithm I am trying here is CatBoostRegressor, this models excels with datasets which have a lot of string data. For this model we don't need to individually 1 hot encode or transform our string data. The model has inbuilt capabilities to handle them. We just mention the columns which has string data.

This time instead of classifying to get the expected rating, I am using regression for guess the expected user rating. Reference: https://catboost.ai/en/docs/

```
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
from sklearn.preprocessing import MultiLabelBinarizer

data = pd.read_csv('../../joined_datasets/joined_rating_dataset.csv')
cleaned_dataset =
pd.read_csv("../../cleaned_datasets/users_details_dataset_cleaned.csv"
)
data.dropna()
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5207686 entries, 0 to 5207685
Data columns (total 21 columns):
 #   Column            Dtype
---  ------            -----
 0   Unnamed: 0        int64
 1   user_id           int64
 2   anime_id          int64
 3   rating            int64
 4   Gender            object
 5   Location          object
 6   Birthday_Date     object
 7   Joined_Date       object
 8   Age_Join          float64
 9   Episodes Watched  float64
 10  Age               float64
 11  Name              object
 12  Genres            object
 13  Type              object
 14  Start Date        object
 15  End Date          object
 16  Studios           object
 17  Source            object
```

```
 18  Rank              object
 19  Episodes          float64
 20  Episodes_Norm     float64
dtypes: float64(5), int64(4), object(12)
memory usage: 834.4+ MB
```

Performing undersampling as number of rows was a bit too high to compute using my laptop(~50,00,000). Considering only the top 10 countries

```
df = cleaned_dataset.copy()
import pandas as pd
import matplotlib.pyplot as plt

location_user_counts = df['Location'].value_counts()

top_countries = df['Location'].value_counts().head(10)

# # Get the list of top 20 countries
top_10_countries = top_countries.index.tolist()
data = data[data['Location'].isin(top_10_countries)]
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 3357313 entries, 0 to 5207685
Data columns (total 21 columns):
 #   Column            Dtype
---  ------            -----
 0   Unnamed: 0        int64
 1   user_id           int64
 2   anime_id          int64
 3   rating            int64
 4   Gender            object
 5   Location          object
 6   Birthday_Date     object
 7   Joined_Date       object
 8   Age_Join          float64
 9   Episodes Watched  float64
 10  Age               float64
 11  Name              object
 12  Genres            object
 13  Type              object
 14  Start Date        object
 15  End Date          object
 16  Studios           object
 17  Source            object
 18  Rank              object
 19  Episodes          float64
 20  Episodes_Norm     float64
```

```
dtypes: float64(5), int64(4), object(12)
memory usage: 563.5+ MB
```

```
# Undersampling
# Count entries for each location
location_counts = data['Location'].value_counts()

# Decide the target sample size (e.g., use the minimum count of the
top 5 locations)
target_sample_size = location_counts.nsmallest(5).min()  # Choose the
minimum of the top 5

# Under-sample the DataFrame
under_sampled_df = data.groupby('Location').apply(lambda x:
x.sample(n=min(len(x), target_sample_size),
random_state=42)).reset_index(drop=True)

# Count occurrences of each class in the target variable (assuming
your target variable is 'rating')
target_counts = under_sampled_df['Location'].value_counts()
# Output the results
print("Under-sampled DataFrame shape:", under_sampled_df.shape)
print("Counts of each class in the target variable:")
print(target_counts)
```

```
/var/folders/dz/fg9tl53x4y16ytgmdhwdt0kr0000gn/T/
ipykernel_15870/807053095.py:9: DeprecationWarning:
DataFrameGroupBy.apply operated on the grouping columns. This behavior
is deprecated, and in a future version of pandas the grouping columns
will be excluded from the operation. Either pass
`include_groups=False` to exclude the groupings or explicitly select
the grouping columns after groupby to silence this warning.
  under_sampled_df = data.groupby('Location').apply(lambda x:
x.sample(n=min(len(x), target_sample_size),
random_state=42)).reset_index(drop=True)
```

```
Under-sampled DataFrame shape: (1075590, 21)
Counts of each class in the target variable:
Location
Australia        107559
Brazil           107559
Canada           107559
France           107559
Germany          107559
Philippines      107559
Poland           107559
Russia           107559
Sweden           107559
United States    107559
Name: count, dtype: int64
```

Here we are not performing any preprocessing of string data columns, we just mention the column indices while doing model fitting. Performing first pass for regression using CatBoostRegressor

```
import catboost as cb
features = under_sampled_df.columns.difference(['user_id', 'anime_id',
'rating', 'Birthday_Date', 'Joined_Date', 'Age_Join', 'Episodes
Watched',
                                    'Start Date', 'End Date', 'Name',
'Studios', 'Source', 'Episodes_Norm', 'Unnamed: 0', 'Type'])

df = under_sampled_df.dropna()
df = df[df["Rank"]!="UNKNOWN"]
df[features].info()
print(features)
X = df[features]

y = df["rating"]


# # Split into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

model = cb.CatBoostRegressor(
    learning_rate=0.1,
    depth=10,
    iterations=1000,
    loss_function='RMSE'
)

model.fit(X_train, y_train, cat_features=[2,3,4])
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 781615 entries, 0 to 1075589
Data columns (total 6 columns):
 #   Column    Non-Null Count   Dtype
---  ------    --------------   -----
 0   Age       781615 non-null  float64
 1   Episodes  781615 non-null  float64
 2   Gender    781615 non-null  object
 3   Genres    781615 non-null  object
 4   Location  781615 non-null  object
 5   Rank      781615 non-null  object
dtypes: float64(2), object(4)
memory usage: 41.7+ MB
Index(['Age', 'Episodes', 'Gender', 'Genres', 'Location', 'Rank'],
dtype='object')
0:    learn: 1.6200493 total: 76.6ms    remaining: 1m 16s
1:    learn: 1.5983237 total: 140ms     remaining: 1m 9s
```

```
2:   learn: 1.5807286 total: 205ms    remaining: 1m 8s
3:   learn: 1.5656122 total: 280ms    remaining: 1m 9s
4:   learn: 1.5532923 total: 343ms    remaining: 1m 8s
5:   learn: 1.5427331 total: 407ms    remaining: 1m 7s
6:   learn: 1.5340006 total: 475ms    remaining: 1m 7s
7:   learn: 1.5268498 total: 543ms    remaining: 1m 7s
8:   learn: 1.5208395 total: 599ms    remaining: 1m 5s
9:   learn: 1.5157140 total: 654ms    remaining: 1m 4s
10:  learn: 1.5114581 total: 708ms    remaining: 1m 3s
11:  learn: 1.5078904 total: 774ms    remaining: 1m 3s
12:  learn: 1.5048609 total: 843ms    remaining: 1m 3s
13:  learn: 1.5023680 total: 889ms    remaining: 1m 2s
14:  learn: 1.5002148 total: 946ms    remaining: 1m 2s
15:  learn: 1.4983410 total: 1.01s    remaining: 1m 2s
16:  learn: 1.4967920 total: 1.07s    remaining: 1m 1s
17:  learn: 1.4952376 total: 1.13s    remaining: 1m 1s
18:  learn: 1.4941031 total: 1.19s    remaining: 1m 1s
19:  learn: 1.4931097 total: 1.26s    remaining: 1m 1s
20:  learn: 1.4922167 total: 1.32s    remaining: 1m 1s
21:  learn: 1.4915336 total: 1.4s     remaining: 1m 2s
22:  learn: 1.4908186 total: 1.47s    remaining: 1m 2s
23:  learn: 1.4903190 total: 1.52s    remaining: 1m 1s
24:  learn: 1.4897846 total: 1.59s    remaining: 1m 1s
25:  learn: 1.4892620 total: 1.66s    remaining: 1m 2s
26:  learn: 1.4887737 total: 1.73s    remaining: 1m 2s
27:  learn: 1.4882409 total: 1.79s    remaining: 1m 2s
28:  learn: 1.4877267 total: 1.85s    remaining: 1m 1s
29:  learn: 1.4872921 total: 1.92s    remaining: 1m 1s
30:  learn: 1.4867446 total: 1.99s    remaining: 1m 2s
31:  learn: 1.4863632 total: 2.04s    remaining: 1m 1s
32:  learn: 1.4861180 total: 2.14s    remaining: 1m 2s
33:  learn: 1.4857223 total: 2.23s    remaining: 1m 3s
34:  learn: 1.4854337 total: 2.29s    remaining: 1m 3s
35:  learn: 1.4851291 total: 2.35s    remaining: 1m 2s
36:  learn: 1.4848185 total: 2.43s    remaining: 1m 3s
37:  learn: 1.4845974 total: 2.49s    remaining: 1m 3s
38:  learn: 1.4843269 total: 2.55s    remaining: 1m 2s
39:  learn: 1.4841087 total: 2.62s    remaining: 1m 2s
40:  learn: 1.4838749 total: 2.7s     remaining: 1m 3s
41:  learn: 1.4836792 total: 2.77s    remaining: 1m 3s
42:  learn: 1.4834914 total: 2.82s    remaining: 1m 2s
43:  learn: 1.4833375 total: 2.9s     remaining: 1m 2s
44:  learn: 1.4829992 total: 2.95s    remaining: 1m 2s
45:  learn: 1.4827422 total: 3.02s    remaining: 1m 2s
46:  learn: 1.4824558 total: 3.08s    remaining: 1m 2s
47:  learn: 1.4823261 total: 3.15s    remaining: 1m 2s
48:  learn: 1.4820874 total: 3.21s    remaining: 1m 2s
49:  learn: 1.4819197 total: 3.28s    remaining: 1m 2s
50:  learn: 1.4817692 total: 3.34s    remaining: 1m 2s
```

```
51:   learn: 1.4816350 total: 3.42s    remaining: 1m 2s
52:   learn: 1.4813997 total: 3.48s    remaining: 1m 2s
53:   learn: 1.4811197 total: 3.55s    remaining: 1m 2s
54:   learn: 1.4808587 total: 3.61s    remaining: 1m 2s
55:   learn: 1.4807021 total: 3.69s    remaining: 1m 2s
56:   learn: 1.4804539 total: 3.77s    remaining: 1m 2s
57:   learn: 1.4804144 total: 3.84s    remaining: 1m 2s
58:   learn: 1.4800619 total: 3.93s    remaining: 1m 2s
59:   learn: 1.4798755 total: 4.01s    remaining: 1m 2s
60:   learn: 1.4796665 total: 4.09s    remaining: 1m 2s
61:   learn: 1.4795456 total: 4.15s    remaining: 1m 2s
62:   learn: 1.4794256 total: 4.21s    remaining: 1m 2s
63:   learn: 1.4792627 total: 4.3s     remaining: 1m 2s
64:   learn: 1.4791370 total: 4.36s    remaining: 1m 2s
65:   learn: 1.4788842 total: 4.42s    remaining: 1m 2s
66:   learn: 1.4787995 total: 4.47s    remaining: 1m 2s
67:   learn: 1.4786984 total: 4.54s    remaining: 1m 2s
68:   learn: 1.4785963 total: 4.62s    remaining: 1m 2s
69:   learn: 1.4784252 total: 4.68s    remaining: 1m 2s
70:   learn: 1.4783795 total: 4.76s    remaining: 1m 2s
71:   learn: 1.4782137 total: 4.79s    remaining: 1m 1s
72:   learn: 1.4779966 total: 4.87s    remaining: 1m 1s
73:   learn: 1.4779442 total: 4.9s     remaining: 1m 1s
74:   learn: 1.4778543 total: 4.96s    remaining: 1m 1s
75:   learn: 1.4778465 total: 4.98s    remaining: 1m
76:   learn: 1.4777513 total: 5.05s    remaining: 1m
77:   learn: 1.4775829 total: 5.13s    remaining: 1m
78:   learn: 1.4774535 total: 5.19s    remaining: 1m
79:   learn: 1.4771731 total: 5.26s    remaining: 1m
80:   learn: 1.4770367 total: 5.32s    remaining: 1m
81:   learn: 1.4769446 total: 5.39s    remaining: 1m
82:   learn: 1.4767332 total: 5.46s    remaining: 1m
83:   learn: 1.4765227 total: 5.52s    remaining: 1m
84:   learn: 1.4763611 total: 5.57s    remaining: 1m
85:   learn: 1.4762939 total: 5.64s    remaining: 60s
86:   learn: 1.4761805 total: 5.71s    remaining: 59.9s
87:   learn: 1.4760779 total: 5.79s    remaining: 1m
88:   learn: 1.4758672 total: 5.84s    remaining: 59.8s
89:   learn: 1.4758289 total: 5.9s     remaining: 59.7s
90:   learn: 1.4757749 total: 5.98s    remaining: 59.8s
91:   learn: 1.4755998 total: 6.08s    remaining: 60s
92:   learn: 1.4755941 total: 6.1s     remaining: 59.5s
93:   learn: 1.4753912 total: 6.17s    remaining: 59.5s
94:   learn: 1.4752163 total: 6.24s    remaining: 59.4s
95:   learn: 1.4750767 total: 6.29s    remaining: 59.2s
96:   learn: 1.4749548 total: 6.34s    remaining: 59s
97:   learn: 1.4747871 total: 6.39s    remaining: 58.8s
98:   learn: 1.4744746 total: 6.47s    remaining: 58.9s
99:   learn: 1.4742650 total: 6.52s    remaining: 58.6s
```

```
100:  learn: 1.4741589 total: 6.57s    remaining: 58.4s
101:  learn: 1.4740684 total: 6.64s    remaining: 58.4s
102:  learn: 1.4740042 total: 6.68s    remaining: 58.2s
103:  learn: 1.4739990 total: 6.7s     remaining: 57.8s
104:  learn: 1.4738584 total: 6.76s    remaining: 57.6s
105:  learn: 1.4738135 total: 6.81s    remaining: 57.4s
106:  learn: 1.4737209 total: 6.85s    remaining: 57.2s
107:  learn: 1.4736436 total: 6.93s    remaining: 57.2s
108:  learn: 1.4735558 total: 6.98s    remaining: 57.1s
109:  learn: 1.4734036 total: 7.02s    remaining: 56.8s
110:  learn: 1.4732952 total: 7.1s     remaining: 56.8s
111:  learn: 1.4731427 total: 7.17s    remaining: 56.8s
112:  learn: 1.4730035 total: 7.24s    remaining: 56.9s
113:  learn: 1.4729464 total: 7.29s    remaining: 56.7s
114:  learn: 1.4728560 total: 7.34s    remaining: 56.5s
115:  learn: 1.4726771 total: 7.41s    remaining: 56.5s
116:  learn: 1.4725714 total: 7.47s    remaining: 56.4s
117:  learn: 1.4725358 total: 7.54s    remaining: 56.4s
118:  learn: 1.4724399 total: 7.61s    remaining: 56.4s
119:  learn: 1.4724282 total: 7.64s    remaining: 56s
120:  learn: 1.4723196 total: 7.7s     remaining: 56s
121:  learn: 1.4722282 total: 7.77s    remaining: 55.9s
122:  learn: 1.4721662 total: 7.84s    remaining: 55.9s
123:  learn: 1.4720740 total: 7.89s    remaining: 55.7s
124:  learn: 1.4718860 total: 7.96s    remaining: 55.8s
125:  learn: 1.4717837 total: 8.02s    remaining: 55.6s
126:  learn: 1.4717499 total: 8.07s    remaining: 55.5s
127:  learn: 1.4716055 total: 8.12s    remaining: 55.3s
128:  learn: 1.4714948 total: 8.16s    remaining: 55.1s
129:  learn: 1.4714603 total: 8.25s    remaining: 55.2s
130:  learn: 1.4712886 total: 8.3s     remaining: 55.1s
131:  learn: 1.4712017 total: 8.36s    remaining: 55s
132:  learn: 1.4710783 total: 8.46s    remaining: 55.2s
133:  learn: 1.4710237 total: 8.54s    remaining: 55.2s
134:  learn: 1.4708853 total: 8.59s    remaining: 55.1s
135:  learn: 1.4707479 total: 8.66s    remaining: 55s
136:  learn: 1.4707134 total: 8.73s    remaining: 55s
137:  learn: 1.4705997 total: 8.8s     remaining: 55s
138:  learn: 1.4704346 total: 8.88s    remaining: 55s
139:  learn: 1.4703588 total: 8.97s    remaining: 55.1s
140:  learn: 1.4701768 total: 9.06s    remaining: 55.2s
141:  learn: 1.4700593 total: 9.12s    remaining: 55.1s
142:  learn: 1.4699957 total: 9.21s    remaining: 55.2s
143:  learn: 1.4698325 total: 9.27s    remaining: 55.1s
144:  learn: 1.4697915 total: 9.32s    remaining: 55s
145:  learn: 1.4696536 total: 9.39s    remaining: 54.9s
146:  learn: 1.4695416 total: 9.45s    remaining: 54.9s
147:  learn: 1.4694730 total: 9.53s    remaining: 54.9s
148:  learn: 1.4694025 total: 9.6s     remaining: 54.9s
```

```
149:  learn: 1.4693142 total: 9.65s    remaining: 54.7s
150:  learn: 1.4692567 total: 9.73s    remaining: 54.7s
151:  learn: 1.4690932 total: 9.8s     remaining: 54.7s
152:  learn: 1.4690212 total: 9.88s    remaining: 54.7s
153:  learn: 1.4688939 total: 9.95s    remaining: 54.7s
154:  learn: 1.4687334 total: 10s remaining: 54.7s
155:  learn: 1.4686849 total: 10.1s    remaining: 54.6s
156:  learn: 1.4685103 total: 10.2s    remaining: 54.5s
157:  learn: 1.4684170 total: 10.2s    remaining: 54.6s
158:  learn: 1.4682928 total: 10.3s    remaining: 54.6s
159:  learn: 1.4681294 total: 10.4s    remaining: 54.4s
160:  learn: 1.4680916 total: 10.5s    remaining: 54.5s
161:  learn: 1.4679640 total: 10.5s    remaining: 54.5s
162:  learn: 1.4678210 total: 10.6s    remaining: 54.4s
163:  learn: 1.4677414 total: 10.7s    remaining: 54.5s
164:  learn: 1.4676310 total: 10.8s    remaining: 54.6s
165:  learn: 1.4675159 total: 10.9s    remaining: 54.6s
166:  learn: 1.4673754 total: 10.9s    remaining: 54.5s
167:  learn: 1.4672610 total: 11s remaining: 54.6s
168:  learn: 1.4671508 total: 11.1s    remaining: 54.6s
169:  learn: 1.4670952 total: 11.2s    remaining: 54.6s
170:  learn: 1.4670212 total: 11.2s    remaining: 54.5s
171:  learn: 1.4669055 total: 11.3s    remaining: 54.5s
172:  learn: 1.4667820 total: 11.4s    remaining: 54.4s
173:  learn: 1.4666628 total: 11.4s    remaining: 54.3s
174:  learn: 1.4665975 total: 11.5s    remaining: 54.3s
175:  learn: 1.4664778 total: 11.6s    remaining: 54.3s
176:  learn: 1.4663921 total: 11.6s    remaining: 54.2s
177:  learn: 1.4663172 total: 11.7s    remaining: 54.1s
178:  learn: 1.4662429 total: 11.8s    remaining: 54.1s
179:  learn: 1.4660927 total: 11.9s    remaining: 54s
180:  learn: 1.4660123 total: 11.9s    remaining: 54s
181:  learn: 1.4659254 total: 12s remaining: 54.1s
182:  learn: 1.4658749 total: 12.1s    remaining: 54.1s
183:  learn: 1.4657758 total: 12.2s    remaining: 54s
184:  learn: 1.4656716 total: 12.2s    remaining: 54s
185:  learn: 1.4655640 total: 12.3s    remaining: 53.9s
186:  learn: 1.4654652 total: 12.4s    remaining: 53.9s
187:  learn: 1.4653825 total: 12.4s    remaining: 53.8s
188:  learn: 1.4652142 total: 12.5s    remaining: 53.7s
189:  learn: 1.4651145 total: 12.6s    remaining: 53.7s
190:  learn: 1.4649916 total: 12.7s    remaining: 53.7s
191:  learn: 1.4648630 total: 12.7s    remaining: 53.6s
192:  learn: 1.4647888 total: 12.8s    remaining: 53.6s
193:  learn: 1.4646845 total: 12.9s    remaining: 53.4s
194:  learn: 1.4646066 total: 12.9s    remaining: 53.4s
195:  learn: 1.4645589 total: 13s remaining: 53.3s
196:  learn: 1.4644722 total: 13.1s    remaining: 53.3s
197:  learn: 1.4643325 total: 13.1s    remaining: 53.2s
```

```
198:  learn: 1.4642212  total: 13.2s    remaining: 53.1s
199:  learn: 1.4641435  total: 13.2s    remaining: 53s
200:  learn: 1.4640674  total: 13.3s    remaining: 52.9s
201:  learn: 1.4639941  total: 13.3s    remaining: 52.7s
202:  learn: 1.4638778  total: 13.4s    remaining: 52.7s
203:  learn: 1.4638088  total: 13.5s    remaining: 52.7s
204:  learn: 1.4637084  total: 13.6s    remaining: 52.6s
205:  learn: 1.4635874  total: 13.6s    remaining: 52.5s
206:  learn: 1.4634916  total: 13.7s    remaining: 52.5s
207:  learn: 1.4634363  total: 13.8s    remaining: 52.4s
208:  learn: 1.4633691  total: 13.8s    remaining: 52.3s
209:  learn: 1.4632215  total: 13.9s    remaining: 52.2s
210:  learn: 1.4630918  total: 13.9s    remaining: 52.2s
211:  learn: 1.4630498  total: 14s remaining: 52.2s
212:  learn: 1.4629929  total: 14.1s    remaining: 52.1s
213:  learn: 1.4628760  total: 14.1s    remaining: 52s
214:  learn: 1.4627978  total: 14.2s    remaining: 51.8s
215:  learn: 1.4627303  total: 14.3s    remaining: 51.8s
216:  learn: 1.4626782  total: 14.3s    remaining: 51.8s
217:  learn: 1.4626098  total: 14.4s    remaining: 51.7s
218:  learn: 1.4625516  total: 14.5s    remaining: 51.6s
219:  learn: 1.4624872  total: 14.5s    remaining: 51.6s
220:  learn: 1.4624259  total: 14.6s    remaining: 51.5s
221:  learn: 1.4623720  total: 14.7s    remaining: 51.4s
222:  learn: 1.4623084  total: 14.7s    remaining: 51.3s
223:  learn: 1.4622424  total: 14.8s    remaining: 51.2s
224:  learn: 1.4621675  total: 14.9s    remaining: 51.2s
225:  learn: 1.4620574  total: 14.9s    remaining: 51.2s
226:  learn: 1.4619205  total: 15s remaining: 51.1s
227:  learn: 1.4618947  total: 15.1s    remaining: 51s
228:  learn: 1.4618401  total: 15.2s    remaining: 51s
229:  learn: 1.4617134  total: 15.2s    remaining: 51s
230:  learn: 1.4616839  total: 15.3s    remaining: 50.9s
231:  learn: 1.4616277  total: 15.4s    remaining: 50.9s
232:  learn: 1.4615716  total: 15.4s    remaining: 50.8s
233:  learn: 1.4614873  total: 15.5s    remaining: 50.8s
234:  learn: 1.4613664  total: 15.6s    remaining: 50.8s
235:  learn: 1.4612632  total: 15.7s    remaining: 50.7s
236:  learn: 1.4611940  total: 15.7s    remaining: 50.7s
237:  learn: 1.4611114  total: 15.8s    remaining: 50.5s
238:  learn: 1.4610462  total: 15.8s    remaining: 50.5s
239:  learn: 1.4609903  total: 15.9s    remaining: 50.4s
240:  learn: 1.4609310  total: 16s remaining: 50.3s
241:  learn: 1.4608655  total: 16.1s    remaining: 50.3s
242:  learn: 1.4608453  total: 16.1s    remaining: 50.3s
243:  learn: 1.4607893  total: 16.2s    remaining: 50.2s
244:  learn: 1.4607575  total: 16.3s    remaining: 50.2s
245:  learn: 1.4606582  total: 16.4s    remaining: 50.1s
246:  learn: 1.4605563  total: 16.4s    remaining: 50s
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247:  learn: 1.4605073total: 16.5s    remaining: 49.9s
248:  learn: 1.4604544total: 16.5s    remaining: 49.8s
249:  learn: 1.4603699total: 16.6s    remaining: 49.8s
250:  learn: 1.4603077total: 16.7s    remaining: 49.8s
251:  learn: 1.4602657total: 16.7s    remaining: 49.7s
252:  learn: 1.4601527total: 16.8s    remaining: 49.7s
253:  learn: 1.4600926total: 16.9s    remaining: 49.6s
254:  learn: 1.4599559total: 17s remaining: 49.5s
255:  learn: 1.4598880total: 17s remaining: 49.5s
256:  learn: 1.4598400total: 17.1s    remaining: 49.5s
257:  learn: 1.4597420total: 17.2s    remaining: 49.3s
258:  learn: 1.4596768total: 17.2s    remaining: 49.2s
259:  learn: 1.4596313total: 17.3s    remaining: 49.2s
260:  learn: 1.4595618total: 17.3s    remaining: 49.1s
261:  learn: 1.4594707total: 17.4s    remaining: 49s
262:  learn: 1.4593793total: 17.5s    remaining: 49s
263:  learn: 1.4593466total: 17.6s    remaining: 49s
264:  learn: 1.4592963total: 17.7s    remaining: 49s
265:  learn: 1.4592302total: 17.7s    remaining: 49s
266:  learn: 1.4591542total: 17.8s    remaining: 48.9s
267:  learn: 1.4591078total: 17.9s    remaining: 48.8s
268:  learn: 1.4590958total: 18s remaining: 48.8s
269:  learn: 1.4590054total: 18s remaining: 48.7s
270:  learn: 1.4589314total: 18.1s    remaining: 48.6s
271:  learn: 1.4588055total: 18.1s    remaining: 48.5s
272:  learn: 1.4587938total: 18.2s    remaining: 48.5s
273:  learn: 1.4587370total: 18.3s    remaining: 48.4s
274:  learn: 1.4587269total: 18.4s    remaining: 48.4s
275:  learn: 1.4586526total: 18.4s    remaining: 48.3s
276:  learn: 1.4585778total: 18.5s    remaining: 48.2s
277:  learn: 1.4585070total: 18.5s    remaining: 48.2s
278:  learn: 1.4584595total: 18.6s    remaining: 48.1s
279:  learn: 1.4583790total: 18.7s    remaining: 48.1s
280:  learn: 1.4583062total: 18.8s    remaining: 48s
281:  learn: 1.4582704total: 18.8s    remaining: 47.9s
282:  learn: 1.4581862total: 18.9s    remaining: 47.8s
283:  learn: 1.4581627total: 18.9s    remaining: 47.7s
284:  learn: 1.4580845total: 19s remaining: 47.6s
285:  learn: 1.4579352total: 19s remaining: 47.6s
286:  learn: 1.4578893total: 19.1s    remaining: 47.5s
287:  learn: 1.4578272total: 19.2s    remaining: 47.5s
288:  learn: 1.4577261total: 19.3s    remaining: 47.4s
289:  learn: 1.4576233total: 19.3s    remaining: 47.3s
290:  learn: 1.4575478total: 19.4s    remaining: 47.2s
291:  learn: 1.4575269total: 19.5s    remaining: 47.2s
292:  learn: 1.4574971total: 19.5s    remaining: 47.1s
293:  learn: 1.4574781total: 19.6s    remaining: 47.1s
294:  learn: 1.4573221total: 19.7s    remaining: 47s
295:  learn: 1.4572660total: 19.7s    remaining: 46.9s
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296:  learn: 1.4572043  total: 19.8s    remaining: 46.9s
297:  learn: 1.4571209  total: 19.8s    remaining: 46.7s
298:  learn: 1.4570833  total: 19.9s    remaining: 46.7s
299:  learn: 1.4570256  total: 20s remaining: 46.6s
300:  learn: 1.4570075  total: 20.1s    remaining: 46.6s
301:  learn: 1.4569087  total: 20.1s    remaining: 46.5s
302:  learn: 1.4568229  total: 20.2s    remaining: 46.4s
303:  learn: 1.4567771  total: 20.3s    remaining: 46.4s
304:  learn: 1.4567220  total: 20.3s    remaining: 46.3s
305:  learn: 1.4566513  total: 20.4s    remaining: 46.3s
306:  learn: 1.4566005  total: 20.5s    remaining: 46.2s
307:  learn: 1.4565296  total: 20.5s    remaining: 46.1s
308:  learn: 1.4564720  total: 20.6s    remaining: 46.1s
309:  learn: 1.4564232  total: 20.7s    remaining: 46s
310:  learn: 1.4563760  total: 20.8s    remaining: 46s
311:  learn: 1.4562577  total: 20.8s    remaining: 45.9s
312:  learn: 1.4561624  total: 20.9s    remaining: 45.8s
313:  learn: 1.4561171  total: 20.9s    remaining: 45.7s
314:  learn: 1.4561066  total: 21s remaining: 45.7s
315:  learn: 1.4560545  total: 21.1s    remaining: 45.6s
316:  learn: 1.4559846  total: 21.1s    remaining: 45.5s
317:  learn: 1.4559656  total: 21.2s    remaining: 45.5s
318:  learn: 1.4559208  total: 21.3s    remaining: 45.4s
319:  learn: 1.4558819  total: 21.4s    remaining: 45.4s
320:  learn: 1.4558572  total: 21.5s    remaining: 45.4s
321:  learn: 1.4557944  total: 21.5s    remaining: 45.3s
322:  learn: 1.4557471  total: 21.6s    remaining: 45.3s
323:  learn: 1.4556944  total: 21.7s    remaining: 45.2s
324:  learn: 1.4556279  total: 21.7s    remaining: 45.2s
325:  learn: 1.4555830  total: 21.8s    remaining: 45.1s
326:  learn: 1.4554488  total: 21.9s    remaining: 45s
327:  learn: 1.4554214  total: 21.9s    remaining: 45s
328:  learn: 1.4553592  total: 22s remaining: 44.9s
329:  learn: 1.4552976  total: 22.1s    remaining: 44.8s
330:  learn: 1.4552768  total: 22.1s    remaining: 44.7s
331:  learn: 1.4552092  total: 22.2s    remaining: 44.8s
332:  learn: 1.4551865  total: 22.3s    remaining: 44.7s
333:  learn: 1.4551503  total: 22.4s    remaining: 44.7s
334:  learn: 1.4550590  total: 22.5s    remaining: 44.6s
335:  learn: 1.4550096  total: 22.5s    remaining: 44.5s
336:  learn: 1.4549703  total: 22.6s    remaining: 44.5s
337:  learn: 1.4548972  total: 22.7s    remaining: 44.4s
338:  learn: 1.4548533  total: 22.8s    remaining: 44.4s
339:  learn: 1.4548185  total: 22.8s    remaining: 44.3s
340:  learn: 1.4547739  total: 22.9s    remaining: 44.3s
341:  learn: 1.4547305  total: 23s remaining: 44.2s
342:  learn: 1.4546045  total: 23.1s    remaining: 44.2s
343:  learn: 1.4545897  total: 23.1s    remaining: 44.1s
344:  learn: 1.4545098  total: 23.2s    remaining: 44.1s
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345:  learn: 1.4545003  total: 23.2s    remaining: 43.9s
346:  learn: 1.4544593  total: 23.3s    remaining: 43.9s
347:  learn: 1.4543981  total: 23.4s    remaining: 43.8s
348:  learn: 1.4542972  total: 23.4s    remaining: 43.7s
349:  learn: 1.4542480  total: 23.5s    remaining: 43.6s
350:  learn: 1.4541983  total: 23.6s    remaining: 43.6s
351:  learn: 1.4541450  total: 23.7s    remaining: 43.5s
352:  learn: 1.4541077  total: 23.7s    remaining: 43.5s
353:  learn: 1.4540647  total: 23.8s    remaining: 43.4s
354:  learn: 1.4539796  total: 23.8s    remaining: 43.3s
355:  learn: 1.4539152  total: 23.9s    remaining: 43.3s
356:  learn: 1.4538761  total: 24s remaining: 43.2s
357:  learn: 1.4538487  total: 24.1s    remaining: 43.2s
358:  learn: 1.4537536  total: 24.1s    remaining: 43.1s
359:  learn: 1.4537136  total: 24.2s    remaining: 43s
360:  learn: 1.4536589  total: 24.3s    remaining: 42.9s
361:  learn: 1.4536288  total: 24.3s    remaining: 42.9s
362:  learn: 1.4535706  total: 24.4s    remaining: 42.8s
363:  learn: 1.4535166  total: 24.4s    remaining: 42.7s
364:  learn: 1.4534914  total: 24.5s    remaining: 42.6s
365:  learn: 1.4534670  total: 24.6s    remaining: 42.6s
366:  learn: 1.4534370  total: 24.7s    remaining: 42.5s
367:  learn: 1.4534132  total: 24.7s    remaining: 42.5s
368:  learn: 1.4533804  total: 24.8s    remaining: 42.5s
369:  learn: 1.4533372  total: 24.9s    remaining: 42.5s
370:  learn: 1.4532258  total: 25s remaining: 42.4s
371:  learn: 1.4531843  total: 25.1s    remaining: 42.3s
372:  learn: 1.4531345  total: 25.1s    remaining: 42.3s
373:  learn: 1.4530728  total: 25.2s    remaining: 42.2s
374:  learn: 1.4529786  total: 25.3s    remaining: 42.1s
375:  learn: 1.4529259  total: 25.4s    remaining: 42.1s
376:  learn: 1.4528920  total: 25.4s    remaining: 42s
377:  learn: 1.4528111  total: 25.5s    remaining: 42s
378:  learn: 1.4527781  total: 25.6s    remaining: 42s
379:  learn: 1.4527205  total: 25.7s    remaining: 42s
380:  learn: 1.4526894  total: 25.8s    remaining: 41.9s
381:  learn: 1.4526784  total: 25.9s    remaining: 41.9s
382:  learn: 1.4525824  total: 26s remaining: 41.9s
383:  learn: 1.4525323  total: 26.1s    remaining: 41.8s
384:  learn: 1.4525188  total: 26.2s    remaining: 41.8s
385:  learn: 1.4524413  total: 26.2s    remaining: 41.8s
386:  learn: 1.4523613  total: 26.3s    remaining: 41.7s
387:  learn: 1.4523157  total: 26.4s    remaining: 41.6s
388:  learn: 1.4522559  total: 26.4s    remaining: 41.5s
389:  learn: 1.4522509  total: 26.5s    remaining: 41.5s
390:  learn: 1.4522283  total: 26.6s    remaining: 41.5s
391:  learn: 1.4521732  total: 26.7s    remaining: 41.4s
392:  learn: 1.4521045  total: 26.8s    remaining: 41.4s
393:  learn: 1.4520390  total: 26.8s    remaining: 41.3s
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394:  learn: 1.4519998  total: 26.9s    remaining: 41.2s
395:  learn: 1.4519760  total: 27s remaining: 41.2s
396:  learn: 1.4519244  total: 27.1s    remaining: 41.1s
397:  learn: 1.4518312  total: 27.1s    remaining: 41s
398:  learn: 1.4517208  total: 27.2s    remaining: 41s
399:  learn: 1.4516921  total: 27.3s    remaining: 40.9s
400:  learn: 1.4516745  total: 27.3s    remaining: 40.8s
401:  learn: 1.4516741  total: 27.4s    remaining: 40.8s
402:  learn: 1.4515928  total: 27.5s    remaining: 40.7s
403:  learn: 1.4515756  total: 27.5s    remaining: 40.6s
404:  learn: 1.4514712  total: 27.6s    remaining: 40.5s
405:  learn: 1.4514116  total: 27.7s    remaining: 40.5s
406:  learn: 1.4513510  total: 27.8s    remaining: 40.5s
407:  learn: 1.4513186  total: 27.9s    remaining: 40.4s
408:  learn: 1.4512673  total: 27.9s    remaining: 40.4s
409:  learn: 1.4511883  total: 28s remaining: 40.3s
410:  learn: 1.4511526  total: 28.1s    remaining: 40.2s
411:  learn: 1.4510756  total: 28.2s    remaining: 40.2s
412:  learn: 1.4510278  total: 28.3s    remaining: 40.2s
413:  learn: 1.4509450  total: 28.3s    remaining: 40.1s
414:  learn: 1.4509088  total: 28.4s    remaining: 40.1s
415:  learn: 1.4508573  total: 28.5s    remaining: 40s
416:  learn: 1.4507943  total: 28.6s    remaining: 39.9s
417:  learn: 1.4506940  total: 28.6s    remaining: 39.9s
418:  learn: 1.4506619  total: 28.7s    remaining: 39.8s
419:  learn: 1.4506077  total: 28.8s    remaining: 39.7s
420:  learn: 1.4505630  total: 28.9s    remaining: 39.7s
421:  learn: 1.4504921  total: 28.9s    remaining: 39.6s
422:  learn: 1.4504781  total: 29s remaining: 39.6s
423:  learn: 1.4504314  total: 29.1s    remaining: 39.6s
424:  learn: 1.4503691  total: 29.2s    remaining: 39.5s
425:  learn: 1.4502935  total: 29.3s    remaining: 39.4s
426:  learn: 1.4502330  total: 29.4s    remaining: 39.4s
427:  learn: 1.4501827  total: 29.5s    remaining: 39.4s
428:  learn: 1.4501420  total: 29.5s    remaining: 39.3s
429:  learn: 1.4501191  total: 29.6s    remaining: 39.3s
430:  learn: 1.4500236  total: 29.7s    remaining: 39.2s
431:  learn: 1.4499876  total: 29.7s    remaining: 39.1s
432:  learn: 1.4499441  total: 29.8s    remaining: 39s
433:  learn: 1.4498930  total: 29.9s    remaining: 39s
434:  learn: 1.4498327  total: 29.9s    remaining: 38.9s
435:  learn: 1.4498157  total: 30s remaining: 38.8s
436:  learn: 1.4497285  total: 30.1s    remaining: 38.7s
437:  learn: 1.4496800  total: 30.1s    remaining: 38.7s
438:  learn: 1.4496595  total: 30.2s    remaining: 38.6s
439:  learn: 1.4496351  total: 30.3s    remaining: 38.5s
440:  learn: 1.4496011  total: 30.4s    remaining: 38.5s
441:  learn: 1.4495725  total: 30.4s    remaining: 38.4s
442:  learn: 1.4495291  total: 30.5s    remaining: 38.3s
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443:  learn: 1.4494605  total: 30.6s    remaining: 38.3s
444:  learn: 1.4494536  total: 30.6s    remaining: 38.2s
445:  learn: 1.4494007  total: 30.7s    remaining: 38.1s
446:  learn: 1.4493859  total: 30.8s    remaining: 38.1s
447:  learn: 1.4493474  total: 30.8s    remaining: 38s
448:  learn: 1.4493210  total: 30.9s    remaining: 37.9s
449:  learn: 1.4492685  total: 31s remaining: 37.9s
450:  learn: 1.4492279  total: 31.1s    remaining: 37.8s
451:  learn: 1.4491848  total: 31.1s    remaining: 37.7s
452:  learn: 1.4491378  total: 31.2s    remaining: 37.7s
453:  learn: 1.4490994  total: 31.3s    remaining: 37.6s
454:  learn: 1.4490387  total: 31.3s    remaining: 37.5s
455:  learn: 1.4489778  total: 31.4s    remaining: 37.5s
456:  learn: 1.4489081  total: 31.5s    remaining: 37.4s
457:  learn: 1.4488313  total: 31.5s    remaining: 37.3s
458:  learn: 1.4487894  total: 31.6s    remaining: 37.3s
459:  learn: 1.4487043  total: 31.7s    remaining: 37.2s
460:  learn: 1.4486904  total: 31.8s    remaining: 37.1s
461:  learn: 1.4486759  total: 31.8s    remaining: 37.1s
462:  learn: 1.4486289  total: 31.9s    remaining: 37s
463:  learn: 1.4485664  total: 32s remaining: 36.9s
464:  learn: 1.4485061  total: 32.1s    remaining: 36.9s
465:  learn: 1.4484309  total: 32.1s    remaining: 36.8s
466:  learn: 1.4483744  total: 32.2s    remaining: 36.7s
467:  learn: 1.4483148  total: 32.2s    remaining: 36.6s
468:  learn: 1.4482750  total: 32.3s    remaining: 36.6s
469:  learn: 1.4482446  total: 32.4s    remaining: 36.5s
470:  learn: 1.4481887  total: 32.5s    remaining: 36.4s
471:  learn: 1.4481172  total: 32.5s    remaining: 36.4s
472:  learn: 1.4480551  total: 32.6s    remaining: 36.3s
473:  learn: 1.4480446  total: 32.7s    remaining: 36.2s
474:  learn: 1.4480092  total: 32.7s    remaining: 36.2s
475:  learn: 1.4479427  total: 32.8s    remaining: 36.1s
476:  learn: 1.4478920  total: 32.9s    remaining: 36s
477:  learn: 1.4478422  total: 32.9s    remaining: 36s
478:  learn: 1.4477635  total: 33s remaining: 35.9s
479:  learn: 1.4477376  total: 33.1s    remaining: 35.9s
480:  learn: 1.4477107  total: 33.2s    remaining: 35.8s
481:  learn: 1.4476791  total: 33.2s    remaining: 35.7s
482:  learn: 1.4476050  total: 33.3s    remaining: 35.6s
483:  learn: 1.4475685  total: 33.3s    remaining: 35.5s
484:  learn: 1.4475437  total: 33.4s    remaining: 35.5s
485:  learn: 1.4474784  total: 33.5s    remaining: 35.4s
486:  learn: 1.4474563  total: 33.6s    remaining: 35.4s
487:  learn: 1.4474310  total: 33.6s    remaining: 35.3s
488:  learn: 1.4474053  total: 33.7s    remaining: 35.2s
489:  learn: 1.4473603  total: 33.8s    remaining: 35.2s
490:  learn: 1.4473380  total: 33.9s    remaining: 35.1s
491:  learn: 1.4472700  total: 34s remaining: 35.1s
492:  learn: 1.4472245  total: 34s remaining: 35s
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493:  learn: 1.4472189  total: 34.1s    remaining: 35s
494:  learn: 1.4471955  total: 34.2s    remaining: 34.9s
495:  learn: 1.4471398  total: 34.3s    remaining: 34.8s
496:  learn: 1.4471046  total: 34.3s    remaining: 34.8s
497:  learn: 1.4470711  total: 34.4s    remaining: 34.7s
498:  learn: 1.4470497  total: 34.5s    remaining: 34.6s
499:  learn: 1.4470391  total: 34.6s    remaining: 34.6s
500:  learn: 1.4469764  total: 34.7s    remaining: 34.5s
501:  learn: 1.4469480  total: 34.8s    remaining: 34.5s
502:  learn: 1.4469094  total: 34.8s    remaining: 34.4s
503:  learn: 1.4468670  total: 34.9s    remaining: 34.3s
504:  learn: 1.4468134  total: 35s remaining: 34.3s
505:  learn: 1.4467640  total: 35s remaining: 34.2s
506:  learn: 1.4467584  total: 35.1s    remaining: 34.1s
507:  learn: 1.4467224  total: 35.2s    remaining: 34.1s
508:  learn: 1.4466772  total: 35.2s    remaining: 34s
509:  learn: 1.4466437  total: 35.3s    remaining: 33.9s
510:  learn: 1.4465757  total: 35.4s    remaining: 33.9s
511:  learn: 1.4465350  total: 35.5s    remaining: 33.8s
512:  learn: 1.4465120  total: 35.6s    remaining: 33.8s
513:  learn: 1.4464848  total: 35.6s    remaining: 33.7s
514:  learn: 1.4464403  total: 35.7s    remaining: 33.6s
515:  learn: 1.4463514  total: 35.8s    remaining: 33.5s
516:  learn: 1.4463303  total: 35.8s    remaining: 33.5s
517:  learn: 1.4462898  total: 35.9s    remaining: 33.4s
518:  learn: 1.4462266  total: 36s remaining: 33.3s
519:  learn: 1.4460895  total: 36s remaining: 33.3s
520:  learn: 1.4460520  total: 36.1s    remaining: 33.2s
521:  learn: 1.4460230  total: 36.2s    remaining: 33.1s
522:  learn: 1.4460054  total: 36.2s    remaining: 33.1s
523:  learn: 1.4459810  total: 36.3s    remaining: 33s
524:  learn: 1.4459047  total: 36.4s    remaining: 32.9s
525:  learn: 1.4458798  total: 36.5s    remaining: 32.9s
526:  learn: 1.4458570  total: 36.5s    remaining: 32.8s
527:  learn: 1.4458245  total: 36.6s    remaining: 32.7s
528:  learn: 1.4457939  total: 36.7s    remaining: 32.7s
529:  learn: 1.4457788  total: 36.7s    remaining: 32.6s
530:  learn: 1.4457389  total: 36.8s    remaining: 32.5s
531:  learn: 1.4457248  total: 36.9s    remaining: 32.5s
532:  learn: 1.4456993  total: 37s remaining: 32.4s
533:  learn: 1.4456670  total: 37s remaining: 32.3s
534:  learn: 1.4455702  total: 37.1s    remaining: 32.2s
535:  learn: 1.4455575  total: 37.2s    remaining: 32.2s
536:  learn: 1.4455458  total: 37.3s    remaining: 32.1s
537:  learn: 1.4454853  total: 37.3s    remaining: 32.1s
538:  learn: 1.4454562  total: 37.4s    remaining: 32s
539:  learn: 1.4454152  total: 37.5s    remaining: 31.9s
540:  learn: 1.4453731  total: 37.6s    remaining: 31.9s
541:  learn: 1.4453285  total: 37.6s    remaining: 31.8s
```

