```
import imageio as iio
import visvis as vv
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import pandas as pd
from PIL import Image
import csv
import os
%matplotlib inline
pd.options.mode.chained_assignment = None
```

```
df = pd.read_csv('savedwork.csv')
```

```
df
```

	hash	site_nm	date	country	img_url	
0	f810500fcf4ffdbd89571a469951c835	July	2022-06-10	United States	https://assets.awwwards.com/awards/media/cache...	f810500fcf4ffdbd89571a46
1	147fd1ccb1a369fa1663d26dfff9bdd9	Shaping Better Maritime World	2022-05-06	France	https://assets.awwwards.com/awards/media/cache...	147fd1ccb1a369fa1663d2
2	e077a8deb52eb3dc2560248fb6b2fb2f	No Fun Studio	2022-03-30	United States	https://assets.awwwards.com/awards/media/cache...	e077a8deb52eb3dc2560248
3	9313bd9422860e60229e52f2f5f8dafd	Dynamic Solution	2022-03-29	Germany	https://assets.awwwards.com/awards/media/cache...	9313bd9422860e60229e52
4	f14a4c67cadf1cfb5d6b9cb8ec2c432a	AllCaps	2022-03-28	Czech Republic	https://assets.awwwards.com/awards/media/cache...	f14a4c67cadf1cfb5d6b9cb
...	...	...	...	...	...	
9810	27971fd45b0cd48d79a7323c1a170203	UNLOCK YOU | WW	2019-12-09	Japan	https://assets.awwwards.com/awards/media/cache...	27971fd45b0cd48d79a7323
9811	ab5ea49896c0534621131fdaac491c15	The Scott Resort & Spa	2019-12-08	United Kingdom	https://assets.awwwards.com/awards/media/cache...	ab5ea49896c0534621131fd
9812	bfb60a6e07853064a377f4c7d5f5a6d6	Sacha Tourtoulou - Portfolio	2019-12-07	France	https://assets.awwwards.com/awards/media/cache...	bfb60a6e07853064a377f4c
9813	799957330d0cc8fb36c3439cd9252688	The Geek Designer	2019-12-06	United States	https://assets.awwwards.com/awards/media/cache...	799957330d0cc8fb36c3439c
9814	8fdef32d6f960f42baabcb3b6f331353	Limnia Modular Fine Jewelry	2019-12-05	United States	https://assets.awwwards.com/awards/media/cache...	8fdef32d6f960f42baabcb3b

9815 rows × 11 columns

Formatting Dates to Date Types

```
print(df['date'].dtype)
df['date'] = pd.to_datetime(df['date'])
print(df['date'].dtype)
```

```
object
datetime64[ns]
```

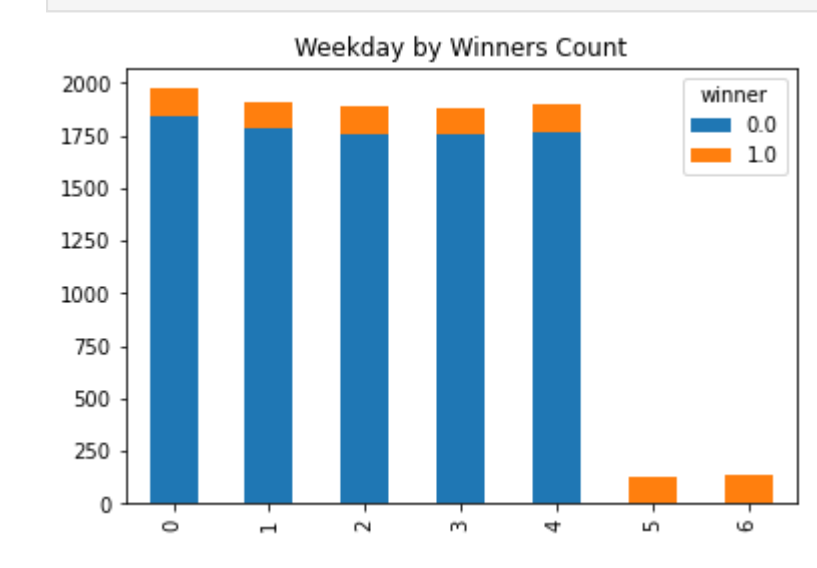
Creating Date Parts

```
df['weekday'] = df['date'].dt.day_of_week
df['day'] = df['date'].dt.day
df['year'] = df['date'].dt.year
df['month'] = df['date'].dt.month
```

```
2021    4358
2020    4086
2022    1131
2019     240
Name: year, dtype: int64
```

Reviewing Weekday Trends

```
weekday_df = df.groupby(['weekday','winner'])['year'].count().unstack('winner').reset_index().set_index('weekda
weekday_df.index.names = [None]
weekday_df.head()
ax = weekday_df[[0.0,1.0]].plot(kind='bar', stacked=True, title = 'Weekday by Winners Count')
```