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542:  learn: 1.4452963  total: 37.7s    remaining: 31.7s
543:  learn: 1.4452347  total: 37.8s    remaining: 31.7s
544:  learn: 1.4451774  total: 37.8s    remaining: 31.6s
545:  learn: 1.4451410  total: 37.9s    remaining: 31.5s
546:  learn: 1.4451130  total: 38s remaining: 31.4s
547:  learn: 1.4450967  total: 38s remaining: 31.4s
548:  learn: 1.4450764  total: 38.1s    remaining: 31.3s
549:  learn: 1.4450409  total: 38.2s    remaining: 31.2s
550:  learn: 1.4450065  total: 38.2s    remaining: 31.1s
551:  learn: 1.4449942  total: 38.3s    remaining: 31.1s
552:  learn: 1.4449639  total: 38.4s    remaining: 31s
553:  learn: 1.4449432  total: 38.4s    remaining: 30.9s
554:  learn: 1.4449382  total: 38.5s    remaining: 30.9s
555:  learn: 1.4448991  total: 38.6s    remaining: 30.8s
556:  learn: 1.4448677  total: 38.6s    remaining: 30.7s
557:  learn: 1.4448468  total: 38.7s    remaining: 30.7s
558:  learn: 1.4448063  total: 38.8s    remaining: 30.6s
559:  learn: 1.4447284  total: 38.9s    remaining: 30.5s
560:  learn: 1.4447012  total: 38.9s    remaining: 30.5s
561:  learn: 1.4446600  total: 39s remaining: 30.4s
562:  learn: 1.4446373  total: 39.1s    remaining: 30.3s
563:  learn: 1.4446265  total: 39.1s    remaining: 30.3s
564:  learn: 1.4445815  total: 39.2s    remaining: 30.2s
565:  learn: 1.4445275  total: 39.3s    remaining: 30.1s
566:  learn: 1.4444960  total: 39.4s    remaining: 30.1s
567:  learn: 1.4444573  total: 39.4s    remaining: 30s
568:  learn: 1.4444080  total: 39.5s    remaining: 29.9s
569:  learn: 1.4443469  total: 39.5s    remaining: 29.8s
570:  learn: 1.4443175  total: 39.6s    remaining: 29.7s
571:  learn: 1.4443001  total: 39.6s    remaining: 29.7s
572:  learn: 1.4442612  total: 39.7s    remaining: 29.6s
573:  learn: 1.4442204  total: 39.8s    remaining: 29.5s
574:  learn: 1.4441718  total: 39.9s    remaining: 29.5s
575:  learn: 1.4441106  total: 39.9s    remaining: 29.4s
576:  learn: 1.4440715  total: 40s remaining: 29.3s
577:  learn: 1.4440449  total: 40.1s    remaining: 29.3s
578:  learn: 1.4439876  total: 40.1s    remaining: 29.2s
579:  learn: 1.4439472  total: 40.2s    remaining: 29.1s
580:  learn: 1.4439318  total: 40.3s    remaining: 29.1s
581:  learn: 1.4438939  total: 40.3s    remaining: 29s
582:  learn: 1.4438689  total: 40.4s    remaining: 28.9s
583:  learn: 1.4438447  total: 40.5s    remaining: 28.9s
584:  learn: 1.4437903  total: 40.6s    remaining: 28.8s
585:  learn: 1.4437611  total: 40.7s    remaining: 28.7s
586:  learn: 1.4437072  total: 40.7s    remaining: 28.6s
587:  learn: 1.4436309  total: 40.8s    remaining: 28.6s
588:  learn: 1.4435837  total: 40.8s    remaining: 28.5s
589:  learn: 1.4435128  total: 40.9s    remaining: 28.4s
590:  learn: 1.4434983  total: 41s remaining: 28.4s
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591:  learn: 1.4434318  total: 41.1s    remaining: 28.3s
592:  learn: 1.4434010  total: 41.2s    remaining: 28.3s
593:  learn: 1.4433607  total: 41.3s    remaining: 28.2s
594:  learn: 1.4432986  total: 41.3s    remaining: 28.1s
595:  learn: 1.4432490  total: 41.4s    remaining: 28.1s
596:  learn: 1.4432362  total: 41.4s    remaining: 28s
597:  learn: 1.4432272  total: 41.5s    remaining: 27.9s
598:  learn: 1.4431501  total: 41.6s    remaining: 27.8s
599:  learn: 1.4430629  total: 41.6s    remaining: 27.7s
600:  learn: 1.4430139  total: 41.7s    remaining: 27.7s
601:  learn: 1.4429070  total: 41.7s    remaining: 27.6s
602:  learn: 1.4428860  total: 41.8s    remaining: 27.5s
603:  learn: 1.4428482  total: 41.9s    remaining: 27.5s
604:  learn: 1.4427772  total: 42s remaining: 27.4s
605:  learn: 1.4427202  total: 42.1s    remaining: 27.3s
606:  learn: 1.4426754  total: 42.1s    remaining: 27.3s
607:  learn: 1.4426541  total: 42.2s    remaining: 27.2s
608:  learn: 1.4426431  total: 42.3s    remaining: 27.1s
609:  learn: 1.4426121  total: 42.3s    remaining: 27.1s
610:  learn: 1.4426003  total: 42.4s    remaining: 27s
611:  learn: 1.4425818  total: 42.5s    remaining: 26.9s
612:  learn: 1.4425267  total: 42.5s    remaining: 26.8s
613:  learn: 1.4424976  total: 42.6s    remaining: 26.8s
614:  learn: 1.4424812  total: 42.7s    remaining: 26.7s
615:  learn: 1.4424456  total: 42.8s    remaining: 26.7s
616:  learn: 1.4424235  total: 42.8s    remaining: 26.6s
617:  learn: 1.4423973  total: 42.9s    remaining: 26.5s
618:  learn: 1.4423517  total: 43s remaining: 26.5s
619:  learn: 1.4423310  total: 43.1s    remaining: 26.4s
620:  learn: 1.4422925  total: 43.1s    remaining: 26.3s
621:  learn: 1.4422521  total: 43.2s    remaining: 26.3s
622:  learn: 1.4421929  total: 43.3s    remaining: 26.2s
623:  learn: 1.4421563  total: 43.3s    remaining: 26.1s
624:  learn: 1.4421282  total: 43.4s    remaining: 26s
625:  learn: 1.4420857  total: 43.5s    remaining: 26s
626:  learn: 1.4420605  total: 43.5s    remaining: 25.9s
627:  learn: 1.4420488  total: 43.6s    remaining: 25.8s
628:  learn: 1.4420361  total: 43.7s    remaining: 25.8s
629:  learn: 1.4420064  total: 43.8s    remaining: 25.7s
630:  learn: 1.4419659  total: 43.8s    remaining: 25.6s
631:  learn: 1.4418959  total: 43.9s    remaining: 25.6s
632:  learn: 1.4418526  total: 44s remaining: 25.5s
633:  learn: 1.4417941  total: 44s remaining: 25.4s
634:  learn: 1.4417225  total: 44.1s    remaining: 25.3s
635:  learn: 1.4416586  total: 44.2s    remaining: 25.3s
636:  learn: 1.4416406  total: 44.3s    remaining: 25.2s
637:  learn: 1.4416102  total: 44.3s    remaining: 25.2s
638:  learn: 1.4415950  total: 44.4s    remaining: 25.1s
639:  learn: 1.4415743  total: 44.5s    remaining: 25s
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640:  learn: 1.4414763 total: 44.5s    remaining: 24.9s
641:  learn: 1.4414615 total: 44.6s    remaining: 24.9s
642:  learn: 1.4414282 total: 44.7s    remaining: 24.8s
643:  learn: 1.4413925 total: 44.7s    remaining: 24.7s
644:  learn: 1.4413661 total: 44.8s    remaining: 24.7s
645:  learn: 1.4413005 total: 44.9s    remaining: 24.6s
646:  learn: 1.4412770 total: 45s remaining: 24.5s
647:  learn: 1.4412553 total: 45s remaining: 24.4s
648:  learn: 1.4412073 total: 45.1s    remaining: 24.4s
649:  learn: 1.4411678 total: 45.1s    remaining: 24.3s
650:  learn: 1.4411512 total: 45.2s    remaining: 24.2s
651:  learn: 1.4411187 total: 45.3s    remaining: 24.2s
652:  learn: 1.4411157 total: 45.4s    remaining: 24.1s
653:  learn: 1.4410842 total: 45.5s    remaining: 24.1s
654:  learn: 1.4410183 total: 45.6s    remaining: 24s
655:  learn: 1.4409968 total: 45.6s    remaining: 23.9s
656:  learn: 1.4409744 total: 45.7s    remaining: 23.9s
657:  learn: 1.4409637 total: 45.8s    remaining: 23.8s
658:  learn: 1.4409551 total: 45.9s    remaining: 23.7s
659:  learn: 1.4409441 total: 46s remaining: 23.7s
660:  learn: 1.4408908 total: 46.1s    remaining: 23.6s
661:  learn: 1.4408643 total: 46.1s    remaining: 23.6s
662:  learn: 1.4407807 total: 46.2s    remaining: 23.5s
663:  learn: 1.4407408 total: 46.3s    remaining: 23.4s
664:  learn: 1.4406839 total: 46.3s    remaining: 23.3s
665:  learn: 1.4406548 total: 46.4s    remaining: 23.3s
666:  learn: 1.4406220 total: 46.5s    remaining: 23.2s
667:  learn: 1.4405657 total: 46.6s    remaining: 23.2s
668:  learn: 1.4405206 total: 46.7s    remaining: 23.1s
669:  learn: 1.4404708 total: 46.7s    remaining: 23s
670:  learn: 1.4404292 total: 46.8s    remaining: 22.9s
671:  learn: 1.4403992 total: 46.9s    remaining: 22.9s
672:  learn: 1.4403764 total: 47s remaining: 22.8s
673:  learn: 1.4403617 total: 47s remaining: 22.7s
674:  learn: 1.4403333 total: 47.1s    remaining: 22.7s
675:  learn: 1.4402662 total: 47.2s    remaining: 22.6s
676:  learn: 1.4402159 total: 47.2s    remaining: 22.5s
677:  learn: 1.4401989 total: 47.3s    remaining: 22.5s
678:  learn: 1.4401689 total: 47.3s    remaining: 22.4s
679:  learn: 1.4401280 total: 47.4s    remaining: 22.3s
680:  learn: 1.4400795 total: 47.5s    remaining: 22.2s
681:  learn: 1.4400466 total: 47.6s    remaining: 22.2s
682:  learn: 1.4399985 total: 47.6s    remaining: 22.1s
683:  learn: 1.4399675 total: 47.7s    remaining: 22s
684:  learn: 1.4399624 total: 47.8s    remaining: 22s
685:  learn: 1.4399418 total: 47.9s    remaining: 21.9s
686:  learn: 1.4399313 total: 47.9s    remaining: 21.8s
687:  learn: 1.4398956 total: 48s remaining: 21.8s
688:  learn: 1.4398625 total: 48.1s    remaining: 21.7s
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689:  learn: 1.4397731  total: 48.1s    remaining: 21.6s
690:  learn: 1.4397507  total: 48.2s    remaining: 21.6s
691:  learn: 1.4396841  total: 48.3s    remaining: 21.5s
692:  learn: 1.4396621  total: 48.4s    remaining: 21.4s
693:  learn: 1.4396342  total: 48.4s    remaining: 21.4s
694:  learn: 1.4396010  total: 48.5s    remaining: 21.3s
695:  learn: 1.4395573  total: 48.6s    remaining: 21.2s
696:  learn: 1.4395218  total: 48.7s    remaining: 21.2s
697:  learn: 1.4394753  total: 48.7s    remaining: 21.1s
698:  learn: 1.4394268  total: 48.8s    remaining: 21s
699:  learn: 1.4394201  total: 48.9s    remaining: 20.9s
700:  learn: 1.4394108  total: 48.9s    remaining: 20.9s
701:  learn: 1.4393987  total: 49s remaining: 20.8s
702:  learn: 1.4393689  total: 49.1s    remaining: 20.7s
703:  learn: 1.4392931  total: 49.1s    remaining: 20.7s
704:  learn: 1.4392520  total: 49.2s    remaining: 20.6s
705:  learn: 1.4391781  total: 49.3s    remaining: 20.5s
706:  learn: 1.4391499  total: 49.4s    remaining: 20.5s
707:  learn: 1.4391035  total: 49.4s    remaining: 20.4s
708:  learn: 1.4390692  total: 49.5s    remaining: 20.3s
709:  learn: 1.4390016  total: 49.6s    remaining: 20.3s
710:  learn: 1.4389649  total: 49.7s    remaining: 20.2s
711:  learn: 1.4389429  total: 49.8s    remaining: 20.1s
712:  learn: 1.4389206  total: 49.8s    remaining: 20.1s
713:  learn: 1.4388749  total: 49.9s    remaining: 20s
714:  learn: 1.4388518  total: 50s remaining: 19.9s
715:  learn: 1.4388241  total: 50s remaining: 19.8s
716:  learn: 1.4387682  total: 50.1s    remaining: 19.8s
717:  learn: 1.4387321  total: 50.2s    remaining: 19.7s
718:  learn: 1.4387105  total: 50.3s    remaining: 19.6s
719:  learn: 1.4386353  total: 50.3s    remaining: 19.6s
720:  learn: 1.4385798  total: 50.4s    remaining: 19.5s
721:  learn: 1.4385543  total: 50.5s    remaining: 19.4s
722:  learn: 1.4385226  total: 50.5s    remaining: 19.4s
723:  learn: 1.4385119  total: 50.6s    remaining: 19.3s
724:  learn: 1.4384798  total: 50.7s    remaining: 19.2s
725:  learn: 1.4384054  total: 50.8s    remaining: 19.2s
726:  learn: 1.4383439  total: 50.8s    remaining: 19.1s
727:  learn: 1.4383193  total: 50.9s    remaining: 19s
728:  learn: 1.4383048  total: 51s remaining: 19s
729:  learn: 1.4382532  total: 51.1s    remaining: 18.9s
730:  learn: 1.4382193  total: 51.2s    remaining: 18.8s
731:  learn: 1.4381393  total: 51.2s    remaining: 18.8s
732:  learn: 1.4381140  total: 51.3s    remaining: 18.7s
733:  learn: 1.4380787  total: 51.3s    remaining: 18.6s
734:  learn: 1.4380460  total: 51.4s    remaining: 18.5s
735:  learn: 1.4380354  total: 51.5s    remaining: 18.5s
736:  learn: 1.4380025  total: 51.5s    remaining: 18.4s
737:  learn: 1.4379696  total: 51.6s    remaining: 18.3s
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738:  learn: 1.4379459  total: 51.7s    remaining: 18.2s
739:  learn: 1.4379220  total: 51.8s    remaining: 18.2s
740:  learn: 1.4378831  total: 51.8s    remaining: 18.1s
741:  learn: 1.4378592  total: 51.9s    remaining: 18s
742:  learn: 1.4378285  total: 52s remaining: 18s
743:  learn: 1.4377775  total: 52.1s    remaining: 17.9s
744:  learn: 1.4377542  total: 52.1s    remaining: 17.8s
745:  learn: 1.4377344  total: 52.2s    remaining: 17.8s
746:  learn: 1.4377115  total: 52.3s    remaining: 17.7s
747:  learn: 1.4376767  total: 52.3s    remaining: 17.6s
748:  learn: 1.4376488  total: 52.4s    remaining: 17.6s
749:  learn: 1.4375979  total: 52.5s    remaining: 17.5s
750:  learn: 1.4375847  total: 52.5s    remaining: 17.4s
751:  learn: 1.4375607  total: 52.6s    remaining: 17.4s
752:  learn: 1.4375584  total: 52.7s    remaining: 17.3s
753:  learn: 1.4375082  total: 52.8s    remaining: 17.2s
754:  learn: 1.4374604  total: 52.8s    remaining: 17.1s
755:  learn: 1.4374454  total: 52.9s    remaining: 17.1s
756:  learn: 1.4374374  total: 53s remaining: 17s
757:  learn: 1.4374296  total: 53.1s    remaining: 16.9s
758:  learn: 1.4373578  total: 53.1s    remaining: 16.9s
759:  learn: 1.4373476  total: 53.2s    remaining: 16.8s
760:  learn: 1.4373181  total: 53.2s    remaining: 16.7s
761:  learn: 1.4372595  total: 53.3s    remaining: 16.6s
762:  learn: 1.4372019  total: 53.4s    remaining: 16.6s
763:  learn: 1.4371723  total: 53.5s    remaining: 16.5s
764:  learn: 1.4371412  total: 53.5s    remaining: 16.4s
765:  learn: 1.4371072  total: 53.6s    remaining: 16.4s
766:  learn: 1.4370661  total: 53.7s    remaining: 16.3s
767:  learn: 1.4369915  total: 53.7s    remaining: 16.2s
768:  learn: 1.4369171  total: 53.8s    remaining: 16.2s
769:  learn: 1.4368922  total: 53.9s    remaining: 16.1s
770:  learn: 1.4368151  total: 54s remaining: 16s
771:  learn: 1.4367831  total: 54s remaining: 16s
772:  learn: 1.4366790  total: 54.1s    remaining: 15.9s
773:  learn: 1.4366135  total: 54.1s    remaining: 15.8s
774:  learn: 1.4365873  total: 54.2s    remaining: 15.7s
775:  learn: 1.4365100  total: 54.3s    remaining: 15.7s
776:  learn: 1.4364863  total: 54.3s    remaining: 15.6s
777:  learn: 1.4364655  total: 54.4s    remaining: 15.5s
778:  learn: 1.4364355  total: 54.5s    remaining: 15.5s
779:  learn: 1.4364041  total: 54.5s    remaining: 15.4s
780:  learn: 1.4363972  total: 54.6s    remaining: 15.3s
781:  learn: 1.4363747  total: 54.7s    remaining: 15.3s
782:  learn: 1.4363464  total: 54.8s    remaining: 15.2s
783:  learn: 1.4363209  total: 54.9s    remaining: 15.1s
784:  learn: 1.4363036  total: 54.9s    remaining: 15s
785:  learn: 1.4362843  total: 55s remaining: 15s
786:  learn: 1.4362207  total: 55.1s    remaining: 14.9s
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787:  learn: 1.4361653  total: 55.2s    remaining: 14.8s
788:  learn: 1.4361411  total: 55.3s    remaining: 14.8s
789:  learn: 1.4361366  total: 55.3s    remaining: 14.7s
790:  learn: 1.4361003  total: 55.4s    remaining: 14.6s
791:  learn: 1.4360629  total: 55.5s    remaining: 14.6s
792:  learn: 1.4360332  total: 55.6s    remaining: 14.5s
793:  learn: 1.4360232  total: 55.7s    remaining: 14.4s
794:  learn: 1.4359840  total: 55.8s    remaining: 14.4s
795:  learn: 1.4359636  total: 55.8s    remaining: 14.3s
796:  learn: 1.4359289  total: 55.9s    remaining: 14.2s
797:  learn: 1.4358752  total: 56s remaining: 14.2s
798:  learn: 1.4358032  total: 56s remaining: 14.1s
799:  learn: 1.4357593  total: 56.1s    remaining: 14s
800:  learn: 1.4357345  total: 56.2s    remaining: 14s
801:  learn: 1.4356613  total: 56.2s    remaining: 13.9s
802:  learn: 1.4356429  total: 56.3s    remaining: 13.8s
803:  learn: 1.4356047  total: 56.3s    remaining: 13.7s
804:  learn: 1.4355787  total: 56.4s    remaining: 13.7s
805:  learn: 1.4355678  total: 56.5s    remaining: 13.6s
806:  learn: 1.4355415  total: 56.6s    remaining: 13.5s
807:  learn: 1.4355236  total: 56.7s    remaining: 13.5s
808:  learn: 1.4355022  total: 56.8s    remaining: 13.4s
809:  learn: 1.4354774  total: 56.9s    remaining: 13.3s
810:  learn: 1.4354047  total: 56.9s    remaining: 13.3s
811:  learn: 1.4353653  total: 57s remaining: 13.2s
812:  learn: 1.4353271  total: 57s remaining: 13.1s
813:  learn: 1.4352967  total: 57.1s    remaining: 13.1s
814:  learn: 1.4352326  total: 57.2s    remaining: 13s
815:  learn: 1.4351558  total: 57.3s    remaining: 12.9s
816:  learn: 1.4350977  total: 57.3s    remaining: 12.8s
817:  learn: 1.4350736  total: 57.4s    remaining: 12.8s
818:  learn: 1.4350664  total: 57.5s    remaining: 12.7s
819:  learn: 1.4350508  total: 57.5s    remaining: 12.6s
820:  learn: 1.4350047  total: 57.6s    remaining: 12.6s
821:  learn: 1.4349633  total: 57.7s    remaining: 12.5s
822:  learn: 1.4349397  total: 57.7s    remaining: 12.4s
823:  learn: 1.4349063  total: 57.8s    remaining: 12.3s
824:  learn: 1.4348672  total: 57.9s    remaining: 12.3s
825:  learn: 1.4348638  total: 58s remaining: 12.2s
826:  learn: 1.4348093  total: 58s remaining: 12.1s
827:  learn: 1.4347796  total: 58.1s    remaining: 12.1s
828:  learn: 1.4347400  total: 58.1s    remaining: 12s
829:  learn: 1.4347199  total: 58.2s    remaining: 11.9s
830:  learn: 1.4346928  total: 58.3s    remaining: 11.9s
831:  learn: 1.4346204  total: 58.3s    remaining: 11.8s
832:  learn: 1.4345622  total: 58.4s    remaining: 11.7s
833:  learn: 1.4344905  total: 58.5s    remaining: 11.6s
834:  learn: 1.4344210  total: 58.5s    remaining: 11.6s
835:  learn: 1.4343939  total: 58.6s    remaining: 11.5s
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836:  learn: 1.4343806  total: 58.6s    remaining: 11.4s
837:  learn: 1.4343359  total: 58.7s    remaining: 11.4s
838:  learn: 1.4342928  total: 58.8s    remaining: 11.3s
839:  learn: 1.4342733  total: 58.9s    remaining: 11.2s
840:  learn: 1.4342503  total: 58.9s    remaining: 11.1s
841:  learn: 1.4342197  total: 59s remaining: 11.1s
842:  learn: 1.4341747  total: 59.1s    remaining: 11s
843:  learn: 1.4340916  total: 59.1s    remaining: 10.9s
844:  learn: 1.4340789  total: 59.2s    remaining: 10.9s
845:  learn: 1.4340519  total: 59.3s    remaining: 10.8s
846:  learn: 1.4340094  total: 59.3s    remaining: 10.7s
847:  learn: 1.4339797  total: 59.4s    remaining: 10.6s
848:  learn: 1.4339643  total: 59.5s    remaining: 10.6s
849:  learn: 1.4339344  total: 59.5s    remaining: 10.5s
850:  learn: 1.4338766  total: 59.6s    remaining: 10.4s
851:  learn: 1.4338148  total: 59.7s    remaining: 10.4s
852:  learn: 1.4337931  total: 59.7s    remaining: 10.3s
853:  learn: 1.4337745  total: 59.8s    remaining: 10.2s
854:  learn: 1.4337087  total: 59.9s    remaining: 10.2s
855:  learn: 1.4336589  total: 59.9s    remaining: 10.1s
856:  learn: 1.4336330  total: 60s remaining: 10s
857:  learn: 1.4336089  total: 1m  remaining: 9.94s
858:  learn: 1.4335813  total: 1m  remaining: 9.87s
859:  learn: 1.4335462  total: 1m  remaining: 9.8s
860:  learn: 1.4334922  total: 1m  remaining: 9.72s
861:  learn: 1.4334543  total: 1m  remaining: 9.65s
862:  learn: 1.4334385  total: 1m  remaining: 9.58s
863:  learn: 1.4334062  total: 1m  remaining: 9.51s
864:  learn: 1.4333605  total: 1m  remaining: 9.45s
865:  learn: 1.4333217  total: 1m  remaining: 9.38s
866:  learn: 1.4332880  total: 1m  remaining: 9.3s
867:  learn: 1.4332519  total: 1m  remaining: 9.23s
868:  learn: 1.4332304  total: 1m  remaining: 9.16s
869:  learn: 1.4331739  total: 1m  remaining: 9.09s
870:  learn: 1.4331286  total: 1m  remaining: 9.02s
871:  learn: 1.4330989  total: 1m 1s    remaining: 8.96s
872:  learn: 1.4330668  total: 1m 1s    remaining: 8.89s
873:  learn: 1.4330582  total: 1m 1s    remaining: 8.81s
874:  learn: 1.4330472  total: 1m 1s    remaining: 8.74s
875:  learn: 1.4330157  total: 1m 1s    remaining: 8.68s
876:  learn: 1.4329881  total: 1m 1s    remaining: 8.61s
877:  learn: 1.4329575  total: 1m 1s    remaining: 8.54s
878:  learn: 1.4328870  total: 1m 1s    remaining: 8.46s
879:  learn: 1.4328186  total: 1m 1s    remaining: 8.39s
880:  learn: 1.4327900  total: 1m 1s    remaining: 8.32s
881:  learn: 1.4327469  total: 1m 1s    remaining: 8.26s
882:  learn: 1.4327332  total: 1m 1s    remaining: 8.19s
883:  learn: 1.4327203  total: 1m 1s    remaining: 8.12s
884:  learn: 1.4326753  total: 1m 1s    remaining: 8.05s
```

```
885:  learn: 1.4326299  total: 1m 2s    remaining: 7.98s
886:  learn: 1.4326075  total: 1m 2s    remaining: 7.91s
887:  learn: 1.4325859  total: 1m 2s    remaining: 7.84s
888:  learn: 1.4325352  total: 1m 2s    remaining: 7.77s
889:  learn: 1.4325116  total: 1m 2s    remaining: 7.7s
890:  learn: 1.4324953  total: 1m 2s    remaining: 7.63s
891:  learn: 1.4324801  total: 1m 2s    remaining: 7.56s
892:  learn: 1.4324616  total: 1m 2s    remaining: 7.49s
893:  learn: 1.4324075  total: 1m 2s    remaining: 7.42s
894:  learn: 1.4323679  total: 1m 2s    remaining: 7.35s
895:  learn: 1.4323577  total: 1m 2s    remaining: 7.29s
896:  learn: 1.4323266  total: 1m 2s    remaining: 7.21s
897:  learn: 1.4322829  total: 1m 2s    remaining: 7.15s
898:  learn: 1.4322370  total: 1m 2s    remaining: 7.08s
899:  learn: 1.4322261  total: 1m 3s    remaining: 7.01s
900:  learn: 1.4321877  total: 1m 3s    remaining: 6.94s
901:  learn: 1.4321309  total: 1m 3s    remaining: 6.87s
902:  learn: 1.4320782  total: 1m 3s    remaining: 6.8s
903:  learn: 1.4320183  total: 1m 3s    remaining: 6.73s
904:  learn: 1.4319707  total: 1m 3s    remaining: 6.66s
905:  learn: 1.4319645  total: 1m 3s    remaining: 6.59s
906:  learn: 1.4319345  total: 1m 3s    remaining: 6.52s
907:  learn: 1.4318998  total: 1m 3s    remaining: 6.45s
908:  learn: 1.4318599  total: 1m 3s    remaining: 6.38s
909:  learn: 1.4318170  total: 1m 3s    remaining: 6.31s
910:  learn: 1.4317781  total: 1m 3s    remaining: 6.24s
911:  learn: 1.4317121  total: 1m 3s    remaining: 6.17s
912:  learn: 1.4316838  total: 1m 4s    remaining: 6.1s
913:  learn: 1.4315980  total: 1m 4s    remaining: 6.03s
914:  learn: 1.4315515  total: 1m 4s    remaining: 5.96s
915:  learn: 1.4314913  total: 1m 4s    remaining: 5.88s
916:  learn: 1.4314247  total: 1m 4s    remaining: 5.81s
917:  learn: 1.4313311  total: 1m 4s    remaining: 5.75s
918:  learn: 1.4313118  total: 1m 4s    remaining: 5.68s
919:  learn: 1.4312837  total: 1m 4s    remaining: 5.61s
920:  learn: 1.4312466  total: 1m 4s    remaining: 5.54s
921:  learn: 1.4312114  total: 1m 4s    remaining: 5.47s
922:  learn: 1.4311884  total: 1m 4s    remaining: 5.39s
923:  learn: 1.4311322  total: 1m 4s    remaining: 5.33s
924:  learn: 1.4310994  total: 1m 4s    remaining: 5.25s
925:  learn: 1.4310373  total: 1m 4s    remaining: 5.18s
926:  learn: 1.4310085  total: 1m 4s    remaining: 5.11s
927:  learn: 1.4309383  total: 1m 4s    remaining: 5.04s
928:  learn: 1.4309031  total: 1m 5s    remaining: 4.97s
929:  learn: 1.4308800  total: 1m 5s    remaining: 4.9s
930:  learn: 1.4308459  total: 1m 5s    remaining: 4.83s
931:  learn: 1.4308167  total: 1m 5s    remaining: 4.76s
932:  learn: 1.4307872  total: 1m 5s    remaining: 4.69s
933:  learn: 1.4307597  total: 1m 5s    remaining: 4.62s
```

```
934:  learn: 1.4307504  total: 1m 5s    remaining: 4.55s
935:  learn: 1.4306684  total: 1m 5s    remaining: 4.48s
936:  learn: 1.4305970  total: 1m 5s    remaining: 4.41s
937:  learn: 1.4305588  total: 1m 5s    remaining: 4.34s
938:  learn: 1.4305426  total: 1m 5s    remaining: 4.27s
939:  learn: 1.4305058  total: 1m 5s    remaining: 4.2s
940:  learn: 1.4304724  total: 1m 5s    remaining: 4.13s
941:  learn: 1.4304438  total: 1m 5s    remaining: 4.06s
942:  learn: 1.4304181  total: 1m 6s    remaining: 3.99s
943:  learn: 1.4303806  total: 1m 6s    remaining: 3.92s
944:  learn: 1.4303288  total: 1m 6s    remaining: 3.85s
945:  learn: 1.4302977  total: 1m 6s    remaining: 3.78s
946:  learn: 1.4302592  total: 1m 6s    remaining: 3.71s
947:  learn: 1.4302088  total: 1m 6s    remaining: 3.64s
948:  learn: 1.4301886  total: 1m 6s    remaining: 3.57s
949:  learn: 1.4301566  total: 1m 6s    remaining: 3.5s
950:  learn: 1.4301088  total: 1m 6s    remaining: 3.43s
951:  learn: 1.4300945  total: 1m 6s    remaining: 3.36s
952:  learn: 1.4300356  total: 1m 6s    remaining: 3.29s
953:  learn: 1.4299958  total: 1m 6s    remaining: 3.22s
954:  learn: 1.4299903  total: 1m 6s    remaining: 3.15s
955:  learn: 1.4299513  total: 1m 6s    remaining: 3.08s
956:  learn: 1.4299209  total: 1m 6s    remaining: 3.01s
957:  learn: 1.4298490  total: 1m 7s    remaining: 2.94s
958:  learn: 1.4298289  total: 1m 7s    remaining: 2.87s
959:  learn: 1.4298244  total: 1m 7s    remaining: 2.8s
960:  learn: 1.4297905  total: 1m 7s    remaining: 2.73s
961:  learn: 1.4297588  total: 1m 7s    remaining: 2.66s
962:  learn: 1.4296935  total: 1m 7s    remaining: 2.59s
963:  learn: 1.4296579  total: 1m 7s    remaining: 2.52s
964:  learn: 1.4296479  total: 1m 7s    remaining: 2.45s
965:  learn: 1.4296341  total: 1m 7s    remaining: 2.38s
966:  learn: 1.4296105  total: 1m 7s    remaining: 2.31s
967:  learn: 1.4295892  total: 1m 7s    remaining: 2.24s
968:  learn: 1.4295562  total: 1m 7s    remaining: 2.17s
969:  learn: 1.4295370  total: 1m 7s    remaining: 2.1s
970:  learn: 1.4295069  total: 1m 7s    remaining: 2.03s
971:  learn: 1.4294953  total: 1m 8s    remaining: 1.96s
972:  learn: 1.4294472  total: 1m 8s    remaining: 1.89s
973:  learn: 1.4294127  total: 1m 8s    remaining: 1.82s
974:  learn: 1.4293609  total: 1m 8s    remaining: 1.75s
975:  learn: 1.4293407  total: 1m 8s    remaining: 1.68s
976:  learn: 1.4292786  total: 1m 8s    remaining: 1.61s
977:  learn: 1.4291908  total: 1m 8s    remaining: 1.54s
978:  learn: 1.4291379  total: 1m 8s    remaining: 1.47s
979:  learn: 1.4291177  total: 1m 8s    remaining: 1.4s
980:  learn: 1.4290253  total: 1m 8s    remaining: 1.33s
981:  learn: 1.4290086  total: 1m 8s    remaining: 1.26s
982:  learn: 1.4289547  total: 1m 8s    remaining: 1.19s
```

```
983:  learn: 1.4288656 total: 1m 8s    remaining: 1.12s
984:  learn: 1.4288522 total: 1m 9s    remaining: 1.05s
985:  learn: 1.4287807 total: 1m 9s    remaining: 981ms
986:  learn: 1.4287592 total: 1m 9s    remaining: 911ms
987:  learn: 1.4287337 total: 1m 9s    remaining: 841ms
988:  learn: 1.4286674 total: 1m 9s    remaining: 770ms
989:  learn: 1.4286481 total: 1m 9s    remaining: 700ms
990:  learn: 1.4286325 total: 1m 9s    remaining: 630ms
991:  learn: 1.4285798 total: 1m 9s    remaining: 560ms
992:  learn: 1.4285329 total: 1m 9s    remaining: 490ms
993:  learn: 1.4284945 total: 1m 9s    remaining: 420ms
994:  learn: 1.4284687 total: 1m 9s    remaining: 350ms
995:  learn: 1.4284184 total: 1m 9s    remaining: 280ms
996:  learn: 1.4283460 total: 1m 9s    remaining: 210ms
997:  learn: 1.4283220 total: 1m 9s    remaining: 140ms
998:  learn: 1.4283075 total: 1m 10s   remaining: 70.1ms
999:  learn: 1.4282616 total: 1m 10s   remaining: 0us

<catboost.core.CatBoostRegressor at 0x1171586b0>
```

Saving the model and testing it

```
import pickle
!touch ./models/cat_boost_1_model.pkl
# Save the model to a file
with open('./models/cat_boost_1_model.pkl', 'wb') as f:
    pickle.dump(model, f)

with open('./models/cat_boost_1_model.pkl', 'rb') as file:
    _model = pickle.load(file)
    y_pred = _model.predict(X_test)
```

To find the efficiency of our regression model, we are using multiple metrics like Mean Square Error, Mean Absolute Error and Root Mean Square Error. The regression worked pretty well, we only have a mean absolute error of 1.12 and root mean square error of 1.46

```
# To calculate R-squared, you can use the built-in function in
libraries like scikit-learn:
from sklearn.metrics import mean_squared_error, accuracy_score,
r2_score, mean_absolute_error
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
# acc = accuracy_score(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

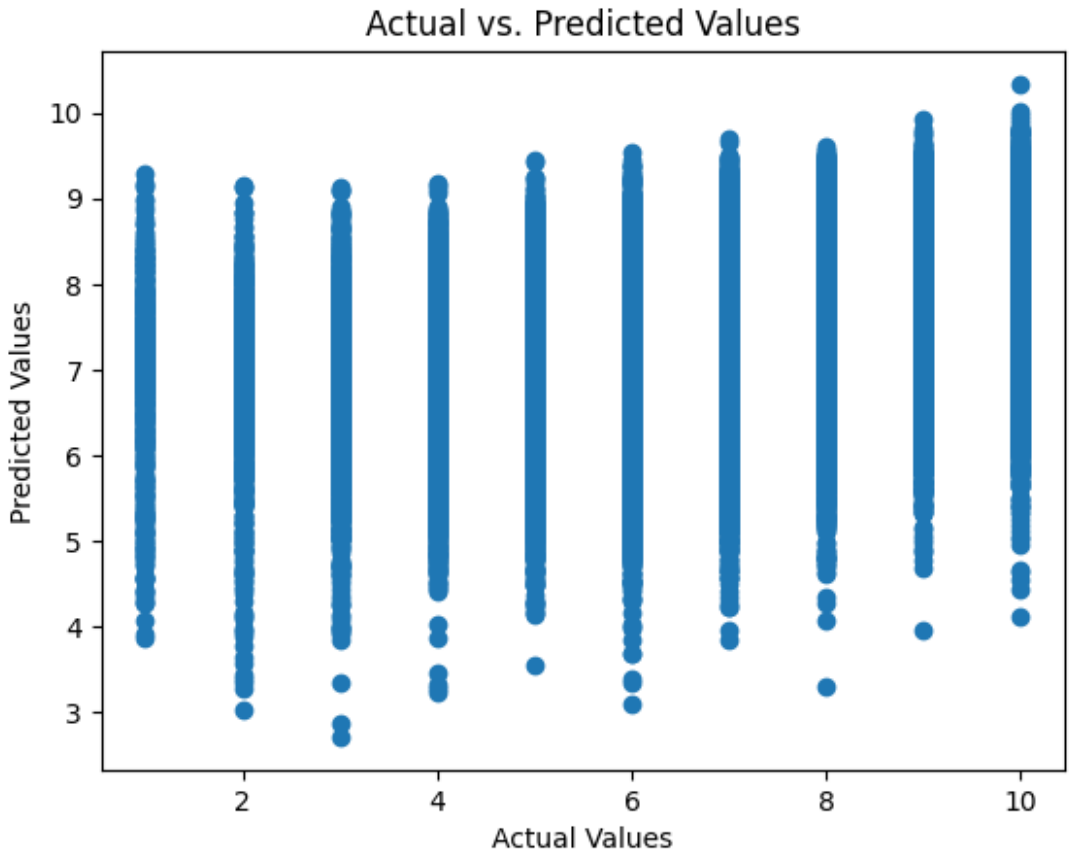
print("MSE:", mse)
print("RMSE:", rmse)
print("MAE:", mae)
```

```
MSE: 2.1594679122061073
RMSE: 1.4695128145770309
MAE: 1.1293489312917373
```

A plot of the spread of predicted rating vs actual rating

```
import matplotlib.pyplot as plt

plt.scatter(y_test, y_pred)
plt.xlabel("Actual Values")
plt.ylabel("Predicted Values")
plt.title("Actual vs. Predicted Values")
plt.show()
```



We also have the ability to check the importance of various features with our model. It appears Episodes did not have much importance compared to other features.

```
train_pool = cb.Pool(X_train, y_train, cat_features=[2,3,4])
test_pool = cb.Pool(X_test, y_test, cat_features=[2,3,4])
# Get feature importance
feature_importance = model.feature_importances_
```

```
# Get SHAP values
shap_values = model.get_feature_importance(data=test_pool,
type='ShapValues')

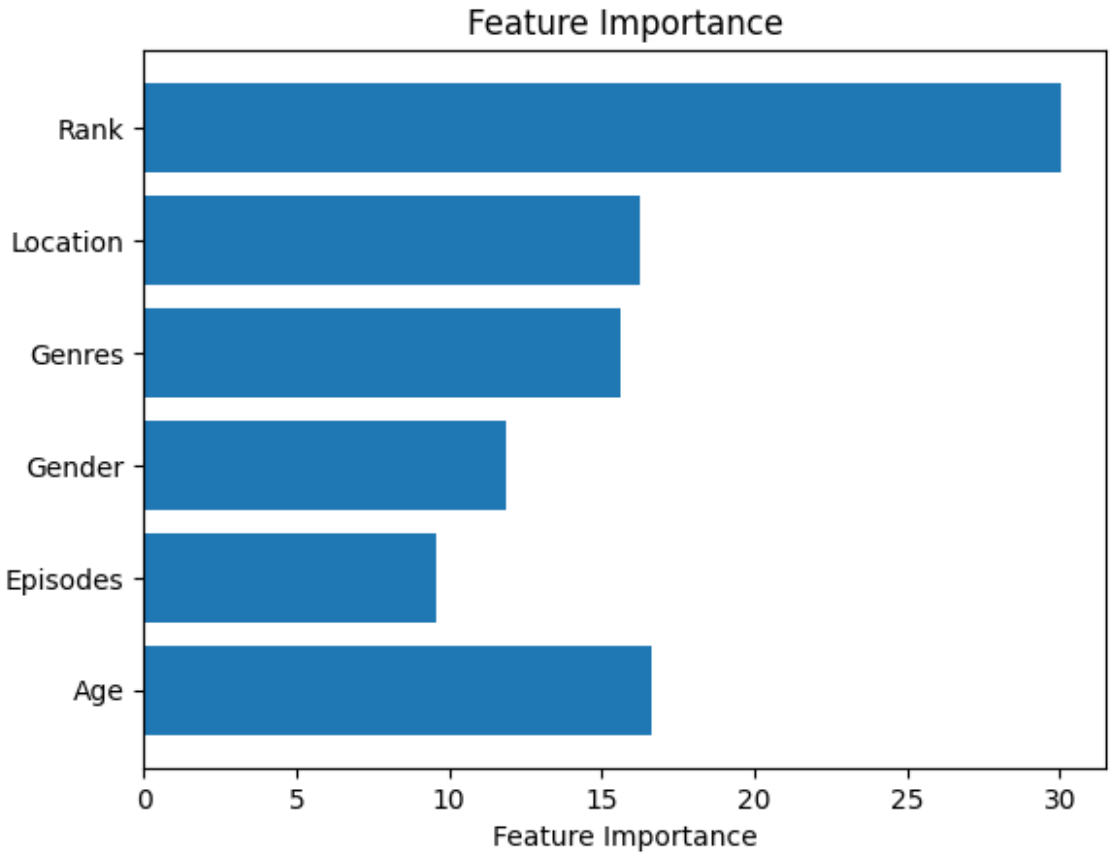
import matplotlib.pyplot as plt

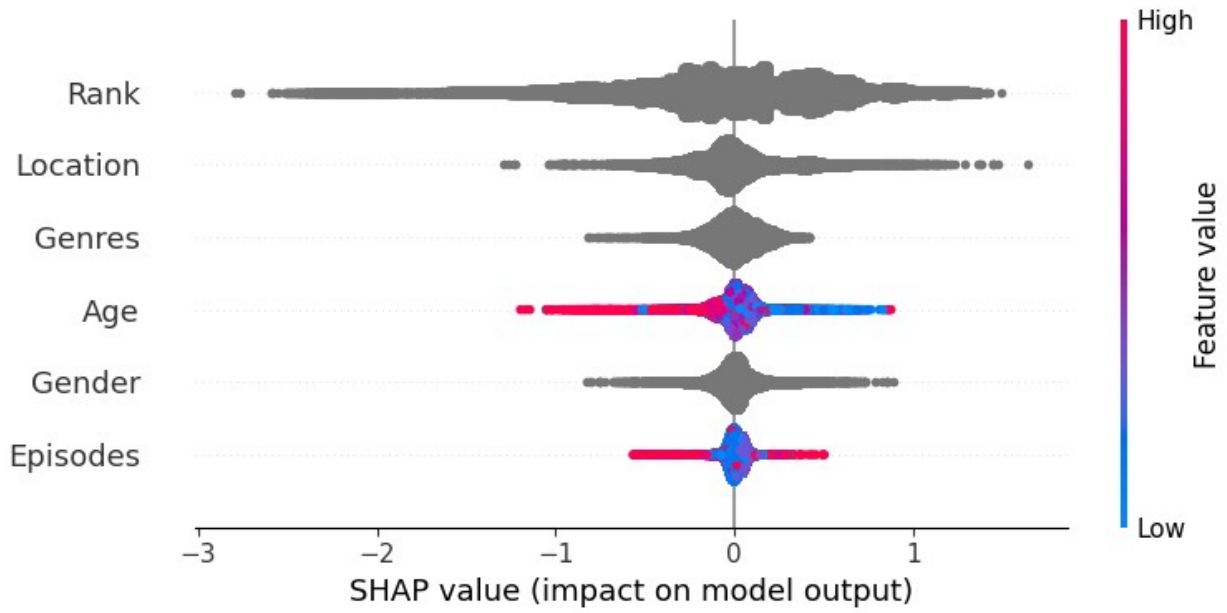
# Plot feature importance
plt.barh(range(len(feature_importance)), feature_importance,
align='center')
plt.yticks(range(len(feature_importance)), X.columns)
plt.xlabel('Feature Importance')

plt.title('Feature Importance')
plt.show()

# Visualize SHAP values (more advanced)
import shap

shap.summary_plot(shap_values[:,:-1], X_test)
```





Trying our model without Episodes feature, to see the difference.

```
import catboost as cb
features = under_sampled_df.columns.difference(['user_id', 'anime_id',
'rating', 'Birthday_Date', 'Joined_Date', 'Age_Join', 'Episodes
Watched',
                                    'Start Date', 'End Date', 'Name',
'Studios', 'Source', 'Episodes_Norm', 'Unnamed: 0', 'Type',
'Episodes'])

df = under_sampled_df.dropna()
df = df[df["Rank"]!="UNKNOWN"]
df[features].info()
print(features)
X = df[features]

y = df["rating"]


# # Split into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

model = cb.CatBoostRegressor(
    learning_rate=0.1,
    depth=10,
    iterations=1000,
    loss_function='RMSE'
)

model.fit(X_train, y_train, cat_features=[1,2,3])
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 781615 entries, 0 to 1075589
Data columns (total 5 columns):
 #   Column    Non-Null Count   Dtype  
---  ------    --------------   -----  
 0   Age       781615 non-null  float64
 1   Gender    781615 non-null  object 
 2   Genres    781615 non-null  object 
 3   Location  781615 non-null  object 
 4   Rank      781615 non-null  object 
dtypes: float64(1), object(4)
memory usage: 35.8+ MB
Index(['Age', 'Gender', 'Genres', 'Location', 'Rank'], dtype='object')
0:   learn: 1.6199767 total: 68.5ms   remaining: 1m 8s
1:   learn: 1.5984787 total: 131ms    remaining: 1m 5s
2:   learn: 1.5805107 total: 197ms    remaining: 1m 5s
3:   learn: 1.5657924 total: 259ms    remaining: 1m 4s
4:   learn: 1.5533246 total: 327ms    remaining: 1m 5s
5:   learn: 1.5430564 total: 390ms    remaining: 1m 4s
6:   learn: 1.5348370 total: 446ms    remaining: 1m 3s
7:   learn: 1.5276711 total: 511ms    remaining: 1m 3s
8:   learn: 1.5215884 total: 576ms    remaining: 1m 3s
9:   learn: 1.5166121 total: 640ms    remaining: 1m 3s
10:  learn: 1.5125408 total: 689ms    remaining: 1m 1s
11:  learn: 1.5089942 total: 746ms    remaining: 1m 1s
12:  learn: 1.5060795 total: 811ms    remaining: 1m 1s
13:  learn: 1.5035911 total: 866ms    remaining: 1m 1s
14:  learn: 1.5014962 total: 917ms    remaining: 1m
15:  learn: 1.4996153 total: 978ms    remaining: 1m
16:  learn: 1.4980807 total: 1.04s    remaining: 59.9s
17:  learn: 1.4965981 total: 1.11s    remaining: 1m
18:  learn: 1.4953225 total: 1.17s    remaining: 1m
19:  learn: 1.4943109 total: 1.23s    remaining: 1m
20:  learn: 1.4936992 total: 1.27s    remaining: 59.3s
21:  learn: 1.4929483 total: 1.34s    remaining: 59.5s
22:  learn: 1.4921244 total: 1.4s     remaining: 59.3s
23:  learn: 1.4915434 total: 1.46s    remaining: 59.3s
24:  learn: 1.4908670 total: 1.53s    remaining: 59.7s
25:  learn: 1.4903424 total: 1.6s     remaining: 59.9s
26:  learn: 1.4898841 total: 1.66s    remaining: 60s
27:  learn: 1.4894788 total: 1.73s    remaining: 1m
28:  learn: 1.4890623 total: 1.81s    remaining: 1m
29:  learn: 1.4886599 total: 1.87s    remaining: 1m
30:  learn: 1.4883093 total: 1.94s    remaining: 1m
31:  learn: 1.4878642 total: 2.01s    remaining: 1m
32:  learn: 1.4876078 total: 2.07s    remaining: 1m
33:  learn: 1.4873263 total: 2.11s    remaining: 59.9s
34:  learn: 1.4869158 total: 2.17s    remaining: 59.9s
35:  learn: 1.4866907 total: 2.23s    remaining: 59.8s
36:  learn: 1.4863024 total: 2.31s    remaining: 1m
```

```
37:   learn: 1.4860778 total: 2.39s    remaining: 1m
38:   learn: 1.4858982 total: 2.47s    remaining: 1m
39:   learn: 1.4855663 total: 2.53s    remaining: 1m
40:   learn: 1.4852989 total: 2.6s     remaining: 1m
41:   learn: 1.4849902 total: 2.69s    remaining: 1m 1s
42:   learn: 1.4848100 total: 2.75s    remaining: 1m 1s
43:   learn: 1.4846114 total: 2.81s    remaining: 1m 1s
44:   learn: 1.4842458 total: 2.9s     remaining: 1m 1s
45:   learn: 1.4839626 total: 2.96s    remaining: 1m 1s
46:   learn: 1.4837127 total: 3.02s    remaining: 1m 1s
47:   learn: 1.4835055 total: 3.08s    remaining: 1m 1s
48:   learn: 1.4834679 total: 3.13s    remaining: 1m
49:   learn: 1.4834559 total: 3.15s    remaining: 59.9s
50:   learn: 1.4831580 total: 3.21s    remaining: 59.7s
51:   learn: 1.4830919 total: 3.29s    remaining: 1m
52:   learn: 1.4829421 total: 3.36s    remaining: 1m
53:   learn: 1.4828239 total: 3.44s    remaining: 1m
54:   learn: 1.4825554 total: 3.53s    remaining: 1m
55:   learn: 1.4823341 total: 3.6s     remaining: 1m
56:   learn: 1.4820487 total: 3.65s    remaining: 1m
57:   learn: 1.4819688 total: 3.71s    remaining: 1m
58:   learn: 1.4817767 total: 3.76s    remaining: 59.9s
59:   learn: 1.4815892 total: 3.84s    remaining: 1m
60:   learn: 1.4815160 total: 3.89s    remaining: 59.9s
61:   learn: 1.4813870 total: 3.95s    remaining: 59.8s
62:   learn: 1.4810957 total: 4.02s    remaining: 59.8s
63:   learn: 1.4810733 total: 4.09s    remaining: 59.8s
64:   learn: 1.4810040 total: 4.15s    remaining: 59.7s
65:   learn: 1.4805941 total: 4.22s    remaining: 59.7s
66:   learn: 1.4804760 total: 4.28s    remaining: 59.6s
67:   learn: 1.4803306 total: 4.33s    remaining: 59.4s
68:   learn: 1.4802734 total: 4.41s    remaining: 59.5s
69:   learn: 1.4802018 total: 4.46s    remaining: 59.3s
70:   learn: 1.4801629 total: 4.5s     remaining: 58.9s
71:   learn: 1.4799680 total: 4.54s    remaining: 58.5s
72:   learn: 1.4799568 total: 4.56s    remaining: 57.9s
73:   learn: 1.4798400 total: 4.61s    remaining: 57.7s
74:   learn: 1.4797437 total: 4.66s    remaining: 57.5s
75:   learn: 1.4795609 total: 4.73s    remaining: 57.5s
76:   learn: 1.4795596 total: 4.75s    remaining: 56.9s
77:   learn: 1.4794475 total: 4.83s    remaining: 57.1s
78:   learn: 1.4792788 total: 4.88s    remaining: 56.9s
79:   learn: 1.4791235 total: 4.96s    remaining: 57s
80:   learn: 1.4789917 total: 5s  remaining: 56.8s
81:   learn: 1.4788084 total: 5.04s    remaining: 56.4s
82:   learn: 1.4786841 total: 5.1s     remaining: 56.3s
83:   learn: 1.4786007 total: 5.14s    remaining: 56s
84:   learn: 1.4784312 total: 5.21s    remaining: 56.1s
85:   learn: 1.4782847 total: 5.26s    remaining: 55.9s
86:   learn: 1.4781845 total: 5.35s    remaining: 56.2s
```