Need to Remove Weekdays of 5 & 6 as these are have winner details but no nominees

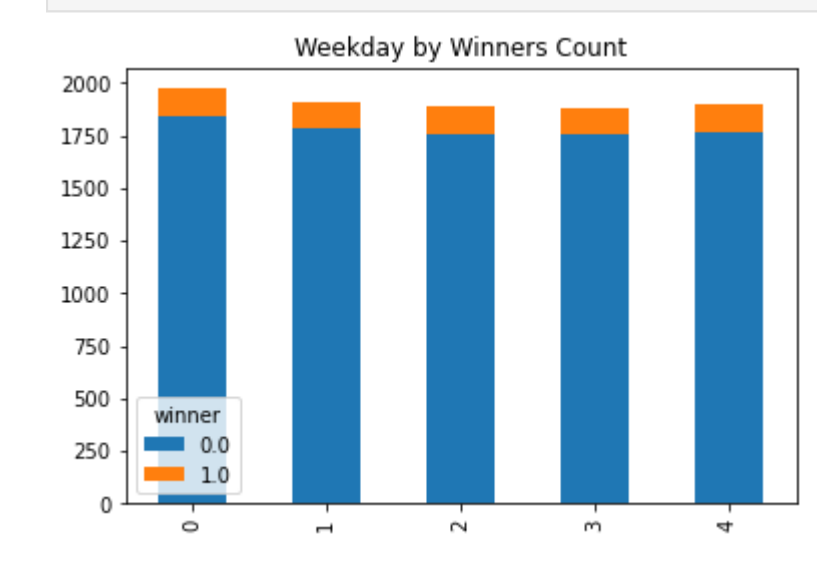
```
weekday_df
```

winner	0.0	1.0
0	1846	126
1	1784	128
2	1757	128
3	1752	130
4	1770	129
5	2	127
6	7	129

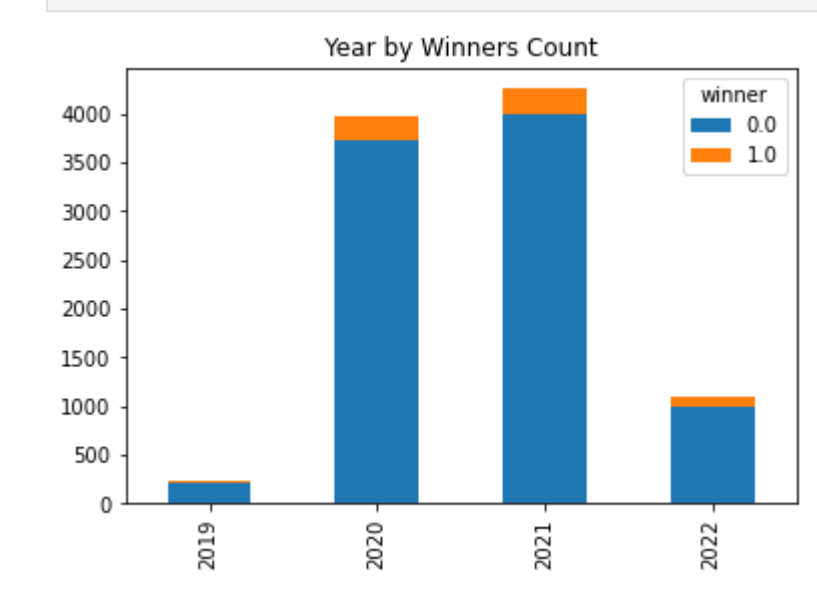
```
print("DF length before removing Saturdays: "+str(len(df)))
df = df[(df['weekday']!=5)]
print("DF length after removing Saturdays: "+str(len(df)))
df = df[(df['weekday']!=6)]
print("DF length after removing Sundays: "+str(len(df)))
```

```
DF length before removing Saturdays: 9815
DF length after removing Saturdays: 9686
DF length after removing Sundays: 9550
```