```
87:   learn: 1.4780209 total: 5.4s      remaining: 56s
88:   learn: 1.4780209 total: 5.41s     remaining: 55.4s
89:   learn: 1.4778794 total: 5.46s     remaining: 55.2s
90:   learn: 1.4776633 total: 5.55s     remaining: 55.4s
91:   learn: 1.4775147 total: 5.61s     remaining: 55.4s
92:   learn: 1.4772303 total: 5.69s     remaining: 55.5s
93:   learn: 1.4771627 total: 5.74s     remaining: 55.3s
94:   learn: 1.4770741 total: 5.8s      remaining: 55.2s
95:   learn: 1.4769723 total: 5.87s     remaining: 55.3s
96:   learn: 1.4768753 total: 5.92s     remaining: 55.1s
97:   learn: 1.4767918 total: 5.97s     remaining: 54.9s
98:   learn: 1.4767609 total: 6.05s     remaining: 55s
99:   learn: 1.4767598 total: 6.06s     remaining: 54.5s
100:  learn: 1.4766815 total: 6.11s     remaining: 54.4s
101:  learn: 1.4766138 total: 6.17s     remaining: 54.3s
102:  learn: 1.4766088 total: 6.2s      remaining: 54s
103:  learn: 1.4764711 total: 6.27s     remaining: 54s
104:  learn: 1.4763921 total: 6.33s     remaining: 53.9s
105:  learn: 1.4763308 total: 6.38s     remaining: 53.8s
106:  learn: 1.4762897 total: 6.43s     remaining: 53.7s
107:  learn: 1.4761836 total: 6.48s     remaining: 53.5s
108:  learn: 1.4761762 total: 6.53s     remaining: 53.4s
109:  learn: 1.4760166 total: 6.57s     remaining: 53.2s
110:  learn: 1.4759581 total: 6.61s     remaining: 53s
111:  learn: 1.4758064 total: 6.67s     remaining: 52.9s
112:  learn: 1.4757407 total: 6.72s     remaining: 52.7s
113:  learn: 1.4755464 total: 6.79s     remaining: 52.8s
114:  learn: 1.4755464 total: 6.8s      remaining: 52.4s
115:  learn: 1.4754657 total: 6.87s     remaining: 52.3s
116:  learn: 1.4753257 total: 6.91s     remaining: 52.1s
117:  learn: 1.4752539 total: 6.96s     remaining: 52s
118:  learn: 1.4751646 total: 7.03s     remaining: 52s
119:  learn: 1.4750938 total: 7.08s     remaining: 51.9s
120:  learn: 1.4750319 total: 7.17s     remaining: 52.1s
121:  learn: 1.4749279 total: 7.23s     remaining: 52s
122:  learn: 1.4747114 total: 7.29s     remaining: 52s
123:  learn: 1.4746432 total: 7.35s     remaining: 51.9s
124:  learn: 1.4745773 total: 7.42s     remaining: 51.9s
125:  learn: 1.4745133 total: 7.47s     remaining: 51.8s
126:  learn: 1.4744163 total: 7.52s     remaining: 51.7s
127:  learn: 1.4743092 total: 7.58s     remaining: 51.6s
128:  learn: 1.4742279 total: 7.64s     remaining: 51.6s
129:  learn: 1.4740643 total: 7.7s      remaining: 51.5s
130:  learn: 1.4739546 total: 7.78s     remaining: 51.6s
131:  learn: 1.4738455 total: 7.84s     remaining: 51.6s
132:  learn: 1.4736493 total: 7.92s     remaining: 51.6s
133:  learn: 1.4735432 total: 7.97s     remaining: 51.5s
134:  learn: 1.4734198 total: 8.03s     remaining: 51.5s
135:  learn: 1.4732819 total: 8.11s     remaining: 51.5s
136:  learn: 1.4732449 total: 8.17s     remaining: 51.4s
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137:  learn: 1.4731089 total: 8.21s    remaining: 51.3s
138:  learn: 1.4729731 total: 8.3s     remaining: 51.4s
139:  learn: 1.4729126 total: 8.4s     remaining: 51.6s
140:  learn: 1.4728003 total: 8.48s    remaining: 51.7s
141:  learn: 1.4727470 total: 8.53s    remaining: 51.5s
142:  learn: 1.4725644 total: 8.59s    remaining: 51.5s
143:  learn: 1.4725015 total: 8.66s    remaining: 51.5s
144:  learn: 1.4724213 total: 8.74s    remaining: 51.5s
145:  learn: 1.4722865 total: 8.8s     remaining: 51.5s
146:  learn: 1.4720579 total: 8.86s    remaining: 51.4s
147:  learn: 1.4720022 total: 8.94s    remaining: 51.4s
148:  learn: 1.4719181 total: 9s  remaining: 51.4s
149:  learn: 1.4718593 total: 9.07s    remaining: 51.4s
150:  learn: 1.4717613 total: 9.13s    remaining: 51.4s
151:  learn: 1.4716839 total: 9.21s    remaining: 51.4s
152:  learn: 1.4715482 total: 9.28s    remaining: 51.4s
153:  learn: 1.4715221 total: 9.35s    remaining: 51.4s
154:  learn: 1.4713760 total: 9.42s    remaining: 51.3s
155:  learn: 1.4711794 total: 9.48s    remaining: 51.3s
156:  learn: 1.4711023 total: 9.57s    remaining: 51.4s
157:  learn: 1.4710640 total: 9.63s    remaining: 51.3s
158:  learn: 1.4709281 total: 9.69s    remaining: 51.3s
159:  learn: 1.4708872 total: 9.77s    remaining: 51.3s
160:  learn: 1.4708372 total: 9.84s    remaining: 51.3s
161:  learn: 1.4707962 total: 9.91s    remaining: 51.3s
162:  learn: 1.4706204 total: 9.97s    remaining: 51.2s
163:  learn: 1.4705708 total: 10s remaining: 51.2s
164:  learn: 1.4704139 total: 10.1s    remaining: 51.1s
165:  learn: 1.4703171 total: 10.2s    remaining: 51s
166:  learn: 1.4702499 total: 10.2s    remaining: 51.1s
167:  learn: 1.4701898 total: 10.3s    remaining: 51.1s
168:  learn: 1.4701227 total: 10.4s    remaining: 51s
169:  learn: 1.4700056 total: 10.4s    remaining: 51s
170:  learn: 1.4699528 total: 10.5s    remaining: 50.9s
171:  learn: 1.4697973 total: 10.6s    remaining: 50.9s
172:  learn: 1.4696861 total: 10.6s    remaining: 50.8s
173:  learn: 1.4695902 total: 10.7s    remaining: 50.8s
174:  learn: 1.4693928 total: 10.7s    remaining: 50.7s
175:  learn: 1.4692826 total: 10.8s    remaining: 50.6s
176:  learn: 1.4691913 total: 10.9s    remaining: 50.6s
177:  learn: 1.4690639 total: 10.9s    remaining: 50.5s
178:  learn: 1.4689222 total: 11s remaining: 50.4s
179:  learn: 1.4688314 total: 11.1s    remaining: 50.4s
180:  learn: 1.4687567 total: 11.1s    remaining: 50.4s
181:  learn: 1.4686599 total: 11.2s    remaining: 50.5s
182:  learn: 1.4685976 total: 11.3s    remaining: 50.4s
183:  learn: 1.4685275 total: 11.4s    remaining: 50.5s
184:  learn: 1.4684821 total: 11.5s    remaining: 50.5s
185:  learn: 1.4683682 total: 11.5s    remaining: 50.4s
186:  learn: 1.4682682 total: 11.6s    remaining: 50.4s
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187:  learn: 1.4681310 total: 11.6s    remaining: 50.3s
188:  learn: 1.4680504 total: 11.7s    remaining: 50.2s
189:  learn: 1.4679303 total: 11.8s    remaining: 50.2s
190:  learn: 1.4678145 total: 11.8s    remaining: 50.2s
191:  learn: 1.4677819 total: 11.9s    remaining: 50.2s
192:  learn: 1.4676713 total: 12s remaining: 50.1s
193:  learn: 1.4675759 total: 12s remaining: 50.1s
194:  learn: 1.4674867 total: 12.1s    remaining: 50s
195:  learn: 1.4674240 total: 12.2s    remaining: 50.1s
196:  learn: 1.4673894 total: 12.3s    remaining: 50.1s
197:  learn: 1.4672625 total: 12.3s    remaining: 50s
198:  learn: 1.4671699 total: 12.4s    remaining: 49.9s
199:  learn: 1.4671404 total: 12.5s    remaining: 49.9s
200:  learn: 1.4670515 total: 12.5s    remaining: 49.8s
201:  learn: 1.4669973 total: 12.6s    remaining: 49.9s
202:  learn: 1.4668989 total: 12.7s    remaining: 49.8s
203:  learn: 1.4668631 total: 12.8s    remaining: 49.9s
204:  learn: 1.4667939 total: 12.9s    remaining: 49.9s
205:  learn: 1.4667390 total: 12.9s    remaining: 49.9s
206:  learn: 1.4666733 total: 13s remaining: 49.8s
207:  learn: 1.4666370 total: 13.1s    remaining: 49.8s
208:  learn: 1.4665962 total: 13.2s    remaining: 49.9s
209:  learn: 1.4664963 total: 13.2s    remaining: 49.8s
210:  learn: 1.4664415 total: 13.3s    remaining: 49.8s
211:  learn: 1.4663064 total: 13.4s    remaining: 49.7s
212:  learn: 1.4662334 total: 13.4s    remaining: 49.7s
213:  learn: 1.4661357 total: 13.5s    remaining: 49.6s
214:  learn: 1.4660268 total: 13.6s    remaining: 49.5s
215:  learn: 1.4659498 total: 13.7s    remaining: 49.6s
216:  learn: 1.4658752 total: 13.7s    remaining: 49.5s
217:  learn: 1.4657512 total: 13.8s    remaining: 49.4s
218:  learn: 1.4656934 total: 13.8s    remaining: 49.4s
219:  learn: 1.4656042 total: 13.9s    remaining: 49.3s
220:  learn: 1.4655491 total: 14s remaining: 49.2s
221:  learn: 1.4654658 total: 14s remaining: 49.2s
222:  learn: 1.4654301 total: 14.1s    remaining: 49.2s
223:  learn: 1.4653891 total: 14.2s    remaining: 49.2s
224:  learn: 1.4653558 total: 14.3s    remaining: 49.2s
225:  learn: 1.4653244 total: 14.4s    remaining: 49.3s
226:  learn: 1.4652760 total: 14.5s    remaining: 49.2s
227:  learn: 1.4652157 total: 14.5s    remaining: 49.2s
228:  learn: 1.4651633 total: 14.6s    remaining: 49.2s
229:  learn: 1.4650810 total: 14.7s    remaining: 49.2s
230:  learn: 1.4649852 total: 14.7s    remaining: 49.1s
231:  learn: 1.4648767 total: 14.8s    remaining: 49s
232:  learn: 1.4648138 total: 14.9s    remaining: 49s
233:  learn: 1.4647213 total: 15s remaining: 48.9s
234:  learn: 1.4646327 total: 15s remaining: 48.9s
235:  learn: 1.4645445 total: 15.1s    remaining: 48.8s
236:  learn: 1.4644690 total: 15.2s    remaining: 48.8s
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237:  learn: 1.4644221  total: 15.3s    remaining: 48.9s
238:  learn: 1.4643693  total: 15.3s    remaining: 48.8s
239:  learn: 1.4643213  total: 15.4s    remaining: 48.8s
240:  learn: 1.4642578  total: 15.5s    remaining: 48.7s
241:  learn: 1.4642122  total: 15.5s    remaining: 48.6s
242:  learn: 1.4641661  total: 15.6s    remaining: 48.6s
243:  learn: 1.4640809  total: 15.7s    remaining: 48.6s
244:  learn: 1.4640200  total: 15.7s    remaining: 48.5s
245:  learn: 1.4639797  total: 15.8s    remaining: 48.4s
246:  learn: 1.4638982  total: 15.9s    remaining: 48.3s
247:  learn: 1.4638427  total: 15.9s    remaining: 48.3s
248:  learn: 1.4637855  total: 16s remaining: 48.3s
249:  learn: 1.4637703  total: 16.1s    remaining: 48.2s
250:  learn: 1.4637206  total: 16.2s    remaining: 48.2s
251:  learn: 1.4635981  total: 16.2s    remaining: 48.2s
252:  learn: 1.4635183  total: 16.3s    remaining: 48s
253:  learn: 1.4634332  total: 16.4s    remaining: 48s
254:  learn: 1.4633927  total: 16.4s    remaining: 47.9s
255:  learn: 1.4633269  total: 16.4s    remaining: 47.8s
256:  learn: 1.4632350  total: 16.5s    remaining: 47.7s
257:  learn: 1.4631765  total: 16.6s    remaining: 47.7s
258:  learn: 1.4630830  total: 16.6s    remaining: 47.6s
259:  learn: 1.4629836  total: 16.7s    remaining: 47.6s
260:  learn: 1.4629338  total: 16.8s    remaining: 47.6s
261:  learn: 1.4628869  total: 16.9s    remaining: 47.6s
262:  learn: 1.4628536  total: 16.9s    remaining: 47.5s
263:  learn: 1.4628027  total: 17s remaining: 47.5s
264:  learn: 1.4627336  total: 17.1s    remaining: 47.4s
265:  learn: 1.4626901  total: 17.2s    remaining: 47.3s
266:  learn: 1.4625552  total: 17.2s    remaining: 47.3s
267:  learn: 1.4624504  total: 17.3s    remaining: 47.2s
268:  learn: 1.4624161  total: 17.4s    remaining: 47.2s
269:  learn: 1.4623564  total: 17.5s    remaining: 47.2s
270:  learn: 1.4623255  total: 17.5s    remaining: 47.1s
271:  learn: 1.4622826  total: 17.6s    remaining: 47.1s
272:  learn: 1.4621967  total: 17.7s    remaining: 47.1s
273:  learn: 1.4621023  total: 17.8s    remaining: 47s
274:  learn: 1.4620171  total: 17.8s    remaining: 47s
275:  learn: 1.4620010  total: 17.9s    remaining: 47s
276:  learn: 1.4619339  total: 18s remaining: 47s
277:  learn: 1.4617979  total: 18.1s    remaining: 46.9s
278:  learn: 1.4617449  total: 18.1s    remaining: 46.8s
279:  learn: 1.4617122  total: 18.2s    remaining: 46.8s
280:  learn: 1.4616360  total: 18.3s    remaining: 46.7s
281:  learn: 1.4616015  total: 18.3s    remaining: 46.7s
282:  learn: 1.4615840  total: 18.4s    remaining: 46.6s
283:  learn: 1.4614760  total: 18.5s    remaining: 46.5s
284:  learn: 1.4613988  total: 18.5s    remaining: 46.5s
285:  learn: 1.4613712  total: 18.6s    remaining: 46.5s
286:  learn: 1.4613290  total: 18.6s    remaining: 46.3s
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287:  learn: 1.4613056  total: 18.7s    remaining: 46.3s
288:  learn: 1.4612500  total: 18.8s    remaining: 46.3s
289:  learn: 1.4612181  total: 18.9s    remaining: 46.2s
290:  learn: 1.4611990  total: 18.9s    remaining: 46.1s
291:  learn: 1.4611417  total: 19s remaining: 46.1s
292:  learn: 1.4611128  total: 19.1s    remaining: 46s
293:  learn: 1.4610358  total: 19.2s    remaining: 46s
294:  learn: 1.4609839  total: 19.3s    remaining: 46s
295:  learn: 1.4609368  total: 19.3s    remaining: 46s
296:  learn: 1.4609130  total: 19.4s    remaining: 46s
297:  learn: 1.4608619  total: 19.5s    remaining: 46s
298:  learn: 1.4608214  total: 19.6s    remaining: 46s
299:  learn: 1.4607923  total: 19.7s    remaining: 46s
300:  learn: 1.4607405  total: 19.8s    remaining: 45.9s
301:  learn: 1.4607168  total: 19.8s    remaining: 45.8s
302:  learn: 1.4606540  total: 19.9s    remaining: 45.7s
303:  learn: 1.4606165  total: 20s remaining: 45.7s
304:  learn: 1.4605526  total: 20s remaining: 45.6s
305:  learn: 1.4604918  total: 20.1s    remaining: 45.5s
306:  learn: 1.4604388  total: 20.2s    remaining: 45.5s
307:  learn: 1.4604020  total: 20.2s    remaining: 45.4s
308:  learn: 1.4603325  total: 20.3s    remaining: 45.4s
309:  learn: 1.4602959  total: 20.4s    remaining: 45.3s
310:  learn: 1.4602534  total: 20.4s    remaining: 45.3s
311:  learn: 1.4601874  total: 20.5s    remaining: 45.2s
312:  learn: 1.4601246  total: 20.6s    remaining: 45.2s
313:  learn: 1.4600508  total: 20.6s    remaining: 45.1s
314:  learn: 1.4599799  total: 20.7s    remaining: 45.1s
315:  learn: 1.4599326  total: 20.8s    remaining: 45s
316:  learn: 1.4598899  total: 20.9s    remaining: 45s
317:  learn: 1.4598298  total: 20.9s    remaining: 44.9s
318:  learn: 1.4598043  total: 21s remaining: 44.8s
319:  learn: 1.4597664  total: 21.1s    remaining: 44.8s
320:  learn: 1.4597318  total: 21.2s    remaining: 44.7s
321:  learn: 1.4597184  total: 21.2s    remaining: 44.7s
322:  learn: 1.4596923  total: 21.3s    remaining: 44.7s
323:  learn: 1.4596353  total: 21.4s    remaining: 44.6s
324:  learn: 1.4595902  total: 21.4s    remaining: 44.5s
325:  learn: 1.4595239  total: 21.5s    remaining: 44.5s
326:  learn: 1.4594970  total: 21.6s    remaining: 44.4s
327:  learn: 1.4594617  total: 21.7s    remaining: 44.4s
328:  learn: 1.4594534  total: 21.7s    remaining: 44.3s
329:  learn: 1.4594251  total: 21.8s    remaining: 44.3s
330:  learn: 1.4593794  total: 21.9s    remaining: 44.2s
331:  learn: 1.4593571  total: 21.9s    remaining: 44.2s
332:  learn: 1.4593195  total: 22s remaining: 44.1s
333:  learn: 1.4593155  total: 22.1s    remaining: 44.1s
334:  learn: 1.4592396  total: 22.2s    remaining: 44s
335:  learn: 1.4591958  total: 22.2s    remaining: 43.9s
336:  learn: 1.4591626  total: 22.3s    remaining: 43.9s
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337:  learn: 1.4591073  total: 22.4s    remaining: 43.8s
338:  learn: 1.4590323  total: 22.4s    remaining: 43.7s
339:  learn: 1.4589773  total: 22.5s    remaining: 43.7s
340:  learn: 1.4588734  total: 22.6s    remaining: 43.6s
341:  learn: 1.4587842  total: 22.6s    remaining: 43.5s
342:  learn: 1.4587330  total: 22.7s    remaining: 43.4s
343:  learn: 1.4586794  total: 22.7s    remaining: 43.3s
344:  learn: 1.4586440  total: 22.8s    remaining: 43.3s
345:  learn: 1.4586041  total: 22.9s    remaining: 43.2s
346:  learn: 1.4585380  total: 22.9s    remaining: 43.1s
347:  learn: 1.4584932  total: 23s remaining: 43.1s
348:  learn: 1.4584723  total: 23.1s    remaining: 43s
349:  learn: 1.4584063  total: 23.1s    remaining: 43s
350:  learn: 1.4583890  total: 23.2s    remaining: 42.9s
351:  learn: 1.4583181  total: 23.3s    remaining: 42.9s
352:  learn: 1.4582473  total: 23.4s    remaining: 42.8s
353:  learn: 1.4582045  total: 23.4s    remaining: 42.7s
354:  learn: 1.4581325  total: 23.5s    remaining: 42.6s
355:  learn: 1.4581213  total: 23.5s    remaining: 42.6s
356:  learn: 1.4580790  total: 23.6s    remaining: 42.5s
357:  learn: 1.4579819  total: 23.7s    remaining: 42.4s
358:  learn: 1.4579503  total: 23.7s    remaining: 42.4s
359:  learn: 1.4578391  total: 23.8s    remaining: 42.3s
360:  learn: 1.4578078  total: 23.9s    remaining: 42.3s
361:  learn: 1.4577386  total: 24s remaining: 42.3s
362:  learn: 1.4577092  total: 24s remaining: 42.2s
363:  learn: 1.4576831  total: 24.1s    remaining: 42.2s
364:  learn: 1.4576434  total: 24.2s    remaining: 42.1s
365:  learn: 1.4576166  total: 24.3s    remaining: 42s
366:  learn: 1.4575585  total: 24.3s    remaining: 41.9s
367:  learn: 1.4575269  total: 24.4s    remaining: 41.9s
368:  learn: 1.4575060  total: 24.4s    remaining: 41.8s
369:  learn: 1.4574617  total: 24.5s    remaining: 41.7s
370:  learn: 1.4574279  total: 24.6s    remaining: 41.6s
371:  learn: 1.4572756  total: 24.6s    remaining: 41.5s
372:  learn: 1.4572300  total: 24.7s    remaining: 41.5s
373:  learn: 1.4572064  total: 24.8s    remaining: 41.4s
374:  learn: 1.4571476  total: 24.8s    remaining: 41.4s
375:  learn: 1.4570556  total: 24.9s    remaining: 41.3s
376:  learn: 1.4570244  total: 25s remaining: 41.2s
377:  learn: 1.4569909  total: 25s remaining: 41.2s
378:  learn: 1.4569626  total: 25.1s    remaining: 41.1s
379:  learn: 1.4569242  total: 25.2s    remaining: 41s
380:  learn: 1.4568843  total: 25.2s    remaining: 41s
381:  learn: 1.4567919  total: 25.3s    remaining: 40.9s
382:  learn: 1.4567050  total: 25.4s    remaining: 40.9s
383:  learn: 1.4566437  total: 25.4s    remaining: 40.8s
384:  learn: 1.4566195  total: 25.5s    remaining: 40.7s
385:  learn: 1.4565940  total: 25.6s    remaining: 40.7s
386:  learn: 1.4565554  total: 25.6s    remaining: 40.6s
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387:  learn: 1.4564909 total: 25.7s    remaining: 40.6s
388:  learn: 1.4564458 total: 25.8s    remaining: 40.5s
389:  learn: 1.4563481 total: 25.9s    remaining: 40.5s
390:  learn: 1.4563015 total: 25.9s    remaining: 40.4s
391:  learn: 1.4562433 total: 26s remaining: 40.3s
392:  learn: 1.4561864 total: 26s remaining: 40.2s
393:  learn: 1.4561508 total: 26.1s    remaining: 40.1s
394:  learn: 1.4560951 total: 26.1s    remaining: 40s
395:  learn: 1.4560228 total: 26.2s    remaining: 40s
396:  learn: 1.4559583 total: 26.3s    remaining: 40s
397:  learn: 1.4558629 total: 26.4s    remaining: 39.9s
398:  learn: 1.4558332 total: 26.4s    remaining: 39.8s
399:  learn: 1.4558031 total: 26.5s    remaining: 39.7s
400:  learn: 1.4557399 total: 26.5s    remaining: 39.7s
401:  learn: 1.4557112 total: 26.6s    remaining: 39.6s
402:  learn: 1.4556353 total: 26.7s    remaining: 39.5s
403:  learn: 1.4556230 total: 26.8s    remaining: 39.5s
404:  learn: 1.4555532 total: 26.9s    remaining: 39.5s
405:  learn: 1.4555217 total: 26.9s    remaining: 39.4s
406:  learn: 1.4554851 total: 27s remaining: 39.4s
407:  learn: 1.4554590 total: 27.1s    remaining: 39.3s
408:  learn: 1.4554187 total: 27.1s    remaining: 39.2s
409:  learn: 1.4553713 total: 27.2s    remaining: 39.2s
410:  learn: 1.4553011 total: 27.3s    remaining: 39.1s
411:  learn: 1.4552440 total: 27.4s    remaining: 39.1s
412:  learn: 1.4552239 total: 27.5s    remaining: 39.1s
413:  learn: 1.4551916 total: 27.6s    remaining: 39s
414:  learn: 1.4551334 total: 27.6s    remaining: 39s
415:  learn: 1.4551079 total: 27.7s    remaining: 38.9s
416:  learn: 1.4550906 total: 27.8s    remaining: 38.9s
417:  learn: 1.4550240 total: 27.9s    remaining: 38.8s
418:  learn: 1.4549940 total: 28s remaining: 38.8s
419:  learn: 1.4549495 total: 28s remaining: 38.7s
420:  learn: 1.4548944 total: 28.1s    remaining: 38.7s
421:  learn: 1.4548772 total: 28.2s    remaining: 38.6s
422:  learn: 1.4548570 total: 28.3s    remaining: 38.6s
423:  learn: 1.4547937 total: 28.4s    remaining: 38.6s
424:  learn: 1.4547456 total: 28.5s    remaining: 38.5s
425:  learn: 1.4547284 total: 28.5s    remaining: 38.5s
426:  learn: 1.4546764 total: 28.6s    remaining: 38.4s
427:  learn: 1.4546150 total: 28.7s    remaining: 38.4s
428:  learn: 1.4545914 total: 28.8s    remaining: 38.3s
429:  learn: 1.4545797 total: 28.9s    remaining: 38.3s
430:  learn: 1.4544561 total: 29s remaining: 38.3s
431:  learn: 1.4544329 total: 29.1s    remaining: 38.2s
432:  learn: 1.4544018 total: 29.1s    remaining: 38.2s
433:  learn: 1.4543450 total: 29.2s    remaining: 38.1s
434:  learn: 1.4542971 total: 29.3s    remaining: 38.1s
435:  learn: 1.4542648 total: 29.4s    remaining: 38s
436:  learn: 1.4542230 total: 29.5s    remaining: 38s
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437:  learn: 1.4542060  total: 29.6s    remaining: 37.9s
438:  learn: 1.4541797  total: 29.7s    remaining: 37.9s
439:  learn: 1.4540938  total: 29.7s    remaining: 37.8s
440:  learn: 1.4540308  total: 29.8s    remaining: 37.7s
441:  learn: 1.4539614  total: 29.9s    remaining: 37.7s
442:  learn: 1.4539371  total: 29.9s    remaining: 37.6s
443:  learn: 1.4539028  total: 30s remaining: 37.5s
444:  learn: 1.4538459  total: 30s remaining: 37.5s
445:  learn: 1.4538044  total: 30.1s    remaining: 37.4s
446:  learn: 1.4537439  total: 30.2s    remaining: 37.3s
447:  learn: 1.4537094  total: 30.2s    remaining: 37.3s
448:  learn: 1.4536384  total: 30.3s    remaining: 37.2s
449:  learn: 1.4536126  total: 30.4s    remaining: 37.1s
450:  learn: 1.4535549  total: 30.4s    remaining: 37s
451:  learn: 1.4535133  total: 30.5s    remaining: 37s
452:  learn: 1.4535109  total: 30.6s    remaining: 36.9s
453:  learn: 1.4534775  total: 30.7s    remaining: 36.9s
454:  learn: 1.4534227  total: 30.7s    remaining: 36.8s
455:  learn: 1.4533615  total: 30.8s    remaining: 36.8s
456:  learn: 1.4533226  total: 30.9s    remaining: 36.7s
457:  learn: 1.4532519  total: 30.9s    remaining: 36.6s
458:  learn: 1.4532066  total: 31s remaining: 36.6s
459:  learn: 1.4531784  total: 31.1s    remaining: 36.5s
460:  learn: 1.4531394  total: 31.1s    remaining: 36.4s
461:  learn: 1.4531203  total: 31.2s    remaining: 36.3s
462:  learn: 1.4530532  total: 31.3s    remaining: 36.3s
463:  learn: 1.4530046  total: 31.3s    remaining: 36.2s
464:  learn: 1.4529828  total: 31.4s    remaining: 36.1s
465:  learn: 1.4529281  total: 31.5s    remaining: 36.1s
466:  learn: 1.4528983  total: 31.6s    remaining: 36s
467:  learn: 1.4528674  total: 31.6s    remaining: 35.9s
468:  learn: 1.4527978  total: 31.7s    remaining: 35.9s
469:  learn: 1.4527636  total: 31.7s    remaining: 35.8s
470:  learn: 1.4527030  total: 31.8s    remaining: 35.7s
471:  learn: 1.4526523  total: 31.9s    remaining: 35.6s
472:  learn: 1.4525911  total: 31.9s    remaining: 35.6s
473:  learn: 1.4525474  total: 32s remaining: 35.5s
474:  learn: 1.4525154  total: 32.1s    remaining: 35.5s
475:  learn: 1.4524860  total: 32.2s    remaining: 35.4s
476:  learn: 1.4524036  total: 32.2s    remaining: 35.3s
477:  learn: 1.4523407  total: 32.3s    remaining: 35.3s
478:  learn: 1.4523219  total: 32.4s    remaining: 35.2s
479:  learn: 1.4522735  total: 32.5s    remaining: 35.2s
480:  learn: 1.4522588  total: 32.5s    remaining: 35.1s
481:  learn: 1.4521767  total: 32.6s    remaining: 35s
482:  learn: 1.4521605  total: 32.7s    remaining: 35s
483:  learn: 1.4521295  total: 32.8s    remaining: 34.9s
484:  learn: 1.4521097  total: 32.8s    remaining: 34.9s
485:  learn: 1.4520857  total: 32.9s    remaining: 34.8s
486:  learn: 1.4520665  total: 33s remaining: 34.7s
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487:  learn: 1.4520223  total: 33s remaining: 34.7s
488:  learn: 1.4520166  total: 33.1s    remaining: 34.6s
489:  learn: 1.4520052  total: 33.2s    remaining: 34.5s
490:  learn: 1.4519617  total: 33.2s    remaining: 34.5s
491:  learn: 1.4519365  total: 33.3s    remaining: 34.4s
492:  learn: 1.4519025  total: 33.3s    remaining: 34.3s
493:  learn: 1.4518690  total: 33.4s    remaining: 34.2s
494:  learn: 1.4518410  total: 33.5s    remaining: 34.2s
495:  learn: 1.4518142  total: 33.6s    remaining: 34.1s
496:  learn: 1.4517808  total: 33.6s    remaining: 34s
497:  learn: 1.4517475  total: 33.7s    remaining: 34s
498:  learn: 1.4517314  total: 33.7s    remaining: 33.9s
499:  learn: 1.4516875  total: 33.8s    remaining: 33.8s
500:  learn: 1.4516578  total: 33.9s    remaining: 33.8s
501:  learn: 1.4516160  total: 34s remaining: 33.7s
502:  learn: 1.4515899  total: 34s remaining: 33.6s
503:  learn: 1.4515546  total: 34.1s    remaining: 33.6s
504:  learn: 1.4515173  total: 34.2s    remaining: 33.5s
505:  learn: 1.4515080  total: 34.2s    remaining: 33.4s
506:  learn: 1.4515008  total: 34.3s    remaining: 33.4s
507:  learn: 1.4514123  total: 34.4s    remaining: 33.3s
508:  learn: 1.4513812  total: 34.4s    remaining: 33.2s
509:  learn: 1.4513700  total: 34.5s    remaining: 33.2s
510:  learn: 1.4513103  total: 34.6s    remaining: 33.1s
511:  learn: 1.4512670  total: 34.6s    remaining: 33s
512:  learn: 1.4512213  total: 34.7s    remaining: 32.9s
513:  learn: 1.4512008  total: 34.8s    remaining: 32.9s
514:  learn: 1.4511749  total: 34.9s    remaining: 32.8s
515:  learn: 1.4511050  total: 34.9s    remaining: 32.8s
516:  learn: 1.4510678  total: 35s remaining: 32.7s
517:  learn: 1.4510499  total: 35.1s    remaining: 32.6s
518:  learn: 1.4510378  total: 35.1s    remaining: 32.5s
519:  learn: 1.4509918  total: 35.2s    remaining: 32.5s
520:  learn: 1.4509482  total: 35.2s    remaining: 32.4s
521:  learn: 1.4508632  total: 35.3s    remaining: 32.3s
522:  learn: 1.4508401  total: 35.3s    remaining: 32.2s
523:  learn: 1.4508245  total: 35.4s    remaining: 32.2s
524:  learn: 1.4507941  total: 35.5s    remaining: 32.1s
525:  learn: 1.4507258  total: 35.5s    remaining: 32s
526:  learn: 1.4506493  total: 35.6s    remaining: 31.9s
527:  learn: 1.4505810  total: 35.6s    remaining: 31.9s
528:  learn: 1.4505612  total: 35.7s    remaining: 31.8s
529:  learn: 1.4505510  total: 35.7s    remaining: 31.7s
530:  learn: 1.4505012  total: 35.8s    remaining: 31.6s
531:  learn: 1.4504775  total: 35.9s    remaining: 31.6s
532:  learn: 1.4504425  total: 35.9s    remaining: 31.5s
533:  learn: 1.4503722  total: 36s remaining: 31.4s
534:  learn: 1.4503620  total: 36.1s    remaining: 31.4s
535:  learn: 1.4503229  total: 36.1s    remaining: 31.3s
536:  learn: 1.4502726  total: 36.2s    remaining: 31.2s
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537:  learn: 1.4502521  total: 36.3s    remaining: 31.2s
538:  learn: 1.4502116  total: 36.4s    remaining: 31.1s
539:  learn: 1.4501596  total: 36.4s    remaining: 31s
540:  learn: 1.4501511  total: 36.5s    remaining: 31s
541:  learn: 1.4501213  total: 36.6s    remaining: 30.9s
542:  learn: 1.4501194  total: 36.6s    remaining: 30.8s
543:  learn: 1.4501111  total: 36.7s    remaining: 30.8s
544:  learn: 1.4500814  total: 36.8s    remaining: 30.7s
545:  learn: 1.4500511  total: 36.9s    remaining: 30.6s
546:  learn: 1.4500282  total: 36.9s    remaining: 30.6s
547:  learn: 1.4499983  total: 37s remaining: 30.5s
548:  learn: 1.4499745  total: 37s remaining: 30.4s
549:  learn: 1.4499060  total: 37.1s    remaining: 30.4s
550:  learn: 1.4498100  total: 37.2s    remaining: 30.3s
551:  learn: 1.4497906  total: 37.2s    remaining: 30.2s
552:  learn: 1.4497505  total: 37.3s    remaining: 30.1s
553:  learn: 1.4497022  total: 37.4s    remaining: 30.1s
554:  learn: 1.4496398  total: 37.4s    remaining: 30s
555:  learn: 1.4496033  total: 37.5s    remaining: 29.9s
556:  learn: 1.4495730  total: 37.6s    remaining: 29.9s
557:  learn: 1.4495325  total: 37.6s    remaining: 29.8s
558:  learn: 1.4494798  total: 37.7s    remaining: 29.8s
559:  learn: 1.4494608  total: 37.8s    remaining: 29.7s
560:  learn: 1.4494543  total: 37.8s    remaining: 29.6s
561:  learn: 1.4494199  total: 37.9s    remaining: 29.6s
562:  learn: 1.4493441  total: 38s remaining: 29.5s
563:  learn: 1.4493106  total: 38.1s    remaining: 29.4s
564:  learn: 1.4492730  total: 38.1s    remaining: 29.3s
565:  learn: 1.4492500  total: 38.2s    remaining: 29.3s
566:  learn: 1.4491867  total: 38.3s    remaining: 29.2s
567:  learn: 1.4491563  total: 38.3s    remaining: 29.2s
568:  learn: 1.4491040  total: 38.4s    remaining: 29.1s
569:  learn: 1.4490422  total: 38.5s    remaining: 29s
570:  learn: 1.4489810  total: 38.5s    remaining: 28.9s
571:  learn: 1.4488934  total: 38.6s    remaining: 28.9s
572:  learn: 1.4488651  total: 38.6s    remaining: 28.8s
573:  learn: 1.4488493  total: 38.7s    remaining: 28.7s
574:  learn: 1.4488281  total: 38.8s    remaining: 28.6s
575:  learn: 1.4487697  total: 38.8s    remaining: 28.6s
576:  learn: 1.4487175  total: 38.9s    remaining: 28.5s
577:  learn: 1.4486521  total: 39s remaining: 28.5s
578:  learn: 1.4486346  total: 39.1s    remaining: 28.4s
579:  learn: 1.4486204  total: 39.1s    remaining: 28.3s
580:  learn: 1.4486004  total: 39.2s    remaining: 28.3s
581:  learn: 1.4485761  total: 39.3s    remaining: 28.2s
582:  learn: 1.4485141  total: 39.3s    remaining: 28.1s
583:  learn: 1.4484726  total: 39.4s    remaining: 28.1s
584:  learn: 1.4484492  total: 39.5s    remaining: 28s
585:  learn: 1.4483804  total: 39.5s    remaining: 27.9s
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586:  learn: 1.4483261  total: 39.6s    remaining: 27.9s
587:  learn: 1.4482900  total: 39.7s    remaining: 27.8s
588:  learn: 1.4482712  total: 39.8s    remaining: 27.7s
589:  learn: 1.4482511  total: 39.8s    remaining: 27.7s
590:  learn: 1.4481992  total: 39.9s    remaining: 27.6s
591:  learn: 1.4481291  total: 40s remaining: 27.5s
592:  learn: 1.4481128  total: 40s remaining: 27.5s
593:  learn: 1.4480538  total: 40.1s    remaining: 27.4s
594:  learn: 1.4480020  total: 40.1s    remaining: 27.3s
595:  learn: 1.4479923  total: 40.2s    remaining: 27.3s
596:  learn: 1.4479304  total: 40.3s    remaining: 27.2s
597:  learn: 1.4479152  total: 40.4s    remaining: 27.1s
598:  learn: 1.4478161  total: 40.4s    remaining: 27.1s
599:  learn: 1.4477530  total: 40.5s    remaining: 27s
600:  learn: 1.4477062  total: 40.6s    remaining: 26.9s
601:  learn: 1.4476942  total: 40.6s    remaining: 26.9s
602:  learn: 1.4476435  total: 40.7s    remaining: 26.8s
603:  learn: 1.4475935  total: 40.8s    remaining: 26.7s
604:  learn: 1.4475847  total: 40.8s    remaining: 26.6s
605:  learn: 1.4474904  total: 40.9s    remaining: 26.6s
606:  learn: 1.4474338  total: 40.9s    remaining: 26.5s
607:  learn: 1.4474087  total: 41s remaining: 26.4s
608:  learn: 1.4473733  total: 41.1s    remaining: 26.4s
609:  learn: 1.4473240  total: 41.1s    remaining: 26.3s
610:  learn: 1.4473166  total: 41.2s    remaining: 26.2s
611:  learn: 1.4472953  total: 41.3s    remaining: 26.2s
612:  learn: 1.4472622  total: 41.4s    remaining: 26.1s
613:  learn: 1.4472468  total: 41.4s    remaining: 26.1s
614:  learn: 1.4472313  total: 41.5s    remaining: 26s
615:  learn: 1.4471846  total: 41.6s    remaining: 25.9s
616:  learn: 1.4471592  total: 41.6s    remaining: 25.9s
617:  learn: 1.4471421  total: 41.7s    remaining: 25.8s
618:  learn: 1.4471251  total: 41.8s    remaining: 25.7s
619:  learn: 1.4471053  total: 41.9s    remaining: 25.7s
620:  learn: 1.4469956  total: 41.9s    remaining: 25.6s
621:  learn: 1.4469628  total: 42s remaining: 25.5s
622:  learn: 1.4469314  total: 42.1s    remaining: 25.5s
623:  learn: 1.4468955  total: 42.1s    remaining: 25.4s
624:  learn: 1.4468910  total: 42.2s    remaining: 25.3s
625:  learn: 1.4468798  total: 42.3s    remaining: 25.3s
626:  learn: 1.4468638  total: 42.3s    remaining: 25.2s
627:  learn: 1.4468393  total: 42.4s    remaining: 25.1s
628:  learn: 1.4468165  total: 42.5s    remaining: 25.1s
629:  learn: 1.4467593  total: 42.6s    remaining: 25s
630:  learn: 1.4467510  total: 42.6s    remaining: 24.9s
631:  learn: 1.4467199  total: 42.7s    remaining: 24.9s
632:  learn: 1.4466552  total: 42.8s    remaining: 24.8s
633:  learn: 1.4466435  total: 42.8s    remaining: 24.7s
634:  learn: 1.4465840  total: 42.9s    remaining: 24.7s
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635:  learn: 1.4465459  total: 42.9s    remaining: 24.6s
636:  learn: 1.4465146  total: 43s remaining: 24.5s
637:  learn: 1.4464891  total: 43.1s    remaining: 24.4s
638:  learn: 1.4464693  total: 43.2s    remaining: 24.4s
639:  learn: 1.4464578  total: 43.2s    remaining: 24.3s
640:  learn: 1.4464068  total: 43.3s    remaining: 24.3s
641:  learn: 1.4463409  total: 43.4s    remaining: 24.2s
642:  learn: 1.4463165  total: 43.5s    remaining: 24.1s
643:  learn: 1.4463001  total: 43.5s    remaining: 24.1s
644:  learn: 1.4462669  total: 43.6s    remaining: 24s
645:  learn: 1.4462063  total: 43.6s    remaining: 23.9s
646:  learn: 1.4461599  total: 43.7s    remaining: 23.8s
647:  learn: 1.4461394  total: 43.8s    remaining: 23.8s
648:  learn: 1.4461000  total: 43.9s    remaining: 23.7s
649:  learn: 1.4460701  total: 43.9s    remaining: 23.7s
650:  learn: 1.4460287  total: 44s remaining: 23.6s
651:  learn: 1.4459416  total: 44.1s    remaining: 23.5s
652:  learn: 1.4458792  total: 44.1s    remaining: 23.4s
653:  learn: 1.4458630  total: 44.2s    remaining: 23.4s
654:  learn: 1.4458412  total: 44.3s    remaining: 23.3s
655:  learn: 1.4458129  total: 44.3s    remaining: 23.2s
656:  learn: 1.4458127  total: 44.4s    remaining: 23.2s
657:  learn: 1.4457565  total: 44.4s    remaining: 23.1s
658:  learn: 1.4456779  total: 44.5s    remaining: 23s
659:  learn: 1.4456418  total: 44.5s    remaining: 22.9s
660:  learn: 1.4456330  total: 44.6s    remaining: 22.9s
661:  learn: 1.4456152  total: 44.6s    remaining: 22.8s
662:  learn: 1.4455944  total: 44.7s    remaining: 22.7s
663:  learn: 1.4455854  total: 44.8s    remaining: 22.7s
664:  learn: 1.4455053  total: 44.9s    remaining: 22.6s
665:  learn: 1.4454608  total: 44.9s    remaining: 22.5s
666:  learn: 1.4453915  total: 45s remaining: 22.4s
667:  learn: 1.4453712  total: 45s remaining: 22.4s
668:  learn: 1.4452865  total: 45.1s    remaining: 22.3s
669:  learn: 1.4452477  total: 45.1s    remaining: 22.2s
670:  learn: 1.4452181  total: 45.2s    remaining: 22.2s
671:  learn: 1.4452052  total: 45.3s    remaining: 22.1s
672:  learn: 1.4451935  total: 45.4s    remaining: 22s
673:  learn: 1.4451353  total: 45.4s    remaining: 22s
674:  learn: 1.4451202  total: 45.5s    remaining: 21.9s
675:  learn: 1.4450781  total: 45.5s    remaining: 21.8s
676:  learn: 1.4450625  total: 45.6s    remaining: 21.8s
677:  learn: 1.4450427  total: 45.7s    remaining: 21.7s
678:  learn: 1.4449587  total: 45.7s    remaining: 21.6s
679:  learn: 1.4449138  total: 45.8s    remaining: 21.6s
680:  learn: 1.4448884  total: 45.9s    remaining: 21.5s
681:  learn: 1.4448705  total: 45.9s    remaining: 21.4s
682:  learn: 1.4448460  total: 46s remaining: 21.3s
683:  learn: 1.4448260  total: 46.1s    remaining: 21.3s
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684:  learn: 1.4447998  total: 46.1s    remaining: 21.2s
685:  learn: 1.4447118  total: 46.2s    remaining: 21.2s
686:  learn: 1.4446632  total: 46.3s    remaining: 21.1s
687:  learn: 1.4446249  total: 46.3s    remaining: 21s
688:  learn: 1.4445616  total: 46.4s    remaining: 21s
689:  learn: 1.4445430  total: 46.5s    remaining: 20.9s
690:  learn: 1.4445034  total: 46.6s    remaining: 20.8s
691:  learn: 1.4444846  total: 46.7s    remaining: 20.8s
692:  learn: 1.4444431  total: 46.8s    remaining: 20.7s
693:  learn: 1.4444012  total: 46.8s    remaining: 20.7s
694:  learn: 1.4443926  total: 46.9s    remaining: 20.6s
695:  learn: 1.4443515  total: 47s remaining: 20.5s
696:  learn: 1.4443302  total: 47.1s    remaining: 20.5s
697:  learn: 1.4442582  total: 47.1s    remaining: 20.4s
698:  learn: 1.4442439  total: 47.2s    remaining: 20.3s
699:  learn: 1.4441997  total: 47.3s    remaining: 20.3s
700:  learn: 1.4441121  total: 47.3s    remaining: 20.2s
701:  learn: 1.4440990  total: 47.4s    remaining: 20.1s
702:  learn: 1.4440734  total: 47.5s    remaining: 20.1s
703:  learn: 1.4440297  total: 47.5s    remaining: 20s
704:  learn: 1.4439809  total: 47.6s    remaining: 19.9s
705:  learn: 1.4439224  total: 47.6s    remaining: 19.8s
706:  learn: 1.4438513  total: 47.7s    remaining: 19.8s
707:  learn: 1.4438140  total: 47.8s    remaining: 19.7s
708:  learn: 1.4437974  total: 47.9s    remaining: 19.6s
709:  learn: 1.4437250  total: 47.9s    remaining: 19.6s
710:  learn: 1.4436915  total: 48s remaining: 19.5s
711:  learn: 1.4436715  total: 48.1s    remaining: 19.4s
712:  learn: 1.4436578  total: 48.1s    remaining: 19.4s
713:  learn: 1.4436103  total: 48.2s    remaining: 19.3s
714:  learn: 1.4435851  total: 48.3s    remaining: 19.2s
715:  learn: 1.4435661  total: 48.3s    remaining: 19.2s
716:  learn: 1.4435138  total: 48.4s    remaining: 19.1s
717:  learn: 1.4434725  total: 48.5s    remaining: 19s
718:  learn: 1.4434547  total: 48.5s    remaining: 19s
719:  learn: 1.4434038  total: 48.6s    remaining: 18.9s
720:  learn: 1.4433518  total: 48.7s    remaining: 18.8s
721:  learn: 1.4433297  total: 48.7s    remaining: 18.8s
722:  learn: 1.4432669  total: 48.8s    remaining: 18.7s
723:  learn: 1.4432119  total: 48.8s    remaining: 18.6s
724:  learn: 1.4431635  total: 48.9s    remaining: 18.6s
725:  learn: 1.4431341  total: 49s remaining: 18.5s
726:  learn: 1.4430850  total: 49s remaining: 18.4s
727:  learn: 1.4430658  total: 49.1s    remaining: 18.4s
728:  learn: 1.4429708  total: 49.2s    remaining: 18.3s
729:  learn: 1.4429401  total: 49.3s    remaining: 18.2s
730:  learn: 1.4429231  total: 49.3s    remaining: 18.2s
731:  learn: 1.4428656  total: 49.4s    remaining: 18.1s
732:  learn: 1.4428281  total: 49.5s    remaining: 18s
```

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733:  learn: 1.4427970  total: 49.6s    remaining: 18s
734:  learn: 1.4427676  total: 49.6s    remaining: 17.9s
735:  learn: 1.4427651  total: 49.7s    remaining: 17.8s
736:  learn: 1.4427236  total: 49.8s    remaining: 17.8s
737:  learn: 1.4426925  total: 49.8s    remaining: 17.7s
738:  learn: 1.4426678  total: 49.9s    remaining: 17.6s
739:  learn: 1.4426596  total: 49.9s    remaining: 17.5s
740:  learn: 1.4426281  total: 50s remaining: 17.5s
741:  learn: 1.4426086  total: 50.1s    remaining: 17.4s
742:  learn: 1.4425779  total: 50.1s    remaining: 17.3s
743:  learn: 1.4425611  total: 50.2s    remaining: 17.3s
744:  learn: 1.4424980  total: 50.3s    remaining: 17.2s
745:  learn: 1.4424705  total: 50.3s    remaining: 17.1s
746:  learn: 1.4424247  total: 50.4s    remaining: 17.1s
747:  learn: 1.4423580  total: 50.5s    remaining: 17s
748:  learn: 1.4423253  total: 50.5s    remaining: 16.9s
749:  learn: 1.4422887  total: 50.6s    remaining: 16.9s
750:  learn: 1.4422749  total: 50.7s    remaining: 16.8s
751:  learn: 1.4422472  total: 50.8s    remaining: 16.7s
752:  learn: 1.4422461  total: 50.8s    remaining: 16.7s
753:  learn: 1.4422316  total: 50.9s    remaining: 16.6s
754:  learn: 1.4422016  total: 51s remaining: 16.5s
755:  learn: 1.4421647  total: 51.1s    remaining: 16.5s
756:  learn: 1.4421502  total: 51.2s    remaining: 16.4s
757:  learn: 1.4421281  total: 51.3s    remaining: 16.4s
758:  learn: 1.4421065  total: 51.4s    remaining: 16.3s
759:  learn: 1.4420947  total: 51.5s    remaining: 16.2s
760:  learn: 1.4420577  total: 51.5s    remaining: 16.2s
761:  learn: 1.4419948  total: 51.6s    remaining: 16.1s
762:  learn: 1.4419020  total: 51.6s    remaining: 16s
763:  learn: 1.4418864  total: 51.7s    remaining: 16s
764:  learn: 1.4418474  total: 51.8s    remaining: 15.9s
765:  learn: 1.4417823  total: 51.8s    remaining: 15.8s
766:  learn: 1.4417285  total: 51.9s    remaining: 15.8s
767:  learn: 1.4417057  total: 51.9s    remaining: 15.7s
768:  learn: 1.4416530  total: 52s remaining: 15.6s
769:  learn: 1.4416272  total: 52s remaining: 15.5s
770:  learn: 1.4416097  total: 52.1s    remaining: 15.5s
771:  learn: 1.4415566  total: 52.2s    remaining: 15.4s
772:  learn: 1.4415462  total: 52.2s    remaining: 15.3s
773:  learn: 1.4415066  total: 52.3s    remaining: 15.3s
774:  learn: 1.4414913  total: 52.4s    remaining: 15.2s
775:  learn: 1.4414893  total: 52.4s    remaining: 15.1s
776:  learn: 1.4414640  total: 52.5s    remaining: 15.1s
777:  learn: 1.4414077  total: 52.6s    remaining: 15s
778:  learn: 1.4413622  total: 52.6s    remaining: 14.9s
779:  learn: 1.4413544  total: 52.7s    remaining: 14.9s
780:  learn: 1.4413229  total: 52.8s    remaining: 14.8s
781:  learn: 1.4413083  total: 52.9s    remaining: 14.7s
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782:  learn: 1.4412581  total: 52.9s    remaining: 14.7s
783:  learn: 1.4412526  total: 53s remaining: 14.6s
784:  learn: 1.4411622  total: 53.1s    remaining: 14.5s
785:  learn: 1.4411282  total: 53.1s    remaining: 14.5s
786:  learn: 1.4411077  total: 53.2s    remaining: 14.4s
787:  learn: 1.4410738  total: 53.3s    remaining: 14.3s
788:  learn: 1.4410423  total: 53.3s    remaining: 14.3s
789:  learn: 1.4409915  total: 53.4s    remaining: 14.2s
790:  learn: 1.4409150  total: 53.5s    remaining: 14.1s
791:  learn: 1.4408996  total: 53.6s    remaining: 14.1s
792:  learn: 1.4408731  total: 53.6s    remaining: 14s
793:  learn: 1.4408379  total: 53.7s    remaining: 13.9s
794:  learn: 1.4407962  total: 53.8s    remaining: 13.9s
795:  learn: 1.4407097  total: 53.8s    remaining: 13.8s
796:  learn: 1.4406971  total: 53.9s    remaining: 13.7s
797:  learn: 1.4406566  total: 54s remaining: 13.7s
798:  learn: 1.4406287  total: 54s remaining: 13.6s
799:  learn: 1.4406160  total: 54.1s    remaining: 13.5s
800:  learn: 1.4405869  total: 54.2s    remaining: 13.5s
801:  learn: 1.4405193  total: 54.2s    remaining: 13.4s
802:  learn: 1.4404583  total: 54.3s    remaining: 13.3s
803:  learn: 1.4404509  total: 54.3s    remaining: 13.2s
804:  learn: 1.4404081  total: 54.4s    remaining: 13.2s
805:  learn: 1.4403823  total: 54.5s    remaining: 13.1s
806:  learn: 1.4403689  total: 54.6s    remaining: 13s
807:  learn: 1.4403481  total: 54.6s    remaining: 13s
808:  learn: 1.4403413  total: 54.7s    remaining: 12.9s
809:  learn: 1.4403210  total: 54.8s    remaining: 12.9s
810:  learn: 1.4402709  total: 54.9s    remaining: 12.8s
811:  learn: 1.4402251  total: 54.9s    remaining: 12.7s
812:  learn: 1.4401998  total: 55s remaining: 12.6s
813:  learn: 1.4401710  total: 55.1s    remaining: 12.6s
814:  learn: 1.4401288  total: 55.1s    remaining: 12.5s
815:  learn: 1.4401022  total: 55.2s    remaining: 12.4s
816:  learn: 1.4400776  total: 55.2s    remaining: 12.4s
817:  learn: 1.4400247  total: 55.3s    remaining: 12.3s
818:  learn: 1.4400091  total: 55.3s    remaining: 12.2s
819:  learn: 1.4399190  total: 55.4s    remaining: 12.2s
820:  learn: 1.4398817  total: 55.4s    remaining: 12.1s
821:  learn: 1.4398162  total: 55.5s    remaining: 12s
822:  learn: 1.4397418  total: 55.6s    remaining: 11.9s
823:  learn: 1.4397092  total: 55.6s    remaining: 11.9s
824:  learn: 1.4397039  total: 55.7s    remaining: 11.8s
825:  learn: 1.4396746  total: 55.8s    remaining: 11.7s
826:  learn: 1.4396409  total: 55.8s    remaining: 11.7s
827:  learn: 1.4396122  total: 55.9s    remaining: 11.6s
828:  learn: 1.4395602  total: 56s remaining: 11.5s
829:  learn: 1.4394872  total: 56s remaining: 11.5s
830:  learn: 1.4394610  total: 56.1s    remaining: 11.4s
```

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831:  learn: 1.4394320  total: 56.2s    remaining: 11.3s
832:  learn: 1.4393825  total: 56.3s    remaining: 11.3s
833:  learn: 1.4393747  total: 56.3s    remaining: 11.2s
834:  learn: 1.4393427  total: 56.4s    remaining: 11.1s
835:  learn: 1.4393174  total: 56.5s    remaining: 11.1s
836:  learn: 1.4392767  total: 56.5s    remaining: 11s
837:  learn: 1.4392624  total: 56.6s    remaining: 10.9s
838:  learn: 1.4392351  total: 56.7s    remaining: 10.9s
839:  learn: 1.4392171  total: 56.7s    remaining: 10.8s
840:  learn: 1.4391933  total: 56.8s    remaining: 10.7s
841:  learn: 1.4391841  total: 56.8s    remaining: 10.7s
842:  learn: 1.4391571  total: 56.9s    remaining: 10.6s
843:  learn: 1.4391404  total: 57s remaining: 10.5s
844:  learn: 1.4390580  total: 57s remaining: 10.5s
845:  learn: 1.4390154  total: 57.1s    remaining: 10.4s
846:  learn: 1.4390120  total: 57.1s    remaining: 10.3s
847:  learn: 1.4389968  total: 57.2s    remaining: 10.3s
848:  learn: 1.4389486  total: 57.3s    remaining: 10.2s
849:  learn: 1.4388934  total: 57.4s    remaining: 10.1s
850:  learn: 1.4388493  total: 57.4s    remaining: 10.1s
851:  learn: 1.4388039  total: 57.5s    remaining: 9.99s
852:  learn: 1.4387626  total: 57.6s    remaining: 9.93s
853:  learn: 1.4387079  total: 57.7s    remaining: 9.86s
854:  learn: 1.4386634  total: 57.7s    remaining: 9.79s
855:  learn: 1.4386306  total: 57.8s    remaining: 9.72s
856:  learn: 1.4385878  total: 57.8s    remaining: 9.65s
857:  learn: 1.4385421  total: 57.9s    remaining: 9.59s
858:  learn: 1.4385286  total: 58s remaining: 9.52s
859:  learn: 1.4385197  total: 58.1s    remaining: 9.46s
860:  learn: 1.4385134  total: 58.2s    remaining: 9.39s
861:  learn: 1.4384692  total: 58.2s    remaining: 9.32s
862:  learn: 1.4384530  total: 58.3s    remaining: 9.26s
863:  learn: 1.4384026  total: 58.4s    remaining: 9.19s
864:  learn: 1.4383091  total: 58.5s    remaining: 9.13s
865:  learn: 1.4382712  total: 58.6s    remaining: 9.07s
866:  learn: 1.4382165  total: 58.7s    remaining: 9s
867:  learn: 1.4381767  total: 58.7s    remaining: 8.93s
868:  learn: 1.4381511  total: 58.8s    remaining: 8.87s
869:  learn: 1.4381321  total: 58.9s    remaining: 8.8s
870:  learn: 1.4380780  total: 58.9s    remaining: 8.73s
871:  learn: 1.4380580  total: 59s remaining: 8.66s
872:  learn: 1.4380201  total: 59.1s    remaining: 8.6s
873:  learn: 1.4379462  total: 59.1s    remaining: 8.53s
874:  learn: 1.4379252  total: 59.2s    remaining: 8.46s
875:  learn: 1.4378889  total: 59.3s    remaining: 8.39s
876:  learn: 1.4378766  total: 59.4s    remaining: 8.32s
877:  learn: 1.4378400  total: 59.4s    remaining: 8.26s
878:  learn: 1.4378138  total: 59.5s    remaining: 8.19s
879:  learn: 1.4377423  total: 59.6s    remaining: 8.13s
```

```
880:  learn: 1.4377012 total: 59.7s    remaining: 8.06s
881:  learn: 1.4376839 total: 59.7s    remaining: 7.99s
882:  learn: 1.4376500 total: 59.8s    remaining: 7.92s
883:  learn: 1.4376013 total: 59.9s    remaining: 7.86s
884:  learn: 1.4375810 total: 60s remaining: 7.79s
885:  learn: 1.4375347 total: 1m  remaining: 7.73s
886:  learn: 1.4374734 total: 1m  remaining: 7.66s
887:  learn: 1.4374466 total: 1m  remaining: 7.59s
888:  learn: 1.4374258 total: 1m  remaining: 7.52s
889:  learn: 1.4374087 total: 1m  remaining: 7.45s
890:  learn: 1.4373938 total: 1m  remaining: 7.39s
891:  learn: 1.4373811 total: 1m  remaining: 7.32s
892:  learn: 1.4373328 total: 1m  remaining: 7.25s
893:  learn: 1.4373269 total: 1m  remaining: 7.18s
894:  learn: 1.4372990 total: 1m  remaining: 7.12s
895:  learn: 1.4372768 total: 1m  remaining: 7.05s
896:  learn: 1.4372321 total: 1m  remaining: 6.98s
897:  learn: 1.4372063 total: 1m  remaining: 6.91s
898:  learn: 1.4371661 total: 1m  remaining: 6.84s
899:  learn: 1.4371462 total: 1m  remaining: 6.78s
900:  learn: 1.4371171 total: 1m 1s    remaining: 6.71s
901:  learn: 1.4370448 total: 1m 1s    remaining: 6.64s
902:  learn: 1.4370228 total: 1m 1s    remaining: 6.57s
903:  learn: 1.4369927 total: 1m 1s    remaining: 6.5s
904:  learn: 1.4369657 total: 1m 1s    remaining: 6.44s
905:  learn: 1.4369124 total: 1m 1s    remaining: 6.37s
906:  learn: 1.4368777 total: 1m 1s    remaining: 6.3s
907:  learn: 1.4368720 total: 1m 1s    remaining: 6.24s
908:  learn: 1.4368366 total: 1m 1s    remaining: 6.17s
909:  learn: 1.4368222 total: 1m 1s    remaining: 6.1s
910:  learn: 1.4367880 total: 1m 1s    remaining: 6.04s
911:  learn: 1.4367314 total: 1m 1s    remaining: 5.97s
912:  learn: 1.4366545 total: 1m 1s    remaining: 5.9s
913:  learn: 1.4366019 total: 1m 1s    remaining: 5.83s
914:  learn: 1.4365794 total: 1m 2s    remaining: 5.76s
915:  learn: 1.4365200 total: 1m 2s    remaining: 5.7s
916:  learn: 1.4364673 total: 1m 2s    remaining: 5.63s
917:  learn: 1.4364080 total: 1m 2s    remaining: 5.56s
918:  learn: 1.4363883 total: 1m 2s    remaining: 5.5s
919:  learn: 1.4363475 total: 1m 2s    remaining: 5.43s
920:  learn: 1.4363023 total: 1m 2s    remaining: 5.36s
921:  learn: 1.4362926 total: 1m 2s    remaining: 5.29s
922:  learn: 1.4362637 total: 1m 2s    remaining: 5.22s
923:  learn: 1.4362039 total: 1m 2s    remaining: 5.16s
924:  learn: 1.4361796 total: 1m 2s    remaining: 5.09s
925:  learn: 1.4361531 total: 1m 2s    remaining: 5.02s
926:  learn: 1.4361229 total: 1m 2s    remaining: 4.95s
927:  learn: 1.4360800 total: 1m 2s    remaining: 4.88s
928:  learn: 1.4360402 total: 1m 3s    remaining: 4.82s
```

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929:  learn: 1.4359858  total: 1m 3s    remaining: 4.75s
930:  learn: 1.4359616  total: 1m 3s    remaining: 4.68s
931:  learn: 1.4358920  total: 1m 3s    remaining: 4.62s
932:  learn: 1.4358846  total: 1m 3s    remaining: 4.55s
933:  learn: 1.4358439  total: 1m 3s    remaining: 4.48s
934:  learn: 1.4358346  total: 1m 3s    remaining: 4.41s
935:  learn: 1.4358186  total: 1m 3s    remaining: 4.35s
936:  learn: 1.4357943  total: 1m 3s    remaining: 4.28s
937:  learn: 1.4357878  total: 1m 3s    remaining: 4.22s
938:  learn: 1.4357300  total: 1m 3s    remaining: 4.15s
939:  learn: 1.4356617  total: 1m 3s    remaining: 4.08s
940:  learn: 1.4356496  total: 1m 4s    remaining: 4.01s
941:  learn: 1.4356321  total: 1m 4s    remaining: 3.94s
942:  learn: 1.4356159  total: 1m 4s    remaining: 3.88s
943:  learn: 1.4355740  total: 1m 4s    remaining: 3.81s
944:  learn: 1.4355410  total: 1m 4s    remaining: 3.74s
945:  learn: 1.4355235  total: 1m 4s    remaining: 3.67s
946:  learn: 1.4354703  total: 1m 4s    remaining: 3.6s
947:  learn: 1.4354217  total: 1m 4s    remaining: 3.54s
948:  learn: 1.4353820  total: 1m 4s    remaining: 3.47s
949:  learn: 1.4353674  total: 1m 4s    remaining: 3.4s
950:  learn: 1.4353247  total: 1m 4s    remaining: 3.33s
951:  learn: 1.4352851  total: 1m 4s    remaining: 3.26s
952:  learn: 1.4352605  total: 1m 4s    remaining: 3.19s
953:  learn: 1.4352260  total: 1m 4s    remaining: 3.13s
954:  learn: 1.4351887  total: 1m 4s    remaining: 3.06s
955:  learn: 1.4351772  total: 1m 5s    remaining: 2.99s
956:  learn: 1.4351244  total: 1m 5s    remaining: 2.92s
957:  learn: 1.4350957  total: 1m 5s    remaining: 2.85s
958:  learn: 1.4350699  total: 1m 5s    remaining: 2.79s
959:  learn: 1.4350425  total: 1m 5s    remaining: 2.72s
960:  learn: 1.4350220  total: 1m 5s    remaining: 2.65s
961:  learn: 1.4350100  total: 1m 5s    remaining: 2.58s
962:  learn: 1.4350006  total: 1m 5s    remaining: 2.52s
963:  learn: 1.4349896  total: 1m 5s    remaining: 2.45s
964:  learn: 1.4349430  total: 1m 5s    remaining: 2.38s
965:  learn: 1.4349112  total: 1m 5s    remaining: 2.31s
966:  learn: 1.4348871  total: 1m 5s    remaining: 2.25s
967:  learn: 1.4348474  total: 1m 5s    remaining: 2.18s
968:  learn: 1.4348336  total: 1m 5s    remaining: 2.11s
969:  learn: 1.4348222  total: 1m 6s    remaining: 2.04s
970:  learn: 1.4347962  total: 1m 6s    remaining: 1.98s
971:  learn: 1.4347505  total: 1m 6s    remaining: 1.91s
972:  learn: 1.4347184  total: 1m 6s    remaining: 1.84s
973:  learn: 1.4347092  total: 1m 6s    remaining: 1.77s
974:  learn: 1.4346885  total: 1m 6s    remaining: 1.7s
975:  learn: 1.4346439  total: 1m 6s    remaining: 1.64s
976:  learn: 1.4346260  total: 1m 6s    remaining: 1.57s
977:  learn: 1.4345905  total: 1m 6s    remaining: 1.5s
```

```
978:  learn: 1.4345810 total: 1m 6s     remaining: 1.43s
979:  learn: 1.4345511 total: 1m 6s     remaining: 1.36s
980:  learn: 1.4345350 total: 1m 6s     remaining: 1.29s
981:  learn: 1.4344943 total: 1m 6s     remaining: 1.23s
982:  learn: 1.4344307 total: 1m 7s     remaining: 1.16s
983:  learn: 1.4344208 total: 1m 7s     remaining: 1.09s
984:  learn: 1.4343560 total: 1m 7s     remaining: 1.02s
985:  learn: 1.4343243 total: 1m 7s     remaining: 954ms
986:  learn: 1.4343186 total: 1m 7s     remaining: 886ms
987:  learn: 1.4343063 total: 1m 7s     remaining: 818ms
988:  learn: 1.4342937 total: 1m 7s     remaining: 750ms
989:  learn: 1.4342401 total: 1m 7s     remaining: 682ms
990:  learn: 1.4342102 total: 1m 7s     remaining: 613ms
991:  learn: 1.4341877 total: 1m 7s     remaining: 545ms
992:  learn: 1.4341747 total: 1m 7s     remaining: 477ms
993:  learn: 1.4341518 total: 1m 7s     remaining: 409ms
994:  learn: 1.4341031 total: 1m 7s     remaining: 341ms
995:  learn: 1.4340196 total: 1m 7s     remaining: 272ms
996:  learn: 1.4339865 total: 1m 7s     remaining: 204ms
997:  learn: 1.4339771 total: 1m 7s     remaining: 136ms
998:  learn: 1.4339631 total: 1m 8s     remaining: 68.1ms
999:  learn: 1.4338991 total: 1m 8s     remaining: 0us

<catboost.core.CatBoostRegressor at 0x17e5c58e0>
```

```
import pickle
!touch ./models/cat_boost_2_model.pkl
# Save the model to a file
with open('./models/cat_boost_2_model.pkl', 'wb') as f:
    pickle.dump(model, f)

with open('./models/cat_boost_2_model.pkl', 'rb') as file:
    _model = pickle.load(file)
    y_pred = _model.predict(X_test)
```

As expected most of the results are unaffected and get the most of the same accuracy without Episodes as well.

```
# To calculate R-squared, you can use the built-in function in
libraries like scikit-learn:
from sklearn.metrics import mean_squared_error, accuracy_score,
r2_score, mean_absolute_error
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
# acc = accuracy_score(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

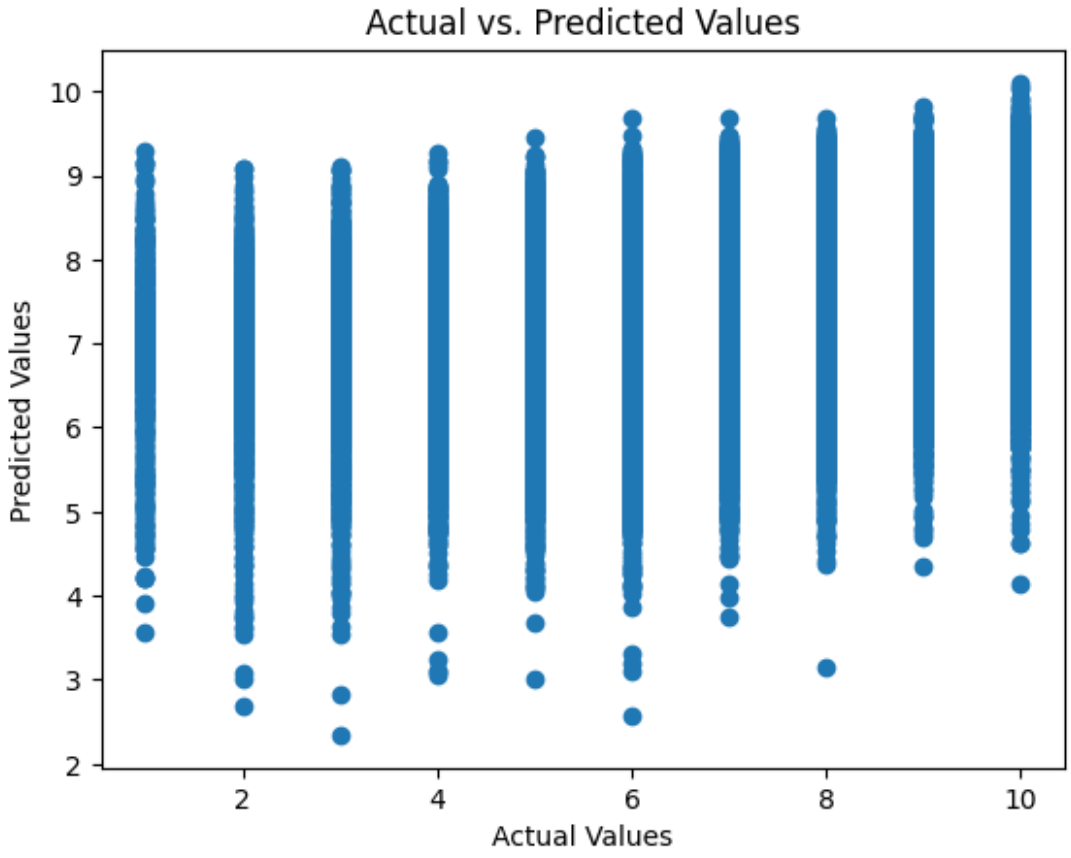
print("MSE:", mse)
```

```
print("RMSE:", rmse)
print("MAE:", mae)
```

```
MSE: 2.163443076269243
RMSE: 1.4708647375844057
MAE: 1.13080959630595
```

```
import matplotlib.pyplot as plt

plt.scatter(y_test, y_pred)
plt.xlabel("Actual Values")
plt.ylabel("Predicted Values")
plt.title("Actual vs. Predicted Values")
plt.show()
```




```
train_pool = cb.Pool(X_train, y_train, cat_features=[1,2,3])
test_pool = cb.Pool(X_test, y_test, cat_features=[1, 2,3])
# Get feature importance
feature_importance = model.feature_importances_

# Get SHAP values
shap_values = model.get_feature_importance(data=test_pool,
type='ShapValues')
```

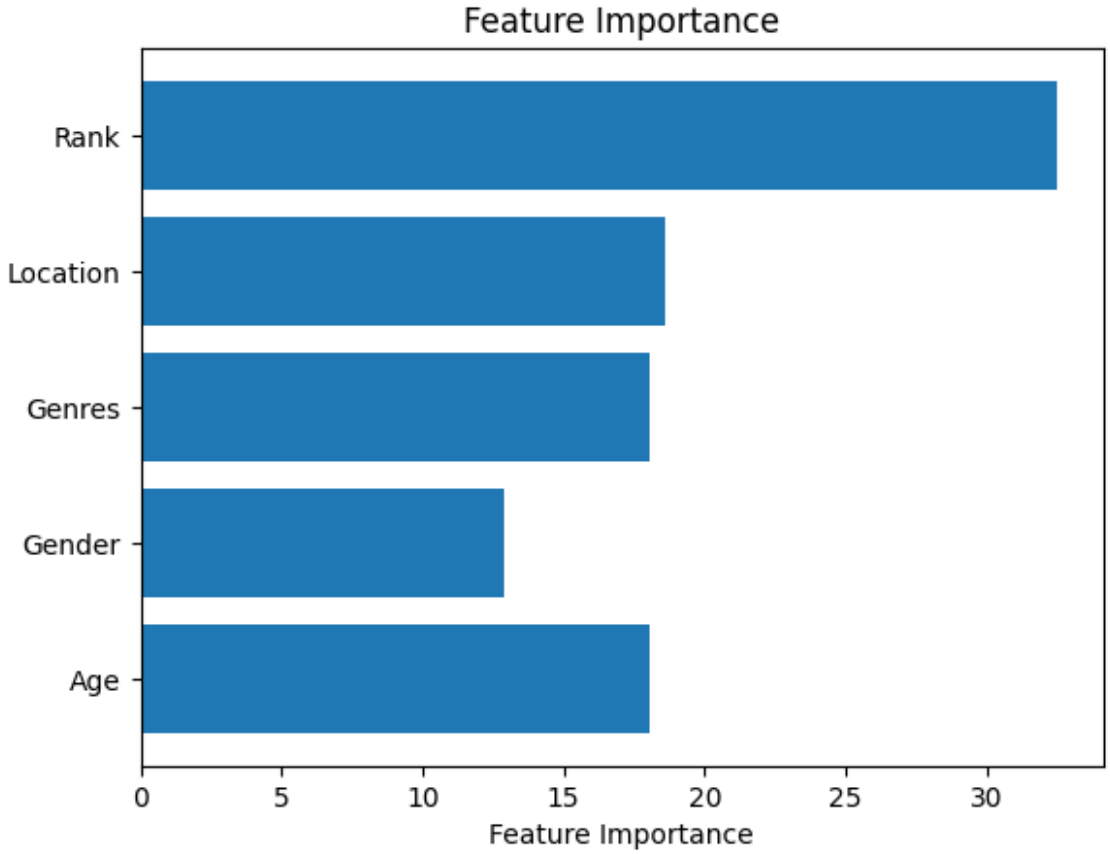
```
import matplotlib.pyplot as plt

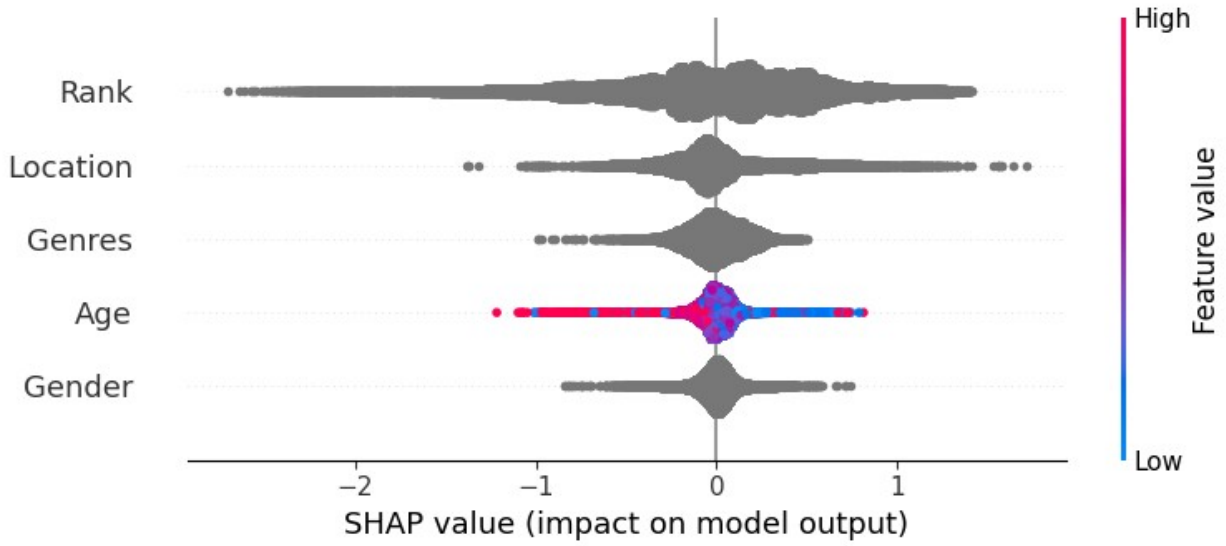
# Plot feature importance
plt.barh(range(len(feature_importance)), feature_importance,
align='center')
plt.yticks(range(len(feature_importance)), X.columns)
plt.xlabel('Feature Importance')

plt.title('Feature Importance')
plt.show()

# Visualize SHAP values (more advanced)
import shap

shap.summary_plot(shap_values[:,:-1], X_test)
```





Trying our model with an additional feature of Rank: This is the overal ranking of an anime. This could probably add some more accuracy. Undersampled the dataset based on rating as well.

```
import catboost as cb
# Undersampling
# Count entries for each location
rating_counts = under_sampled_df['rating'].value_counts()

target_sample_size = rating_counts.nlargest(7).min()

under_sampled_df = data.groupby('rating').apply(lambda x:
x.sample(n=min(len(x), target_sample_size),
random_state=42)).reset_index(drop=True)

target_counts = under_sampled_df['rating'].value_counts()

# Output the results
print("Under-sampled DataFrame shape:", under_sampled_df.shape)
print("Counts of each class in the target variable:")
print(target_counts)
```

```
Under-sampled DataFrame shape: (237172, 21)
Counts of each class in the target variable:
rating
3     25777
4     25777
5     25777
6     25777
7     25777
8     25777
9     25777
10    25777
2     18417
```

```
1     12539
Name: count, dtype: int64

/var/folders/dz/fg9tl53x4y16ytgmdhwdt0kr0000gn/T/
ipykernel_15870/1426502436.py:8: DeprecationWarning:
DataFrameGroupBy.apply operated on the grouping columns. This behavior
is deprecated, and in a future version of pandas the grouping columns
will be excluded from the operation. Either pass
`include_groups=False` to exclude the groupings or explicitly select
the grouping columns after groupby to silence this warning.
  under_sampled_df = data.groupby('rating').apply(lambda x:
x.sample(n=min(len(x), target_sample_size),
random_state=42)).reset_index(drop=True)

features = under_sampled_df.columns.difference(['user_id', 'anime_id',
'rating', 'Birthday_Date', 'Joined_Date', 'Age_Join', 'Episodes
Watched',
                                    'Start Date', 'End Date', 'Name',
'Studios', 'Source', 'Unnamed: 0', 'Type', 'Episodes',
'Episodes_Norm'])

df = under_sampled_df.dropna()
df = df[df["Rank"]!="UNKNOWN"]
df[features].info()
print(features)
X = df[features]

y = df["rating"]


# # Split into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

model = cb.CatBoostRegressor(
    learning_rate=0.1,
    depth=10,
    iterations=1000,
    loss_function='RMSE'
)

model.fit(X_train, y_train, cat_features=[1,2,3])

<class 'pandas.core.frame.DataFrame'>
Index: 166889 entries, 1 to 237171
Data columns (total 5 columns):
 #   Column    Non-Null Count   Dtype
---  ------    --------------   -----
 0   Age       166889 non-null  float64
 1   Gender    166889 non-null  object
 2   Genres    166889 non-null  object
```

```
 3   Location  166889 non-null  object
 4   Rank      166889 non-null  object
dtypes: float64(1), object(4)
memory usage: 7.6+ MB
Index(['Age', 'Gender', 'Genres', 'Location', 'Rank'], dtype='object')
0:   learn: 2.6530803 total: 39.7ms   remaining: 39.7s
1:   learn: 2.6071629 total: 77.9ms   remaining: 38.9s
2:   learn: 2.5695120 total: 106ms    remaining: 35.4s
3:   learn: 2.5382725 total: 131ms    remaining: 32.6s
4:   learn: 2.5115207 total: 162ms    remaining: 32.1s
5:   learn: 2.4894424 total: 185ms    remaining: 30.6s
6:   learn: 2.4711166 total: 213ms    remaining: 30.2s
7:   learn: 2.4571892 total: 235ms    remaining: 29.1s
8:   learn: 2.4446709 total: 259ms    remaining: 28.5s
9:   learn: 2.4339762 total: 327ms    remaining: 32.4s
10:  learn: 2.4250787 total: 347ms    remaining: 31.2s
11:  learn: 2.4176579 total: 368ms    remaining: 30.3s
12:  learn: 2.4100236 total: 382ms    remaining: 29s
13:  learn: 2.4039707 total: 398ms    remaining: 28s
14:  learn: 2.4009750 total: 403ms    remaining: 26.5s
15:  learn: 2.3967262 total: 422ms    remaining: 25.9s
16:  learn: 2.3936052 total: 442ms    remaining: 25.6s
17:  learn: 2.3907328 total: 460ms    remaining: 25.1s
18:  learn: 2.3875125 total: 477ms    remaining: 24.6s
19:  learn: 2.3848187 total: 495ms    remaining: 24.2s
20:  learn: 2.3826461 total: 510ms    remaining: 23.8s
21:  learn: 2.3806970 total: 530ms    remaining: 23.6s
22:  learn: 2.3793333 total: 551ms    remaining: 23.4s
23:  learn: 2.3777812 total: 574ms    remaining: 23.3s
24:  learn: 2.3763031 total: 598ms    remaining: 23.3s
25:  learn: 2.3741436 total: 623ms    remaining: 23.4s
26:  learn: 2.3737183 total: 633ms    remaining: 22.8s
27:  learn: 2.3731407 total: 651ms    remaining: 22.6s
28:  learn: 2.3720465 total: 675ms    remaining: 22.6s
29:  learn: 2.3712831 total: 693ms    remaining: 22.4s
30:  learn: 2.3702265 total: 714ms    remaining: 22.3s
31:  learn: 2.3689899 total: 735ms    remaining: 22.2s
32:  learn: 2.3681548 total: 749ms    remaining: 22s
33:  learn: 2.3676699 total: 768ms    remaining: 21.8s
34:  learn: 2.3670091 total: 785ms    remaining: 21.6s
35:  learn: 2.3658570 total: 802ms    remaining: 21.5s
36:  learn: 2.3649610 total: 825ms    remaining: 21.5s
37:  learn: 2.3641330 total: 848ms    remaining: 21.5s
38:  learn: 2.3635070 total: 862ms    remaining: 21.2s
39:  learn: 2.3630141 total: 880ms    remaining: 21.1s
40:  learn: 2.3620900 total: 904ms    remaining: 21.2s
41:  learn: 2.3619841 total: 910ms    remaining: 20.8s
42:  learn: 2.3615489 total: 929ms    remaining: 20.7s
43:  learn: 2.3609310 total: 953ms    remaining: 20.7s
```

```
44:   learn: 2.3602988 total: 974ms    remaining: 20.7s
45:   learn: 2.3598920 total: 994ms    remaining: 20.6s
46:   learn: 2.3593308 total: 1.01s    remaining: 20.6s
47:   learn: 2.3584155 total: 1.03s    remaining: 20.4s
48:   learn: 2.3578646 total: 1.05s    remaining: 20.4s
49:   learn: 2.3574159 total: 1.06s    remaining: 20.2s
50:   learn: 2.3573954 total: 1.07s    remaining: 19.8s
51:   learn: 2.3566219 total: 1.08s    remaining: 19.7s
52:   learn: 2.3559467 total: 1.1s     remaining: 19.6s
53:   learn: 2.3555790 total: 1.11s    remaining: 19.5s
54:   learn: 2.3551222 total: 1.13s    remaining: 19.4s
55:   learn: 2.3546045 total: 1.15s    remaining: 19.4s
56:   learn: 2.3541555 total: 1.17s    remaining: 19.4s
57:   learn: 2.3536074 total: 1.19s    remaining: 19.4s
58:   learn: 2.3533991 total: 1.22s    remaining: 19.4s
59:   learn: 2.3531757 total: 1.24s    remaining: 19.5s
60:   learn: 2.3529917 total: 1.27s    remaining: 19.5s
61:   learn: 2.3527913 total: 1.29s    remaining: 19.5s
62:   learn: 2.3527205 total: 1.3s     remaining: 19.3s
63:   learn: 2.3522771 total: 1.32s    remaining: 19.2s
64:   learn: 2.3520553 total: 1.33s    remaining: 19.1s
65:   learn: 2.3517345 total: 1.35s    remaining: 19.1s
66:   learn: 2.3511796 total: 1.37s    remaining: 19.1s
67:   learn: 2.3507377 total: 1.39s    remaining: 19s
68:   learn: 2.3503744 total: 1.4s     remaining: 18.9s
69:   learn: 2.3499024 total: 1.43s    remaining: 19s
70:   learn: 2.3495215 total: 1.45s    remaining: 18.9s
71:   learn: 2.3489725 total: 1.46s    remaining: 18.9s
72:   learn: 2.3480405 total: 1.48s    remaining: 18.8s
73:   learn: 2.3480402 total: 1.49s    remaining: 18.6s
74:   learn: 2.3472455 total: 1.5s     remaining: 18.5s
75:   learn: 2.3467601 total: 1.52s    remaining: 18.5s
76:   learn: 2.3464925 total: 1.54s    remaining: 18.5s
77:   learn: 2.3461041 total: 1.55s    remaining: 18.4s
78:   learn: 2.3454798 total: 1.57s    remaining: 18.4s
79:   learn: 2.3448552 total: 1.59s    remaining: 18.3s
80:   learn: 2.3446615 total: 1.61s    remaining: 18.3s
81:   learn: 2.3440144 total: 1.63s    remaining: 18.2s
82:   learn: 2.3433805 total: 1.65s    remaining: 18.2s
83:   learn: 2.3427052 total: 1.67s    remaining: 18.2s
84:   learn: 2.3423072 total: 1.69s    remaining: 18.1s
85:   learn: 2.3420194 total: 1.71s    remaining: 18.1s
86:   learn: 2.3420091 total: 1.71s    remaining: 18s
87:   learn: 2.3415514 total: 1.73s    remaining: 18s
88:   learn: 2.3411872 total: 1.75s    remaining: 17.9s
89:   learn: 2.3400437 total: 1.77s    remaining: 17.9s
90:   learn: 2.3392381 total: 1.78s    remaining: 17.8s
91:   learn: 2.3390725 total: 1.81s    remaining: 17.8s
92:   learn: 2.3390141 total: 1.83s    remaining: 17.8s
```

```
93:   learn: 2.3386894 total: 1.84s    remaining: 17.7s
94:   learn: 2.3383752 total: 1.86s    remaining: 17.7s
95:   learn: 2.3382061 total: 1.88s    remaining: 17.7s
96:   learn: 2.3380628 total: 1.9s     remaining: 17.7s
97:   learn: 2.3378431 total: 1.92s    remaining: 17.7s
98:   learn: 2.3376646 total: 1.94s    remaining: 17.7s
99:   learn: 2.3374717 total: 1.96s    remaining: 17.7s
100:  learn: 2.3373987 total: 1.98s    remaining: 17.7s
101:  learn: 2.3365756 total: 2s  remaining: 17.6s
102:  learn: 2.3359599 total: 2.03s    remaining: 17.7s
103:  learn: 2.3356526 total: 2.05s    remaining: 17.6s
104:  learn: 2.3352993 total: 2.06s    remaining: 17.6s
105:  learn: 2.3347285 total: 2.08s    remaining: 17.5s
106:  learn: 2.3343562 total: 2.1s     remaining: 17.5s
107:  learn: 2.3342210 total: 2.11s    remaining: 17.5s
108:  learn: 2.3340320 total: 2.13s    remaining: 17.4s
109:  learn: 2.3339839 total: 2.14s    remaining: 17.3s
110:  learn: 2.3336693 total: 2.16s    remaining: 17.3s
111:  learn: 2.3335113 total: 2.18s    remaining: 17.3s
112:  learn: 2.3331562 total: 2.21s    remaining: 17.3s
113:  learn: 2.3327032 total: 2.22s    remaining: 17.3s
114:  learn: 2.3322636 total: 2.24s    remaining: 17.2s
115:  learn: 2.3319649 total: 2.26s    remaining: 17.2s
116:  learn: 2.3314879 total: 2.27s    remaining: 17.1s
117:  learn: 2.3308731 total: 2.29s    remaining: 17.1s
118:  learn: 2.3307175 total: 2.31s    remaining: 17.1s
119:  learn: 2.3303906 total: 2.33s    remaining: 17.1s
120:  learn: 2.3303903 total: 2.33s    remaining: 17s
121:  learn: 2.3297895 total: 2.36s    remaining: 17s
122:  learn: 2.3293451 total: 2.37s    remaining: 16.9s
123:  learn: 2.3288029 total: 2.4s     remaining: 16.9s
124:  learn: 2.3281436 total: 2.42s    remaining: 16.9s
125:  learn: 2.3276366 total: 2.44s    remaining: 16.9s
126:  learn: 2.3273873 total: 2.46s    remaining: 16.9s
127:  learn: 2.3268157 total: 2.48s    remaining: 16.9s
128:  learn: 2.3265154 total: 2.5s     remaining: 16.9s
129:  learn: 2.3261681 total: 2.51s    remaining: 16.8s
130:  learn: 2.3258851 total: 2.53s    remaining: 16.8s
131:  learn: 2.3255989 total: 2.55s    remaining: 16.8s
132:  learn: 2.3251527 total: 2.57s    remaining: 16.8s
133:  learn: 2.3247145 total: 2.59s    remaining: 16.7s
134:  learn: 2.3246514 total: 2.61s    remaining: 16.7s
135:  learn: 2.3242457 total: 2.63s    remaining: 16.7s
136:  learn: 2.3231128 total: 2.65s    remaining: 16.7s
137:  learn: 2.3227949 total: 2.67s    remaining: 16.7s
138:  learn: 2.3225102 total: 2.69s    remaining: 16.6s
139:  learn: 2.3222244 total: 2.7s     remaining: 16.6s
140:  learn: 2.3218616 total: 2.73s    remaining: 16.6s
141:  learn: 2.3217273 total: 2.75s    remaining: 16.6s
```

```
142:  learn: 2.3215170  total: 2.77s    remaining: 16.6s
143:  learn: 2.3210788  total: 2.79s    remaining: 16.6s
144:  learn: 2.3202450  total: 2.81s    remaining: 16.6s
145:  learn: 2.3194444  total: 2.82s    remaining: 16.5s
146:  learn: 2.3191536  total: 2.84s    remaining: 16.5s
147:  learn: 2.3189489  total: 2.87s    remaining: 16.5s
148:  learn: 2.3184903  total: 2.89s    remaining: 16.5s
149:  learn: 2.3181780  total: 2.91s    remaining: 16.5s
150:  learn: 2.3178509  total: 2.93s    remaining: 16.5s
151:  learn: 2.3174533  total: 2.95s    remaining: 16.5s
152:  learn: 2.3167618  total: 2.97s    remaining: 16.4s
153:  learn: 2.3165350  total: 2.99s    remaining: 16.4s
154:  learn: 2.3159961  total: 3.01s    remaining: 16.4s
155:  learn: 2.3156814  total: 3.02s    remaining: 16.4s
156:  learn: 2.3151166  total: 3.04s    remaining: 16.3s
157:  learn: 2.3147183  total: 3.06s    remaining: 16.3s
158:  learn: 2.3146132  total: 3.08s    remaining: 16.3s
159:  learn: 2.3142447  total: 3.1s     remaining: 16.3s
160:  learn: 2.3141579  total: 3.12s    remaining: 16.3s
161:  learn: 2.3139114  total: 3.14s    remaining: 16.3s
162:  learn: 2.3137210  total: 3.16s    remaining: 16.2s
163:  learn: 2.3135480  total: 3.18s    remaining: 16.2s
164:  learn: 2.3131003  total: 3.2s     remaining: 16.2s
165:  learn: 2.3127374  total: 3.22s    remaining: 16.2s
166:  learn: 2.3125166  total: 3.24s    remaining: 16.2s
167:  learn: 2.3120151  total: 3.26s    remaining: 16.2s
168:  learn: 2.3116149  total: 3.29s    remaining: 16.2s
169:  learn: 2.3114379  total: 3.31s    remaining: 16.1s
170:  learn: 2.3112971  total: 3.33s    remaining: 16.2s
171:  learn: 2.3111840  total: 3.36s    remaining: 16.2s
172:  learn: 2.3111253  total: 3.38s    remaining: 16.2s
173:  learn: 2.3106813  total: 3.4s     remaining: 16.1s
174:  learn: 2.3105041  total: 3.41s    remaining: 16.1s
175:  learn: 2.3100841  total: 3.43s    remaining: 16.1s
176:  learn: 2.3098241  total: 3.45s    remaining: 16.1s
177:  learn: 2.3096396  total: 3.47s    remaining: 16s
178:  learn: 2.3094026  total: 3.49s    remaining: 16s
179:  learn: 2.3091283  total: 3.51s    remaining: 16s
180:  learn: 2.3090600  total: 3.54s    remaining: 16s
181:  learn: 2.3087422  total: 3.56s    remaining: 16s
182:  learn: 2.3085693  total: 3.58s    remaining: 16s
183:  learn: 2.3084485  total: 3.6s     remaining: 16s
184:  learn: 2.3082196  total: 3.62s    remaining: 15.9s
185:  learn: 2.3080210  total: 3.63s    remaining: 15.9s
186:  learn: 2.3078441  total: 3.66s    remaining: 15.9s
187:  learn: 2.3076074  total: 3.68s    remaining: 15.9s
188:  learn: 2.3073192  total: 3.7s     remaining: 15.9s
189:  learn: 2.3068870  total: 3.71s    remaining: 15.8s
190:  learn: 2.3067197  total: 3.74s    remaining: 15.8s
```

```
191:  learn: 2.3063354  total: 3.76s    remaining: 15.8s
192:  learn: 2.3060857  total: 3.77s    remaining: 15.8s
193:  learn: 2.3059235  total: 3.79s    remaining: 15.8s
194:  learn: 2.3058282  total: 3.81s    remaining: 15.7s
195:  learn: 2.3056522  total: 3.84s    remaining: 15.7s
196:  learn: 2.3051842  total: 3.85s    remaining: 15.7s
197:  learn: 2.3048888  total: 3.88s    remaining: 15.7s
198:  learn: 2.3045984  total: 3.89s    remaining: 15.7s
199:  learn: 2.3041482  total: 3.91s    remaining: 15.7s
200:  learn: 2.3041463  total: 3.93s    remaining: 15.6s
201:  learn: 2.3039951  total: 3.95s    remaining: 15.6s
202:  learn: 2.3038505  total: 3.97s    remaining: 15.6s
203:  learn: 2.3034733  total: 3.99s    remaining: 15.6s
204:  learn: 2.3032632  total: 4s  remaining: 15.5s
205:  learn: 2.3029751  total: 4.02s    remaining: 15.5s
206:  learn: 2.3028305  total: 4.04s    remaining: 15.5s
207:  learn: 2.3023058  total: 4.06s    remaining: 15.4s
208:  learn: 2.3021673  total: 4.08s    remaining: 15.4s
209:  learn: 2.3019780  total: 4.1s     remaining: 15.4s
210:  learn: 2.3019658  total: 4.12s    remaining: 15.4s
211:  learn: 2.3018097  total: 4.14s    remaining: 15.4s
212:  learn: 2.3016148  total: 4.15s    remaining: 15.3s
213:  learn: 2.3012859  total: 4.18s    remaining: 15.3s
214:  learn: 2.3011450  total: 4.2s     remaining: 15.3s
215:  learn: 2.3009773  total: 4.22s    remaining: 15.3s
216:  learn: 2.3007527  total: 4.24s    remaining: 15.3s
217:  learn: 2.3005362  total: 4.26s    remaining: 15.3s
218:  learn: 2.2999506  total: 4.28s    remaining: 15.3s
219:  learn: 2.2996578  total: 4.3s     remaining: 15.3s
220:  learn: 2.2990516  total: 4.33s    remaining: 15.3s
221:  learn: 2.2989360  total: 4.36s    remaining: 15.3s
222:  learn: 2.2987687  total: 4.39s    remaining: 15.3s
223:  learn: 2.2985464  total: 4.42s    remaining: 15.3s
224:  learn: 2.2983313  total: 4.44s    remaining: 15.3s
225:  learn: 2.2981993  total: 4.46s    remaining: 15.3s
226:  learn: 2.2980600  total: 4.47s    remaining: 15.2s
227:  learn: 2.2978032  total: 4.49s    remaining: 15.2s
228:  learn: 2.2974545  total: 4.51s    remaining: 15.2s
229:  learn: 2.2969401  total: 4.54s    remaining: 15.2s
230:  learn: 2.2966490  total: 4.56s    remaining: 15.2s
231:  learn: 2.2965708  total: 4.58s    remaining: 15.2s
232:  learn: 2.2962997  total: 4.61s    remaining: 15.2s
233:  learn: 2.2960309  total: 4.63s    remaining: 15.2s
234:  learn: 2.2955444  total: 4.66s    remaining: 15.2s
235:  learn: 2.2953369  total: 4.68s    remaining: 15.2s
236:  learn: 2.2951340  total: 4.71s    remaining: 15.2s
237:  learn: 2.2948348  total: 4.73s    remaining: 15.2s
238:  learn: 2.2944485  total: 4.76s    remaining: 15.2s
239:  learn: 2.2940609  total: 4.78s    remaining: 15.1s
```

```
240:  learn: 2.2935771 total: 4.8s     remaining: 15.1s
241:  learn: 2.2933517 total: 4.82s    remaining: 15.1s
242:  learn: 2.2930609 total: 4.85s    remaining: 15.1s
243:  learn: 2.2928585 total: 4.87s    remaining: 15.1s
244:  learn: 2.2925359 total: 4.89s    remaining: 15.1s
245:  learn: 2.2923060 total: 4.9s     remaining: 15s
246:  learn: 2.2920269 total: 4.92s    remaining: 15s
247:  learn: 2.2918439 total: 4.94s    remaining: 15s
248:  learn: 2.2918229 total: 4.97s    remaining: 15s
249:  learn: 2.2916024 total: 4.99s    remaining: 15s
250:  learn: 2.2914846 total: 5s  remaining: 14.9s
251:  learn: 2.2913345 total: 5.02s    remaining: 14.9s
252:  learn: 2.2910614 total: 5.04s    remaining: 14.9s
253:  learn: 2.2908466 total: 5.06s    remaining: 14.9s
254:  learn: 2.2906548 total: 5.09s    remaining: 14.9s
255:  learn: 2.2903350 total: 5.1s     remaining: 14.8s
256:  learn: 2.2901989 total: 5.12s    remaining: 14.8s
257:  learn: 2.2899845 total: 5.14s    remaining: 14.8s
258:  learn: 2.2899674 total: 5.16s    remaining: 14.8s
259:  learn: 2.2896971 total: 5.18s    remaining: 14.8s
260:  learn: 2.2894076 total: 5.19s    remaining: 14.7s
261:  learn: 2.2893060 total: 5.21s    remaining: 14.7s
262:  learn: 2.2889202 total: 5.23s    remaining: 14.7s
263:  learn: 2.2887130 total: 5.25s    remaining: 14.6s
264:  learn: 2.2886551 total: 5.28s    remaining: 14.6s
265:  learn: 2.2881039 total: 5.29s    remaining: 14.6s
266:  learn: 2.2880284 total: 5.31s    remaining: 14.6s
267:  learn: 2.2877408 total: 5.33s    remaining: 14.6s
268:  learn: 2.2876519 total: 5.35s    remaining: 14.5s
269:  learn: 2.2875808 total: 5.37s    remaining: 14.5s
270:  learn: 2.2870780 total: 5.39s    remaining: 14.5s
271:  learn: 2.2868499 total: 5.4s     remaining: 14.5s
272:  learn: 2.2864679 total: 5.42s    remaining: 14.4s
273:  learn: 2.2863539 total: 5.45s    remaining: 14.4s
274:  learn: 2.2859408 total: 5.47s    remaining: 14.4s
275:  learn: 2.2856910 total: 5.49s    remaining: 14.4s
276:  learn: 2.2855249 total: 5.51s    remaining: 14.4s
277:  learn: 2.2850565 total: 5.52s    remaining: 14.3s
278:  learn: 2.2848526 total: 5.54s    remaining: 14.3s
279:  learn: 2.2847136 total: 5.56s    remaining: 14.3s
280:  learn: 2.2845310 total: 5.58s    remaining: 14.3s
281:  learn: 2.2844471 total: 5.6s     remaining: 14.3s
282:  learn: 2.2843871 total: 5.63s    remaining: 14.3s
283:  learn: 2.2842686 total: 5.64s    remaining: 14.2s
284:  learn: 2.2840166 total: 5.66s    remaining: 14.2s
285:  learn: 2.2837760 total: 5.67s    remaining: 14.2s
286:  learn: 2.2836076 total: 5.69s    remaining: 14.1s
287:  learn: 2.2834867 total: 5.71s    remaining: 14.1s
288:  learn: 2.2833350 total: 5.72s    remaining: 14.1s
```

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289:  learn: 2.2831079  total: 5.73s    remaining: 14s
290:  learn: 2.2828277  total: 5.75s    remaining: 14s
291:  learn: 2.2827901  total: 5.76s    remaining: 14s
292:  learn: 2.2825568  total: 5.78s    remaining: 13.9s
293:  learn: 2.2823776  total: 5.8s     remaining: 13.9s
294:  learn: 2.2823724  total: 5.82s    remaining: 13.9s
295:  learn: 2.2819500  total: 5.84s    remaining: 13.9s
296:  learn: 2.2813715  total: 5.86s    remaining: 13.9s
297:  learn: 2.2810483  total: 5.87s    remaining: 13.8s
298:  learn: 2.2807839  total: 5.89s    remaining: 13.8s
299:  learn: 2.2803425  total: 5.91s    remaining: 13.8s
300:  learn: 2.2800745  total: 5.92s    remaining: 13.8s
301:  learn: 2.2800054  total: 5.95s    remaining: 13.7s
302:  learn: 2.2797451  total: 5.96s    remaining: 13.7s
303:  learn: 2.2796178  total: 5.98s    remaining: 13.7s
304:  learn: 2.2795855  total: 6s  remaining: 13.7s
305:  learn: 2.2795118  total: 6.02s    remaining: 13.7s
306:  learn: 2.2790364  total: 6.04s    remaining: 13.6s
307:  learn: 2.2783223  total: 6.05s    remaining: 13.6s
308:  learn: 2.2781721  total: 6.07s    remaining: 13.6s
309:  learn: 2.2779350  total: 6.09s    remaining: 13.6s
310:  learn: 2.2774265  total: 6.11s    remaining: 13.5s
311:  learn: 2.2770659  total: 6.12s    remaining: 13.5s
312:  learn: 2.2768253  total: 6.14s    remaining: 13.5s
313:  learn: 2.2765025  total: 6.15s    remaining: 13.4s
314:  learn: 2.2764256  total: 6.17s    remaining: 13.4s
315:  learn: 2.2763517  total: 6.19s    remaining: 13.4s
316:  learn: 2.2759742  total: 6.21s    remaining: 13.4s
317:  learn: 2.2756391  total: 6.22s    remaining: 13.3s
318:  learn: 2.2755621  total: 6.25s    remaining: 13.3s
319:  learn: 2.2753002  total: 6.26s    remaining: 13.3s
320:  learn: 2.2749385  total: 6.28s    remaining: 13.3s
321:  learn: 2.2747330  total: 6.3s     remaining: 13.3s
322:  learn: 2.2746625  total: 6.32s    remaining: 13.2s
323:  learn: 2.2745721  total: 6.34s    remaining: 13.2s
324:  learn: 2.2742796  total: 6.36s    remaining: 13.2s
325:  learn: 2.2741423  total: 6.38s    remaining: 13.2s
326:  learn: 2.2737439  total: 6.4s     remaining: 13.2s
327:  learn: 2.2735412  total: 6.42s    remaining: 13.2s
328:  learn: 2.2731791  total: 6.45s    remaining: 13.1s
329:  learn: 2.2727232  total: 6.46s    remaining: 13.1s
330:  learn: 2.2726381  total: 6.49s    remaining: 13.1s
331:  learn: 2.2726008  total: 6.51s    remaining: 13.1s
332:  learn: 2.2721832  total: 6.53s    remaining: 13.1s
333:  learn: 2.2721542  total: 6.55s    remaining: 13.1s
334:  learn: 2.2718773  total: 6.57s    remaining: 13.1s
335:  learn: 2.2716435  total: 6.59s    remaining: 13s
336:  learn: 2.2714914  total: 6.61s    remaining: 13s
337:  learn: 2.2713641  total: 6.63s    remaining: 13s
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338:  learn: 2.2708946  total: 6.65s    remaining: 13s
339:  learn: 2.2705719  total: 6.67s    remaining: 13s
340:  learn: 2.2704664  total: 6.69s    remaining: 12.9s
341:  learn: 2.2703321  total: 6.71s    remaining: 12.9s
342:  learn: 2.2699506  total: 6.73s    remaining: 12.9s
343:  learn: 2.2698042  total: 6.75s    remaining: 12.9s
344:  learn: 2.2692918  total: 6.77s    remaining: 12.9s
345:  learn: 2.2690495  total: 6.78s    remaining: 12.8s
346:  learn: 2.2688178  total: 6.8s     remaining: 12.8s
347:  learn: 2.2686668  total: 6.83s    remaining: 12.8s
348:  learn: 2.2683347  total: 6.84s    remaining: 12.8s
349:  learn: 2.2680385  total: 6.86s    remaining: 12.7s
350:  learn: 2.2680159  total: 6.88s    remaining: 12.7s
351:  learn: 2.2675287  total: 6.9s     remaining: 12.7s
352:  learn: 2.2672999  total: 6.92s    remaining: 12.7s
353:  learn: 2.2671027  total: 6.94s    remaining: 12.7s
354:  learn: 2.2669039  total: 6.96s    remaining: 12.6s
355:  learn: 2.2666650  total: 6.98s    remaining: 12.6s
356:  learn: 2.2664738  total: 7s  remaining: 12.6s
357:  learn: 2.2661770  total: 7.01s    remaining: 12.6s
358:  learn: 2.2659779  total: 7.03s    remaining: 12.6s
359:  learn: 2.2657534  total: 7.05s    remaining: 12.5s
360:  learn: 2.2655281  total: 7.08s    remaining: 12.5s
361:  learn: 2.2653955  total: 7.1s     remaining: 12.5s
362:  learn: 2.2652704  total: 7.12s    remaining: 12.5s
363:  learn: 2.2651971  total: 7.14s    remaining: 12.5s
364:  learn: 2.2651026  total: 7.15s    remaining: 12.4s
365:  learn: 2.2647539  total: 7.17s    remaining: 12.4s
366:  learn: 2.2645474  total: 7.18s    remaining: 12.4s
367:  learn: 2.2644124  total: 7.2s     remaining: 12.4s
368:  learn: 2.2640585  total: 7.22s    remaining: 12.3s
369:  learn: 2.2637318  total: 7.24s    remaining: 12.3s
370:  learn: 2.2634454  total: 7.26s    remaining: 12.3s
371:  learn: 2.2632640  total: 7.27s    remaining: 12.3s
372:  learn: 2.2629558  total: 7.29s    remaining: 12.3s
373:  learn: 2.2628750  total: 7.31s    remaining: 12.2s
374:  learn: 2.2624228  total: 7.33s    remaining: 12.2s
375:  learn: 2.2622706  total: 7.35s    remaining: 12.2s
376:  learn: 2.2621855  total: 7.37s    remaining: 12.2s
377:  learn: 2.2620036  total: 7.39s    remaining: 12.2s
378:  learn: 2.2615970  total: 7.4s     remaining: 12.1s
379:  learn: 2.2609996  total: 7.42s    remaining: 12.1s
380:  learn: 2.2607996  total: 7.44s    remaining: 12.1s
381:  learn: 2.2603560  total: 7.46s    remaining: 12.1s
382:  learn: 2.2597638  total: 7.47s    remaining: 12s
383:  learn: 2.2593665  total: 7.49s    remaining: 12s
384:  learn: 2.2592298  total: 7.51s    remaining: 12s
385:  learn: 2.2589666  total: 7.53s    remaining: 12s
386:  learn: 2.2586651  total: 7.55s    remaining: 12s
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387:  learn: 2.2585959  total: 7.57s    remaining: 11.9s
388:  learn: 2.2583158  total: 7.59s    remaining: 11.9s
389:  learn: 2.2580943  total: 7.61s    remaining: 11.9s
390:  learn: 2.2576199  total: 7.63s    remaining: 11.9s
391:  learn: 2.2574459  total: 7.65s    remaining: 11.9s
392:  learn: 2.2571763  total: 7.67s    remaining: 11.8s
393:  learn: 2.2569023  total: 7.69s    remaining: 11.8s
394:  learn: 2.2568012  total: 7.71s    remaining: 11.8s
395:  learn: 2.2566568  total: 7.74s    remaining: 11.8s
396:  learn: 2.2560406  total: 7.75s    remaining: 11.8s
397:  learn: 2.2558565  total: 7.78s    remaining: 11.8s
398:  learn: 2.2556358  total: 7.8s     remaining: 11.7s
399:  learn: 2.2551777  total: 7.82s    remaining: 11.7s
400:  learn: 2.2550447  total: 7.84s    remaining: 11.7s
401:  learn: 2.2548319  total: 7.86s    remaining: 11.7s
402:  learn: 2.2546884  total: 7.87s    remaining: 11.7s
403:  learn: 2.2542277  total: 7.89s    remaining: 11.6s
404:  learn: 2.2538340  total: 7.91s    remaining: 11.6s
405:  learn: 2.2537281  total: 7.94s    remaining: 11.6s
406:  learn: 2.2533255  total: 7.96s    remaining: 11.6s
407:  learn: 2.2529971  total: 7.99s    remaining: 11.6s
408:  learn: 2.2528116  total: 8s  remaining: 11.6s
409:  learn: 2.2527363  total: 8.03s    remaining: 11.6s
410:  learn: 2.2525797  total: 8.04s    remaining: 11.5s
411:  learn: 2.2522297  total: 8.06s    remaining: 11.5s
412:  learn: 2.2519062  total: 8.09s    remaining: 11.5s
413:  learn: 2.2513538  total: 8.11s    remaining: 11.5s
414:  learn: 2.2512091  total: 8.13s    remaining: 11.5s
415:  learn: 2.2511379  total: 8.15s    remaining: 11.4s
416:  learn: 2.2510087  total: 8.16s    remaining: 11.4s
417:  learn: 2.2509485  total: 8.19s    remaining: 11.4s
418:  learn: 2.2507217  total: 8.2s     remaining: 11.4s
419:  learn: 2.2504587  total: 8.22s    remaining: 11.4s
420:  learn: 2.2502010  total: 8.24s    remaining: 11.3s
421:  learn: 2.2501613  total: 8.25s    remaining: 11.3s
422:  learn: 2.2500546  total: 8.27s    remaining: 11.3s
423:  learn: 2.2500531  total: 8.28s    remaining: 11.3s
424:  learn: 2.2497314  total: 8.3s     remaining: 11.2s
425:  learn: 2.2496082  total: 8.32s    remaining: 11.2s
426:  learn: 2.2494610  total: 8.33s    remaining: 11.2s
427:  learn: 2.2490208  total: 8.35s    remaining: 11.2s
428:  learn: 2.2489677  total: 8.37s    remaining: 11.1s
429:  learn: 2.2488324  total: 8.39s    remaining: 11.1s
430:  learn: 2.2486742  total: 8.4s     remaining: 11.1s
431:  learn: 2.2483956  total: 8.42s    remaining: 11.1s
432:  learn: 2.2482396  total: 8.44s    remaining: 11.1s
433:  learn: 2.2480868  total: 8.46s    remaining: 11s
434:  learn: 2.2475514  total: 8.48s    remaining: 11s
435:  learn: 2.2473525  total: 8.5s     remaining: 11s
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436:  learn: 2.2470670  total: 8.52s    remaining: 11s
437:  learn: 2.2469466  total: 8.54s    remaining: 11s
438:  learn: 2.2467017  total: 8.55s    remaining: 10.9s
439:  learn: 2.2465922  total: 8.57s    remaining: 10.9s
440:  learn: 2.2461431  total: 8.59s    remaining: 10.9s
441:  learn: 2.2457886  total: 8.61s    remaining: 10.9s
442:  learn: 2.2455852  total: 8.63s    remaining: 10.8s
443:  learn: 2.2454826  total: 8.65s    remaining: 10.8s
444:  learn: 2.2451260  total: 8.66s    remaining: 10.8s
445:  learn: 2.2448543  total: 8.68s    remaining: 10.8s
446:  learn: 2.2446150  total: 8.7s     remaining: 10.8s
447:  learn: 2.2444231  total: 8.72s    remaining: 10.7s
448:  learn: 2.2441183  total: 8.73s    remaining: 10.7s
449:  learn: 2.2439603  total: 8.76s    remaining: 10.7s
450:  learn: 2.2438449  total: 8.78s    remaining: 10.7s
451:  learn: 2.2436909  total: 8.81s    remaining: 10.7s
452:  learn: 2.2432637  total: 8.83s    remaining: 10.7s
453:  learn: 2.2431894  total: 8.85s    remaining: 10.6s
454:  learn: 2.2429965  total: 8.88s    remaining: 10.6s
455:  learn: 2.2427725  total: 8.91s    remaining: 10.6s
456:  learn: 2.2423659  total: 8.94s    remaining: 10.6s
457:  learn: 2.2421854  total: 8.97s    remaining: 10.6s
458:  learn: 2.2419473  total: 8.99s    remaining: 10.6s
459:  learn: 2.2416543  total: 9.01s    remaining: 10.6s
460:  learn: 2.2414920  total: 9.03s    remaining: 10.6s
461:  learn: 2.2412730  total: 9.05s    remaining: 10.5s
462:  learn: 2.2408841  total: 9.08s    remaining: 10.5s
463:  learn: 2.2401237  total: 9.1s     remaining: 10.5s
464:  learn: 2.2400199  total: 9.12s    remaining: 10.5s
465:  learn: 2.2397792  total: 9.14s    remaining: 10.5s
466:  learn: 2.2395335  total: 9.16s    remaining: 10.5s
467:  learn: 2.2394618  total: 9.19s    remaining: 10.4s
468:  learn: 2.2391700  total: 9.21s    remaining: 10.4s
469:  learn: 2.2390423  total: 9.22s    remaining: 10.4s
470:  learn: 2.2388817  total: 9.23s    remaining: 10.4s
471:  learn: 2.2387880  total: 9.25s    remaining: 10.4s
472:  learn: 2.2385748  total: 9.27s    remaining: 10.3s
473:  learn: 2.2384076  total: 9.29s    remaining: 10.3s
474:  learn: 2.2383259  total: 9.31s    remaining: 10.3s
475:  learn: 2.2379531  total: 9.32s    remaining: 10.3s
476:  learn: 2.2377779  total: 9.34s    remaining: 10.2s
477:  learn: 2.2376411  total: 9.36s    remaining: 10.2s
478:  learn: 2.2374003  total: 9.38s    remaining: 10.2s
479:  learn: 2.2372320  total: 9.39s    remaining: 10.2s
480:  learn: 2.2371420  total: 9.42s    remaining: 10.2s
481:  learn: 2.2369725  total: 9.44s    remaining: 10.1s
482:  learn: 2.2367080  total: 9.45s    remaining: 10.1s
483:  learn: 2.2366196  total: 9.47s    remaining: 10.1s
484:  learn: 2.2362715  total: 9.48s    remaining: 10.1s
485:  learn: 2.2361953  total: 9.51s    remaining: 10.1s
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486:  learn: 2.2359993  total: 9.53s    remaining: 10s
487:  learn: 2.2355776  total: 9.55s    remaining: 10s
488:  learn: 2.2354727  total: 9.58s    remaining: 10s
489:  learn: 2.2353465  total: 9.61s    remaining: 10s
490:  learn: 2.2348997  total: 9.64s    remaining: 9.99s
491:  learn: 2.2346964  total: 9.66s    remaining: 9.97s
492:  learn: 2.2345141  total: 9.68s    remaining: 9.96s
493:  learn: 2.2341485  total: 9.71s    remaining: 9.94s
494:  learn: 2.2340486  total: 9.73s    remaining: 9.92s
495:  learn: 2.2336175  total: 9.75s    remaining: 9.9s
496:  learn: 2.2335660  total: 9.77s    remaining: 9.88s
497:  learn: 2.2330238  total: 9.78s    remaining: 9.86s
498:  learn: 2.2326378  total: 9.8s     remaining: 9.84s
499:  learn: 2.2324902  total: 9.81s    remaining: 9.81s
500:  learn: 2.2323751  total: 9.83s    remaining: 9.79s
501:  learn: 2.2321480  total: 9.85s    remaining: 9.77s
502:  learn: 2.2320368  total: 9.87s    remaining: 9.75s
503:  learn: 2.2318625  total: 9.89s    remaining: 9.73s
504:  learn: 2.2316455  total: 9.91s    remaining: 9.71s
505:  learn: 2.2312752  total: 9.93s    remaining: 9.7s
506:  learn: 2.2311494  total: 9.95s    remaining: 9.68s
507:  learn: 2.2310609  total: 9.98s    remaining: 9.66s
508:  learn: 2.2307450  total: 9.99s    remaining: 9.64s
509:  learn: 2.2306018  total: 10s remaining: 9.62s
510:  learn: 2.2304734  total: 10s remaining: 9.61s
511:  learn: 2.2304155  total: 10.1s    remaining: 9.59s
512:  learn: 2.2302378  total: 10.1s    remaining: 9.57s
513:  learn: 2.2300412  total: 10.1s    remaining: 9.55s
514:  learn: 2.2299295  total: 10.1s    remaining: 9.54s
515:  learn: 2.2298438  total: 10.2s    remaining: 9.52s
516:  learn: 2.2296316  total: 10.2s    remaining: 9.5s
517:  learn: 2.2295708  total: 10.2s    remaining: 9.49s
518:  learn: 2.2295114  total: 10.2s    remaining: 9.47s
519:  learn: 2.2294598  total: 10.2s    remaining: 9.46s
520:  learn: 2.2287508  total: 10.3s    remaining: 9.44s
521:  learn: 2.2285635  total: 10.3s    remaining: 9.43s
522:  learn: 2.2284228  total: 10.3s    remaining: 9.4s
523:  learn: 2.2281543  total: 10.3s    remaining: 9.39s
524:  learn: 2.2280241  total: 10.4s    remaining: 9.37s
525:  learn: 2.2279695  total: 10.4s    remaining: 9.35s
526:  learn: 2.2278143  total: 10.4s    remaining: 9.33s
527:  learn: 2.2276321  total: 10.4s    remaining: 9.32s
528:  learn: 2.2274571  total: 10.4s    remaining: 9.3s
529:  learn: 2.2273675  total: 10.5s    remaining: 9.31s
530:  learn: 2.2272207  total: 10.5s    remaining: 9.29s
531:  learn: 2.2270610  total: 10.5s    remaining: 9.27s
532:  learn: 2.2270599  total: 10.6s    remaining: 9.25s
533:  learn: 2.2268319  total: 10.6s    remaining: 9.23s
534:  learn: 2.2266671  total: 10.6s    remaining: 9.21s
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535:  learn: 2.2264495  total: 10.6s    remaining: 9.19s
536:  learn: 2.2262733  total: 10.6s    remaining: 9.17s
537:  learn: 2.2262058  total: 10.7s    remaining: 9.15s
538:  learn: 2.2261159  total: 10.7s    remaining: 9.13s
539:  learn: 2.2258595  total: 10.7s    remaining: 9.11s
540:  learn: 2.2256555  total: 10.7s    remaining: 9.08s
541:  learn: 2.2255903  total: 10.7s    remaining: 9.06s
542:  learn: 2.2253078  total: 10.7s    remaining: 9.04s
543:  learn: 2.2252116  total: 10.8s    remaining: 9.02s
544:  learn: 2.2250385  total: 10.8s    remaining: 9s
545:  learn: 2.2248435  total: 10.8s    remaining: 8.98s
546:  learn: 2.2247894  total: 10.8s    remaining: 8.96s
547:  learn: 2.2246382  total: 10.8s    remaining: 8.94s
548:  learn: 2.2243581  total: 10.9s    remaining: 8.92s
549:  learn: 2.2243103  total: 10.9s    remaining: 8.9s
550:  learn: 2.2241242  total: 10.9s    remaining: 8.88s
551:  learn: 2.2239911  total: 10.9s    remaining: 8.86s
552:  learn: 2.2238283  total: 10.9s    remaining: 8.85s
553:  learn: 2.2237262  total: 11s remaining: 8.82s
554:  learn: 2.2233964  total: 11s remaining: 8.8s
555:  learn: 2.2230649  total: 11s remaining: 8.78s
556:  learn: 2.2229241  total: 11s remaining: 8.76s
557:  learn: 2.2227542  total: 11s remaining: 8.74s
558:  learn: 2.2226408  total: 11.1s    remaining: 8.72s
559:  learn: 2.2222052  total: 11.1s    remaining: 8.7s
560:  learn: 2.2220876  total: 11.1s    remaining: 8.68s
561:  learn: 2.2218177  total: 11.1s    remaining: 8.66s
562:  learn: 2.2214974  total: 11.1s    remaining: 8.63s
563:  learn: 2.2213792  total: 11.1s    remaining: 8.61s
564:  learn: 2.2212370  total: 11.2s    remaining: 8.59s
565:  learn: 2.2210355  total: 11.2s    remaining: 8.57s
566:  learn: 2.2208099  total: 11.2s    remaining: 8.55s
567:  learn: 2.2207307  total: 11.2s    remaining: 8.53s
568:  learn: 2.2206547  total: 11.2s    remaining: 8.51s
569:  learn: 2.2205141  total: 11.2s    remaining: 8.48s
570:  learn: 2.2203814  total: 11.3s    remaining: 8.46s
571:  learn: 2.2202093  total: 11.3s    remaining: 8.45s
572:  learn: 2.2201566  total: 11.3s    remaining: 8.43s
573:  learn: 2.2197338  total: 11.3s    remaining: 8.41s
574:  learn: 2.2193949  total: 11.3s    remaining: 8.39s
575:  learn: 2.2193321  total: 11.4s    remaining: 8.37s
576:  learn: 2.2190406  total: 11.4s    remaining: 8.35s
577:  learn: 2.2187200  total: 11.4s    remaining: 8.34s
578:  learn: 2.2184167  total: 11.4s    remaining: 8.32s
579:  learn: 2.2179647  total: 11.5s    remaining: 8.33s
580:  learn: 2.2176815  total: 11.5s    remaining: 8.32s
581:  learn: 2.2175960  total: 11.6s    remaining: 8.3s
582:  learn: 2.2173829  total: 11.6s    remaining: 8.29s
583:  learn: 2.2172615  total: 11.6s    remaining: 8.27s
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584:  learn: 2.2171777  total: 11.6s    remaining: 8.25s
585:  learn: 2.2170496  total: 11.7s    remaining: 8.23s
586:  learn: 2.2169222  total: 11.7s    remaining: 8.22s
587:  learn: 2.2167913  total: 11.7s    remaining: 8.2s
588:  learn: 2.2166442  total: 11.7s    remaining: 8.18s
589:  learn: 2.2164700  total: 11.7s    remaining: 8.16s
590:  learn: 2.2164093  total: 11.8s    remaining: 8.14s
591:  learn: 2.2163209  total: 11.8s    remaining: 8.12s
592:  learn: 2.2161482  total: 11.8s    remaining: 8.1s
593:  learn: 2.2157720  total: 11.8s    remaining: 8.07s
594:  learn: 2.2155256  total: 11.8s    remaining: 8.05s
595:  learn: 2.2154043  total: 11.8s    remaining: 8.03s
596:  learn: 2.2151043  total: 11.9s    remaining: 8.01s
597:  learn: 2.2150562  total: 11.9s    remaining: 7.99s
598:  learn: 2.2149825  total: 11.9s    remaining: 7.97s
599:  learn: 2.2148451  total: 11.9s    remaining: 7.95s
600:  learn: 2.2147072  total: 11.9s    remaining: 7.92s
601:  learn: 2.2145109  total: 12s remaining: 7.9s
602:  learn: 2.2143925  total: 12s remaining: 7.88s
603:  learn: 2.2143190  total: 12s remaining: 7.86s
604:  learn: 2.2140555  total: 12s remaining: 7.84s
605:  learn: 2.2136209  total: 12s remaining: 7.82s
606:  learn: 2.2134997  total: 12s remaining: 7.8s
607:  learn: 2.2133433  total: 12.1s    remaining: 7.78s
608:  learn: 2.2131762  total: 12.1s    remaining: 7.75s
609:  learn: 2.2131065  total: 12.1s    remaining: 7.73s
610:  learn: 2.2129883  total: 12.1s    remaining: 7.71s
611:  learn: 2.2126444  total: 12.1s    remaining: 7.69s
612:  learn: 2.2123476  total: 12.1s    remaining: 7.67s
613:  learn: 2.2120535  total: 12.2s    remaining: 7.65s
614:  learn: 2.2118908  total: 12.2s    remaining: 7.63s
615:  learn: 2.2115913  total: 12.2s    remaining: 7.61s
616:  learn: 2.2113255  total: 12.2s    remaining: 7.59s
617:  learn: 2.2112341  total: 12.3s    remaining: 7.57s
618:  learn: 2.2109104  total: 12.3s    remaining: 7.55s
619:  learn: 2.2108356  total: 12.3s    remaining: 7.53s
620:  learn: 2.2106601  total: 12.3s    remaining: 7.51s
621:  learn: 2.2105264  total: 12.3s    remaining: 7.49s
622:  learn: 2.2104694  total: 12.3s    remaining: 7.46s
623:  learn: 2.2103545  total: 12.3s    remaining: 7.44s
624:  learn: 2.2102088  total: 12.4s    remaining: 7.42s
625:  learn: 2.2101502  total: 12.4s    remaining: 7.4s
626:  learn: 2.2097096  total: 12.4s    remaining: 7.38s
627:  learn: 2.2094750  total: 12.4s    remaining: 7.36s
628:  learn: 2.2093094  total: 12.4s    remaining: 7.34s
629:  learn: 2.2092476  total: 12.5s    remaining: 7.32s
630:  learn: 2.2091269  total: 12.5s    remaining: 7.3s
631:  learn: 2.2090310  total: 12.5s    remaining: 7.29s
632:  learn: 2.2088963  total: 12.5s    remaining: 7.27s
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633:  learn: 2.2087303 total: 12.5s    remaining: 7.24s
634:  learn: 2.2085975 total: 12.6s    remaining: 7.22s
635:  learn: 2.2082990 total: 12.6s    remaining: 7.2s
636:  learn: 2.2081811 total: 12.6s    remaining: 7.18s
637:  learn: 2.2079896 total: 12.6s    remaining: 7.16s
638:  learn: 2.2079384 total: 12.6s    remaining: 7.14s
639:  learn: 2.2078149 total: 12.7s    remaining: 7.13s
640:  learn: 2.2074456 total: 12.7s    remaining: 7.1s
641:  learn: 2.2072430 total: 12.7s    remaining: 7.09s
642:  learn: 2.2071008 total: 12.7s    remaining: 7.07s
643:  learn: 2.2069346 total: 12.8s    remaining: 7.05s
644:  learn: 2.2066533 total: 12.8s    remaining: 7.04s
645:  learn: 2.2065793 total: 12.8s    remaining: 7.02s
646:  learn: 2.2064983 total: 12.8s    remaining: 7s
647:  learn: 2.2063400 total: 12.8s    remaining: 6.98s
648:  learn: 2.2062351 total: 12.9s    remaining: 6.96s
649:  learn: 2.2060425 total: 12.9s    remaining: 6.94s
650:  learn: 2.2056030 total: 12.9s    remaining: 6.92s
651:  learn: 2.2055386 total: 12.9s    remaining: 6.91s
652:  learn: 2.2053473 total: 13s remaining: 6.89s
653:  learn: 2.2051655 total: 13s remaining: 6.87s
654:  learn: 2.2051596 total: 13s remaining: 6.85s
655:  learn: 2.2050007 total: 13s remaining: 6.83s
656:  learn: 2.2047979 total: 13.1s    remaining: 6.81s
657:  learn: 2.2044074 total: 13.1s    remaining: 6.79s
658:  learn: 2.2040777 total: 13.1s    remaining: 6.77s
659:  learn: 2.2039206 total: 13.1s    remaining: 6.75s
660:  learn: 2.2035629 total: 13.1s    remaining: 6.73s
661:  learn: 2.2032030 total: 13.1s    remaining: 6.71s
662:  learn: 2.2031971 total: 13.2s    remaining: 6.69s
663:  learn: 2.2027354 total: 13.2s    remaining: 6.67s
664:  learn: 2.2027261 total: 13.2s    remaining: 6.65s
665:  learn: 2.2026453 total: 13.2s    remaining: 6.63s
666:  learn: 2.2025283 total: 13.2s    remaining: 6.61s
667:  learn: 2.2023882 total: 13.3s    remaining: 6.6s
668:  learn: 2.2023329 total: 13.3s    remaining: 6.58s
669:  learn: 2.2021883 total: 13.3s    remaining: 6.56s
670:  learn: 2.2016587 total: 13.3s    remaining: 6.54s
671:  learn: 2.2013712 total: 13.4s    remaining: 6.52s
672:  learn: 2.2011593 total: 13.4s    remaining: 6.5s
673:  learn: 2.2010354 total: 13.4s    remaining: 6.48s
674:  learn: 2.2008541 total: 13.4s    remaining: 6.45s
675:  learn: 2.2006585 total: 13.4s    remaining: 6.44s
676:  learn: 2.2004465 total: 13.4s    remaining: 6.42s
677:  learn: 2.2001415 total: 13.5s    remaining: 6.39s
678:  learn: 2.1999011 total: 13.5s    remaining: 6.37s
679:  learn: 2.1997457 total: 13.5s    remaining: 6.36s
680:  learn: 2.1996675 total: 13.5s    remaining: 6.34s
681:  learn: 2.1995475 total: 13.6s    remaining: 6.32s
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682:  learn: 2.1994355 total: 13.6s    remaining: 6.3s
683:  learn: 2.1992805 total: 13.6s    remaining: 6.28s
684:  learn: 2.1991332 total: 13.6s    remaining: 6.26s
685:  learn: 2.1989637 total: 13.6s    remaining: 6.24s
686:  learn: 2.1988559 total: 13.7s    remaining: 6.22s
687:  learn: 2.1987719 total: 13.7s    remaining: 6.2s
688:  learn: 2.1985141 total: 13.7s    remaining: 6.18s
689:  learn: 2.1982169 total: 13.7s    remaining: 6.16s
690:  learn: 2.1980719 total: 13.7s    remaining: 6.14s
691:  learn: 2.1980106 total: 13.7s    remaining: 6.12s
692:  learn: 2.1978415 total: 13.8s    remaining: 6.1s
693:  learn: 2.1976576 total: 13.8s    remaining: 6.07s
694:  learn: 2.1975571 total: 13.8s    remaining: 6.05s
695:  learn: 2.1972668 total: 13.8s    remaining: 6.03s
696:  learn: 2.1971424 total: 13.8s    remaining: 6.01s
697:  learn: 2.1970927 total: 13.8s    remaining: 5.99s
698:  learn: 2.1969574 total: 13.9s    remaining: 5.97s
699:  learn: 2.1968462 total: 13.9s    remaining: 5.95s
700:  learn: 2.1967187 total: 13.9s    remaining: 5.93s
701:  learn: 2.1965704 total: 13.9s    remaining: 5.91s
702:  learn: 2.1964190 total: 13.9s    remaining: 5.89s
703:  learn: 2.1962906 total: 13.9s    remaining: 5.87s
704:  learn: 2.1961511 total: 14s remaining: 5.84s
705:  learn: 2.1960664 total: 14s remaining: 5.82s
706:  learn: 2.1958998 total: 14s remaining: 5.8s
707:  learn: 2.1956357 total: 14s remaining: 5.78s
708:  learn: 2.1955811 total: 14s remaining: 5.76s
709:  learn: 2.1954157 total: 14s remaining: 5.74s
710:  learn: 2.1953623 total: 14.1s    remaining: 5.72s
711:  learn: 2.1949876 total: 14.1s    remaining: 5.7s
712:  learn: 2.1948113 total: 14.1s    remaining: 5.68s
713:  learn: 2.1943188 total: 14.1s    remaining: 5.66s
714:  learn: 2.1942380 total: 14.1s    remaining: 5.63s
715:  learn: 2.1940771 total: 14.2s    remaining: 5.61s
716:  learn: 2.1939378 total: 14.2s    remaining: 5.6s
717:  learn: 2.1937319 total: 14.2s    remaining: 5.58s
718:  learn: 2.1935876 total: 14.2s    remaining: 5.56s
719:  learn: 2.1934210 total: 14.2s    remaining: 5.54s
720:  learn: 2.1929451 total: 14.3s    remaining: 5.51s
721:  learn: 2.1927669 total: 14.3s    remaining: 5.49s
722:  learn: 2.1926600 total: 14.3s    remaining: 5.47s
723:  learn: 2.1924868 total: 14.3s    remaining: 5.45s
724:  learn: 2.1924597 total: 14.3s    remaining: 5.43s
725:  learn: 2.1924179 total: 14.3s    remaining: 5.41s
726:  learn: 2.1923620 total: 14.4s    remaining: 5.39s
727:  learn: 2.1921952 total: 14.4s    remaining: 5.37s
728:  learn: 2.1920693 total: 14.4s    remaining: 5.35s
729:  learn: 2.1918802 total: 14.4s    remaining: 5.33s
730:  learn: 2.1917136 total: 14.4s    remaining: 5.31s
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731:  learn: 2.1915951  total: 14.4s    remaining: 5.29s
732:  learn: 2.1915518  total: 14.5s    remaining: 5.27s
733:  learn: 2.1914195  total: 14.5s    remaining: 5.25s
734:  learn: 2.1912828  total: 14.5s    remaining: 5.23s
735:  learn: 2.1910862  total: 14.5s    remaining: 5.21s
736:  learn: 2.1910535  total: 14.6s    remaining: 5.2s
737:  learn: 2.1908710  total: 14.6s    remaining: 5.18s
738:  learn: 2.1907069  total: 14.6s    remaining: 5.16s
739:  learn: 2.1904504  total: 14.6s    remaining: 5.14s
740:  learn: 2.1903263  total: 14.7s    remaining: 5.12s
741:  learn: 2.1901580  total: 14.7s    remaining: 5.11s
742:  learn: 2.1899976  total: 14.7s    remaining: 5.09s
743:  learn: 2.1897056  total: 14.7s    remaining: 5.07s
744:  learn: 2.1894801  total: 14.8s    remaining: 5.05s
745:  learn: 2.1893831  total: 14.8s    remaining: 5.03s
746:  learn: 2.1893393  total: 14.8s    remaining: 5.01s
747:  learn: 2.1892287  total: 14.8s    remaining: 5s
748:  learn: 2.1890263  total: 14.9s    remaining: 4.98s
749:  learn: 2.1889221  total: 14.9s    remaining: 4.96s
750:  learn: 2.1887297  total: 14.9s    remaining: 4.94s
751:  learn: 2.1885126  total: 14.9s    remaining: 4.92s
752:  learn: 2.1883338  total: 14.9s    remaining: 4.9s
753:  learn: 2.1879829  total: 15s remaining: 4.88s
754:  learn: 2.1879231  total: 15s remaining: 4.86s
755:  learn: 2.1878617  total: 15s remaining: 4.84s
756:  learn: 2.1873677  total: 15s remaining: 4.83s
757:  learn: 2.1872506  total: 15.1s    remaining: 4.8s
758:  learn: 2.1869977  total: 15.1s    remaining: 4.79s
759:  learn: 2.1866731  total: 15.1s    remaining: 4.77s
760:  learn: 2.1865552  total: 15.1s    remaining: 4.75s
761:  learn: 2.1864871  total: 15.2s    remaining: 4.73s
762:  learn: 2.1863918  total: 15.2s    remaining: 4.71s
763:  learn: 2.1862357  total: 15.2s    remaining: 4.7s
764:  learn: 2.1859835  total: 15.2s    remaining: 4.67s
765:  learn: 2.1855798  total: 15.2s    remaining: 4.65s
766:  learn: 2.1854467  total: 15.2s    remaining: 4.63s
767:  learn: 2.1852761  total: 15.3s    remaining: 4.61s
768:  learn: 2.1850697  total: 15.3s    remaining: 4.59s
769:  learn: 2.1848845  total: 15.3s    remaining: 4.57s
770:  learn: 2.1845161  total: 15.3s    remaining: 4.55s
771:  learn: 2.1844722  total: 15.3s    remaining: 4.53s
772:  learn: 2.1843987  total: 15.4s    remaining: 4.51s
773:  learn: 2.1843104  total: 15.4s    remaining: 4.49s
774:  learn: 2.1842480  total: 15.4s    remaining: 4.47s
775:  learn: 2.1838386  total: 15.4s    remaining: 4.45s
776:  learn: 2.1836362  total: 15.4s    remaining: 4.43s
777:  learn: 2.1835511  total: 15.4s    remaining: 4.41s
778:  learn: 2.1835165  total: 15.5s    remaining: 4.39s
779:  learn: 2.1832921  total: 15.5s    remaining: 4.37s
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780:  learn: 2.1831437 total: 15.5s    remaining: 4.35s
781:  learn: 2.1830332 total: 15.5s    remaining: 4.33s
782:  learn: 2.1829094 total: 15.5s    remaining: 4.31s
783:  learn: 2.1827762 total: 15.6s    remaining: 4.29s
784:  learn: 2.1825494 total: 15.6s    remaining: 4.27s
785:  learn: 2.1823204 total: 15.6s    remaining: 4.25s
786:  learn: 2.1821256 total: 15.6s    remaining: 4.23s
787:  learn: 2.1818526 total: 15.6s    remaining: 4.21s
788:  learn: 2.1814396 total: 15.7s    remaining: 4.19s
789:  learn: 2.1811621 total: 15.7s    remaining: 4.16s
790:  learn: 2.1810796 total: 15.7s    remaining: 4.14s
791:  learn: 2.1808908 total: 15.7s    remaining: 4.12s
792:  learn: 2.1806098 total: 15.7s    remaining: 4.1s
793:  learn: 2.1803714 total: 15.7s    remaining: 4.08s
794:  learn: 2.1803028 total: 15.7s    remaining: 4.06s
795:  learn: 2.1801892 total: 15.8s    remaining: 4.04s
796:  learn: 2.1799868 total: 15.8s    remaining: 4.02s
797:  learn: 2.1798746 total: 15.8s    remaining: 4s
798:  learn: 2.1796831 total: 15.8s    remaining: 3.98s
799:  learn: 2.1796115 total: 15.8s    remaining: 3.96s
800:  learn: 2.1794649 total: 15.9s    remaining: 3.94s
801:  learn: 2.1793969 total: 15.9s    remaining: 3.92s
802:  learn: 2.1793363 total: 15.9s    remaining: 3.9s
803:  learn: 2.1791972 total: 15.9s    remaining: 3.88s
804:  learn: 2.1790383 total: 15.9s    remaining: 3.86s
805:  learn: 2.1789872 total: 16s remaining: 3.84s
806:  learn: 2.1788510 total: 16s remaining: 3.82s
807:  learn: 2.1787162 total: 16s remaining: 3.8s
808:  learn: 2.1786134 total: 16s remaining: 3.78s
809:  learn: 2.1783901 total: 16s remaining: 3.76s
810:  learn: 2.1782712 total: 16s remaining: 3.74s
811:  learn: 2.1781485 total: 16.1s    remaining: 3.72s
812:  learn: 2.1781033 total: 16.1s    remaining: 3.7s
813:  learn: 2.1779253 total: 16.1s    remaining: 3.68s
814:  learn: 2.1773639 total: 16.1s    remaining: 3.66s
815:  learn: 2.1772839 total: 16.1s    remaining: 3.64s
816:  learn: 2.1772434 total: 16.2s    remaining: 3.62s
817:  learn: 2.1771436 total: 16.2s    remaining: 3.6s
818:  learn: 2.1769675 total: 16.2s    remaining: 3.58s
819:  learn: 2.1768278 total: 16.2s    remaining: 3.56s
820:  learn: 2.1764411 total: 16.2s    remaining: 3.54s
821:  learn: 2.1761631 total: 16.3s    remaining: 3.52s
822:  learn: 2.1761269 total: 16.3s    remaining: 3.5s
823:  learn: 2.1760533 total: 16.3s    remaining: 3.48s
824:  learn: 2.1759131 total: 16.3s    remaining: 3.46s
825:  learn: 2.1758527 total: 16.3s    remaining: 3.44s
826:  learn: 2.1755844 total: 16.3s    remaining: 3.42s
827:  learn: 2.1754208 total: 16.4s    remaining: 3.4s
828:  learn: 2.1751783 total: 16.4s    remaining: 3.38s
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829:  learn: 2.1748645  total: 16.4s    remaining: 3.36s
830:  learn: 2.1746955  total: 16.4s    remaining: 3.34s
831:  learn: 2.1745616  total: 16.4s    remaining: 3.32s
832:  learn: 2.1744398  total: 16.5s    remaining: 3.3s
833:  learn: 2.1743288  total: 16.5s    remaining: 3.28s
834:  learn: 2.1740908  total: 16.5s    remaining: 3.26s
835:  learn: 2.1739335  total: 16.5s    remaining: 3.24s
836:  learn: 2.1737740  total: 16.5s    remaining: 3.22s
837:  learn: 2.1735642  total: 16.5s    remaining: 3.19s
838:  learn: 2.1733893  total: 16.5s    remaining: 3.17s
839:  learn: 2.1732231  total: 16.6s    remaining: 3.15s
840:  learn: 2.1731415  total: 16.6s    remaining: 3.14s
841:  learn: 2.1730719  total: 16.6s    remaining: 3.12s
842:  learn: 2.1728520  total: 16.6s    remaining: 3.1s
843:  learn: 2.1728050  total: 16.6s    remaining: 3.08s
844:  learn: 2.1727247  total: 16.7s    remaining: 3.06s
845:  learn: 2.1726247  total: 16.7s    remaining: 3.04s
846:  learn: 2.1723874  total: 16.7s    remaining: 3.02s
847:  learn: 2.1723245  total: 16.7s    remaining: 3s
848:  learn: 2.1722236  total: 16.7s    remaining: 2.98s
849:  learn: 2.1720894  total: 16.8s    remaining: 2.96s
850:  learn: 2.1719104  total: 16.8s    remaining: 2.94s
851:  learn: 2.1715802  total: 16.8s    remaining: 2.92s
852:  learn: 2.1714805  total: 16.8s    remaining: 2.9s
853:  learn: 2.1713728  total: 16.8s    remaining: 2.88s
854:  learn: 2.1712645  total: 16.9s    remaining: 2.86s
855:  learn: 2.1712113  total: 16.9s    remaining: 2.84s
856:  learn: 2.1711164  total: 16.9s    remaining: 2.82s
857:  learn: 2.1709713  total: 16.9s    remaining: 2.8s
858:  learn: 2.1709324  total: 16.9s    remaining: 2.78s
859:  learn: 2.1706541  total: 16.9s    remaining: 2.76s
860:  learn: 2.1705404  total: 17s remaining: 2.74s
861:  learn: 2.1702683  total: 17s remaining: 2.72s
862:  learn: 2.1698951  total: 17s remaining: 2.7s
863:  learn: 2.1698663  total: 17s remaining: 2.68s
864:  learn: 2.1697689  total: 17s remaining: 2.66s
865:  learn: 2.1696122  total: 17.1s    remaining: 2.64s
866:  learn: 2.1692897  total: 17.1s    remaining: 2.62s
867:  learn: 2.1692254  total: 17.1s    remaining: 2.6s
868:  learn: 2.1690890  total: 17.1s    remaining: 2.58s
869:  learn: 2.1690537  total: 17.1s    remaining: 2.56s
870:  learn: 2.1689070  total: 17.2s    remaining: 2.54s
871:  learn: 2.1686138  total: 17.2s    remaining: 2.52s
872:  learn: 2.1685943  total: 17.2s    remaining: 2.5s
873:  learn: 2.1683740  total: 17.2s    remaining: 2.48s
874:  learn: 2.1681494  total: 17.3s    remaining: 2.47s
875:  learn: 2.1680389  total: 17.3s    remaining: 2.45s
876:  learn: 2.1676835  total: 17.3s    remaining: 2.43s
877:  learn: 2.1674624  total: 17.3s    remaining: 2.41s
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878:  learn: 2.1672061  total: 17.4s    remaining: 2.39s
879:  learn: 2.1670993  total: 17.4s    remaining: 2.37s
880:  learn: 2.1669119  total: 17.4s    remaining: 2.35s
881:  learn: 2.1667448  total: 17.4s    remaining: 2.33s
882:  learn: 2.1666567  total: 17.5s    remaining: 2.31s
883:  learn: 2.1665158  total: 17.5s    remaining: 2.29s
884:  learn: 2.1664564  total: 17.5s    remaining: 2.27s
885:  learn: 2.1663778  total: 17.5s    remaining: 2.25s
886:  learn: 2.1661544  total: 17.6s    remaining: 2.24s
887:  learn: 2.1660903  total: 17.6s    remaining: 2.22s
888:  learn: 2.1659950  total: 17.6s    remaining: 2.2s
889:  learn: 2.1658347  total: 17.6s    remaining: 2.18s
890:  learn: 2.1655914  total: 17.6s    remaining: 2.16s
891:  learn: 2.1654046  total: 17.7s    remaining: 2.14s
892:  learn: 2.1651202  total: 17.7s    remaining: 2.12s
893:  learn: 2.1649994  total: 17.7s    remaining: 2.1s
894:  learn: 2.1646632  total: 17.7s    remaining: 2.08s
895:  learn: 2.1645929  total: 17.7s    remaining: 2.06s
896:  learn: 2.1643023  total: 17.7s    remaining: 2.04s
897:  learn: 2.1641875  total: 17.8s    remaining: 2.02s
898:  learn: 2.1641345  total: 17.8s    remaining: 2s
899:  learn: 2.1639310  total: 17.8s    remaining: 1.98s
900:  learn: 2.1637827  total: 17.8s    remaining: 1.96s
901:  learn: 2.1636460  total: 17.9s    remaining: 1.94s
902:  learn: 2.1633628  total: 17.9s    remaining: 1.92s
903:  learn: 2.1631969  total: 17.9s    remaining: 1.9s
904:  learn: 2.1629560  total: 17.9s    remaining: 1.88s
905:  learn: 2.1627778  total: 17.9s    remaining: 1.86s
906:  learn: 2.1626118  total: 17.9s    remaining: 1.84s
907:  learn: 2.1623903  total: 18s remaining: 1.82s
908:  learn: 2.1622950  total: 18s remaining: 1.8s
909:  learn: 2.1621434  total: 18s remaining: 1.78s
910:  learn: 2.1620040  total: 18s remaining: 1.76s
911:  learn: 2.1618934  total: 18.1s    remaining: 1.74s
912:  learn: 2.1617371  total: 18.1s    remaining: 1.72s
913:  learn: 2.1615695  total: 18.1s    remaining: 1.7s
914:  learn: 2.1614991  total: 18.1s    remaining: 1.68s
915:  learn: 2.1614423  total: 18.1s    remaining: 1.66s
916:  learn: 2.1613537  total: 18.1s    remaining: 1.64s
917:  learn: 2.1611008  total: 18.2s    remaining: 1.62s
918:  learn: 2.1609909  total: 18.2s    remaining: 1.6s
919:  learn: 2.1609086  total: 18.2s    remaining: 1.58s
920:  learn: 2.1608493  total: 18.2s    remaining: 1.56s
921:  learn: 2.1608132  total: 18.2s    remaining: 1.54s
922:  learn: 2.1605365  total: 18.3s    remaining: 1.52s
923:  learn: 2.1603532  total: 18.3s    remaining: 1.5s
924:  learn: 2.1602010  total: 18.3s    remaining: 1.48s
925:  learn: 2.1600089  total: 18.3s    remaining: 1.46s
926:  learn: 2.1598476  total: 18.3s    remaining: 1.44s
```

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927:  learn: 2.1598156 total: 18.4s    remaining: 1.43s
928:  learn: 2.1597065 total: 18.4s    remaining: 1.41s
929:  learn: 2.1596049 total: 18.4s    remaining: 1.39s
930:  learn: 2.1594169 total: 18.4s    remaining: 1.36s
931:  learn: 2.1593665 total: 18.5s    remaining: 1.35s
932:  learn: 2.1592658 total: 18.5s    remaining: 1.33s
933:  learn: 2.1591199 total: 18.5s    remaining: 1.31s
934:  learn: 2.1589913 total: 18.5s    remaining: 1.29s
935:  learn: 2.1588530 total: 18.5s    remaining: 1.27s
936:  learn: 2.1587367 total: 18.6s    remaining: 1.25s
937:  learn: 2.1586885 total: 18.6s    remaining: 1.23s
938:  learn: 2.1586001 total: 18.6s    remaining: 1.21s
939:  learn: 2.1581735 total: 18.6s    remaining: 1.19s
940:  learn: 2.1580736 total: 18.6s    remaining: 1.17s
941:  learn: 2.1576810 total: 18.7s    remaining: 1.15s
942:  learn: 2.1576055 total: 18.7s    remaining: 1.13s
943:  learn: 2.1573522 total: 18.7s    remaining: 1.11s
944:  learn: 2.1572395 total: 18.7s    remaining: 1.09s
945:  learn: 2.1568694 total: 18.7s    remaining: 1.07s
946:  learn: 2.1568012 total: 18.8s    remaining: 1.05s
947:  learn: 2.1565464 total: 18.8s    remaining: 1.03s
948:  learn: 2.1562404 total: 18.8s    remaining: 1.01s
949:  learn: 2.1559218 total: 18.8s    remaining: 991ms
950:  learn: 2.1558291 total: 18.9s    remaining: 971ms
951:  learn: 2.1557219 total: 18.9s    remaining: 952ms
952:  learn: 2.1553469 total: 18.9s    remaining: 932ms
953:  learn: 2.1551517 total: 18.9s    remaining: 912ms
954:  learn: 2.1548460 total: 18.9s    remaining: 892ms
955:  learn: 2.1548006 total: 19s remaining: 872ms
956:  learn: 2.1546855 total: 19s remaining: 853ms
957:  learn: 2.1545318 total: 19s remaining: 833ms
958:  learn: 2.1542501 total: 19s remaining: 813ms
959:  learn: 2.1540105 total: 19s remaining: 793ms
960:  learn: 2.1538912 total: 19.1s    remaining: 774ms
961:  learn: 2.1538466 total: 19.1s    remaining: 754ms
962:  learn: 2.1536916 total: 19.1s    remaining: 734ms
963:  learn: 2.1534912 total: 19.1s    remaining: 715ms
964:  learn: 2.1532318 total: 19.2s    remaining: 695ms
965:  learn: 2.1531030 total: 19.2s    remaining: 675ms
966:  learn: 2.1527610 total: 19.2s    remaining: 655ms
967:  learn: 2.1526050 total: 19.2s    remaining: 635ms
968:  learn: 2.1524925 total: 19.2s    remaining: 616ms
969:  learn: 2.1523280 total: 19.3s    remaining: 596ms
970:  learn: 2.1521266 total: 19.3s    remaining: 576ms
971:  learn: 2.1520421 total: 19.3s    remaining: 556ms
972:  learn: 2.1518190 total: 19.3s    remaining: 536ms
973:  learn: 2.1516075 total: 19.3s    remaining: 516ms
974:  learn: 2.1513029 total: 19.4s    remaining: 496ms
975:  learn: 2.1510117 total: 19.4s    remaining: 476ms
```

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976:  learn: 2.1509885 total: 19.4s    remaining: 457ms
977:  learn: 2.1508756 total: 19.4s    remaining: 437ms
978:  learn: 2.1507984 total: 19.4s    remaining: 417ms
979:  learn: 2.1507151 total: 19.4s    remaining: 397ms
980:  learn: 2.1506315 total: 19.5s    remaining: 377ms
981:  learn: 2.1505244 total: 19.5s    remaining: 357ms
982:  learn: 2.1502556 total: 19.5s    remaining: 337ms
983:  learn: 2.1500617 total: 19.5s    remaining: 317ms
984:  learn: 2.1499752 total: 19.5s    remaining: 298ms
985:  learn: 2.1497473 total: 19.6s    remaining: 278ms
986:  learn: 2.1495963 total: 19.6s    remaining: 258ms
987:  learn: 2.1495295 total: 19.6s    remaining: 238ms
988:  learn: 2.1494664 total: 19.6s    remaining: 218ms
989:  learn: 2.1491991 total: 19.6s    remaining: 198ms
990:  learn: 2.1490488 total: 19.6s    remaining: 178ms
991:  learn: 2.1489997 total: 19.7s    remaining: 159ms
992:  learn: 2.1487202 total: 19.7s    remaining: 139ms
993:  learn: 2.1486046 total: 19.7s    remaining: 119ms
994:  learn: 2.1484618 total: 19.7s    remaining: 99.1ms
995:  learn: 2.1483880 total: 19.7s    remaining: 79.3ms
996:  learn: 2.1482612 total: 19.8s    remaining: 59.5ms
997:  learn: 2.1482103 total: 19.8s    remaining: 39.6ms
998:  learn: 2.1480615 total: 19.8s    remaining: 19.8ms
999:  learn: 2.1480001 total: 19.8s    remaining: 0us

<catboost.core.CatBoostRegressor at 0x12525b5c0>
```

```
import pickle
!touch ./models/cat_boost_3_model.pkl
# Save the model to a file
with open('./models/cat_boost_3_model.pkl', 'wb') as f:
    pickle.dump(model, f)

with open('./models/cat_boost_3_model.pkl', 'rb') as file:
    _model = pickle.load(file)
    y_pred = _model.predict(X_test)
```

The performance was a bit worse after undersampling again.

```
# To calculate R-squared, you can use the built-in function in
libraries like scikit-learn:
from sklearn.metrics import mean_squared_error, accuracy_score,
r2_score, mean_absolute_error
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
# acc = accuracy_score(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

print("MSE:", mse)
```

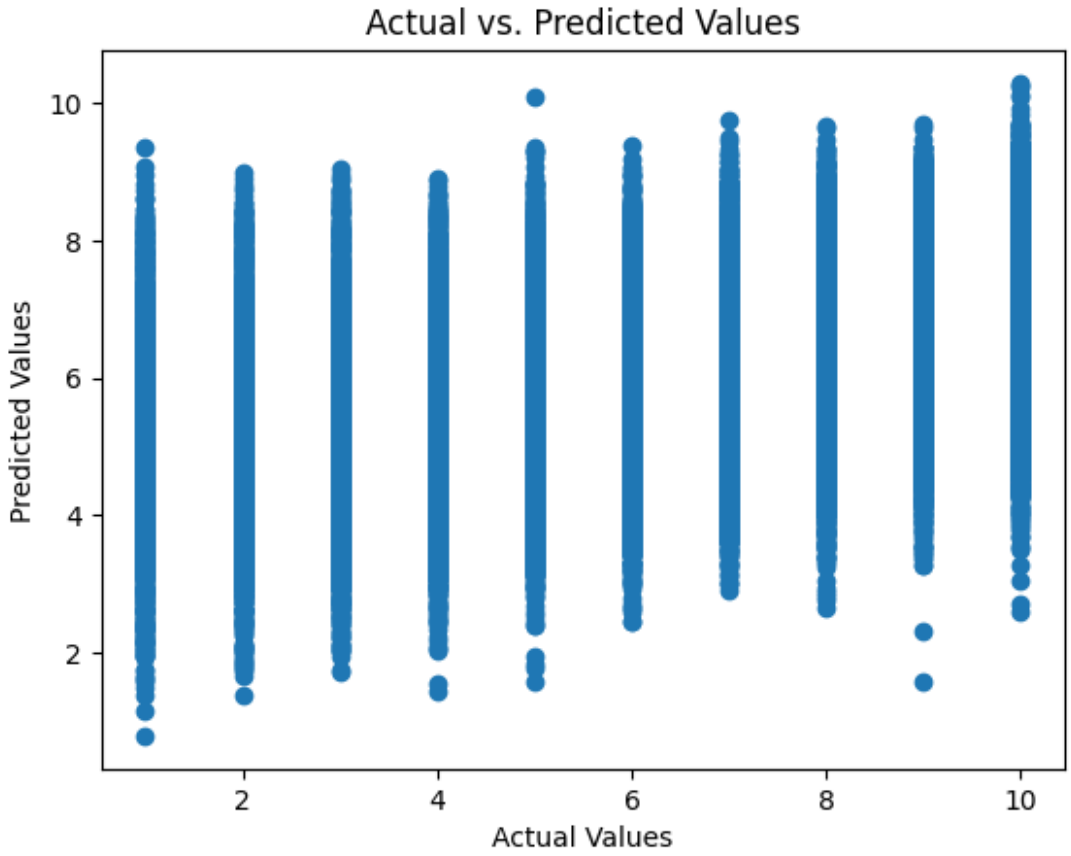
```
print("RMSE:", rmse)
print("MAE:", mae)
```

```
MSE: 5.431816917899729
RMSE: 2.330625863990128
MAE: 1.8957902658730832
```

But with feature importance it can be seen that the importance of ranking is a lot more than all others.

```
import matplotlib.pyplot as plt

plt.scatter(y_test, y_pred)
plt.xlabel("Actual Values")
plt.ylabel("Predicted Values")
plt.title("Actual vs. Predicted Values")
plt.show()
```




```
train_pool = cb.Pool(X_train, y_train, cat_features=[1,2,3])
test_pool = cb.Pool(X_test, y_test, cat_features=[1,2,3])
# Get feature importance
feature_importance = model.feature_importances_
```

```
# Get SHAP values
shap_values = model.get_feature_importance(data=test_pool,
type='ShapValues')

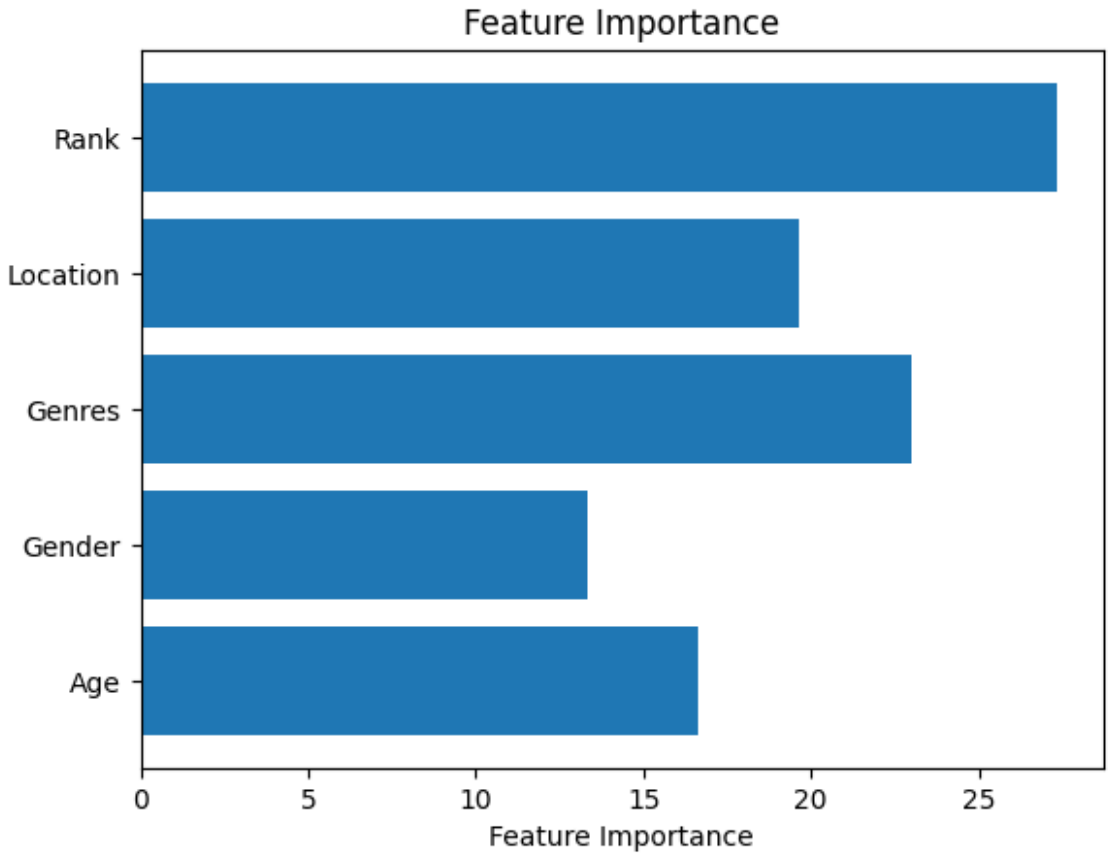
import matplotlib.pyplot as plt

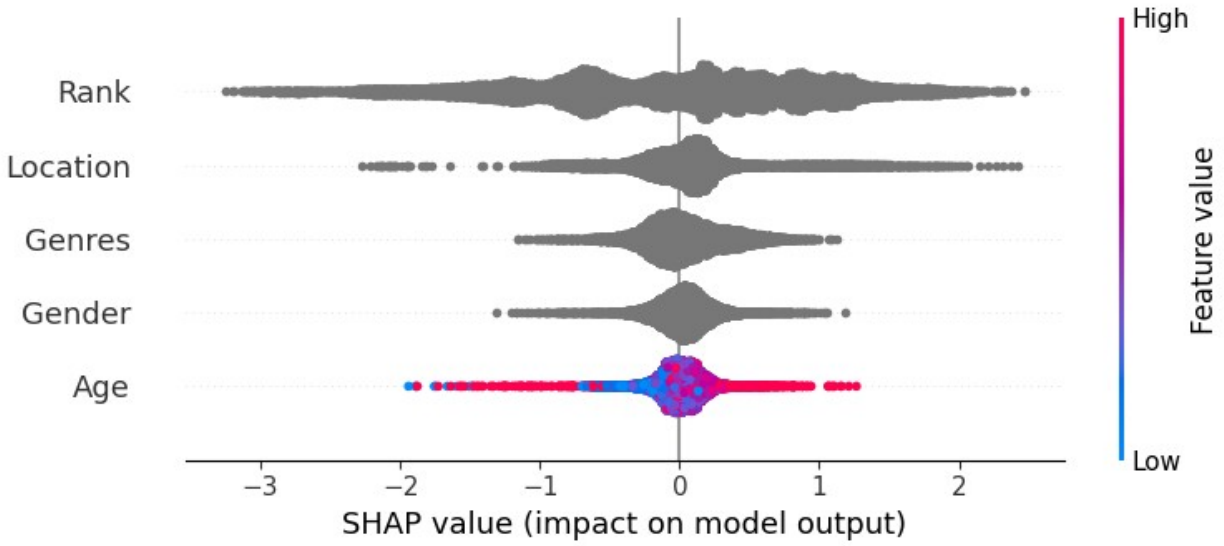
# Plot feature importance
plt.barh(range(len(feature_importance)), feature_importance,
align='center')
plt.yticks(range(len(feature_importance)), X.columns)
plt.xlabel('Feature Importance')

plt.title('Feature Importance')
plt.show()

# Visualize SHAP values (more advanced)
import shap

shap.summary_plot(shap_values[:,:-1], X_test)
```




Rank
Location
Genres
Gender
Age
−3
−2
−1
0
1
2
SHAP value (impact on model output)
High
Feature value
Low