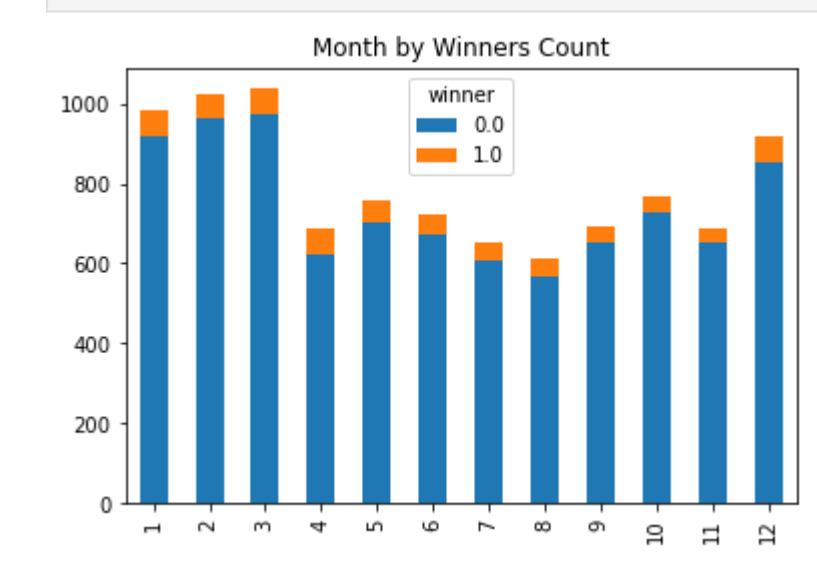
```
weekday_df = df.groupby(['weekday','winner'])['year'].count().unstack('winner').reset_index().set_index('weekda
weekday_df.index.names = [None]
weekday_df.head()
ax = weekday_df[[0.0,1.0]].plot(kind='bar', stacked=True, title = 'Weekday by Winners Count')
```




```
year_df = df.groupby(['year','winner'])['year'].count().unstack('winner').reset_index().set_index('year')
year_df.index.names = [None]
year_df.head()
ax = year_df[[0.0,1.0]].plot(kind='bar', stacked=True, title = 'Year by Winners Count')
```

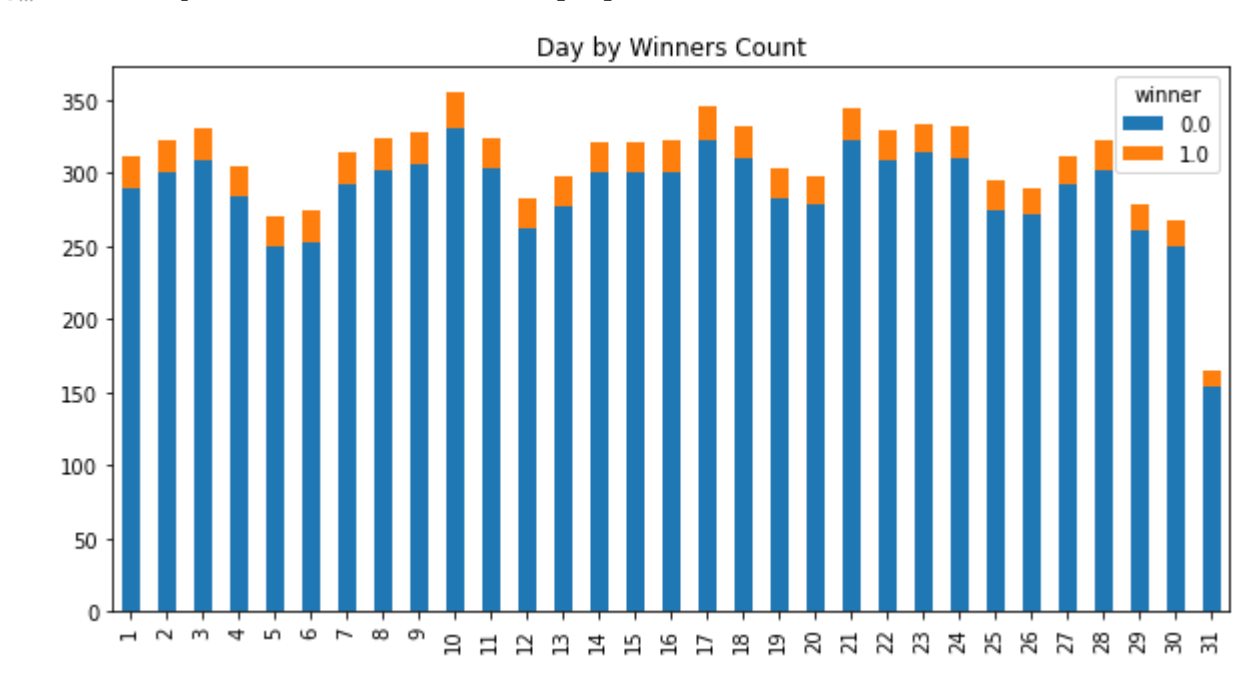



```
month_df = df.groupby(['month','winner'])['month'].count().unstack('winner').reset_index().set_index('month')
month_df.index.names = [None]
month_df.head()
ax = month_df[[0.0,1.0]].plot(kind='bar', stacked=True, title = 'Month by Winners Count')
```




```
day_df = df.groupby(['day','winner'])['day'].count().unstack('winner').reset_index().set_index('day')
day_df.index.names = [None]
day_df.head()
day_df[[0.0,1.0]].plot(kind='bar', stacked=True, title = 'Day by Winners Count', figsize=(10, 5))
```

```
<AxesSubplot:title={'center':'Day by Winners Count'}>
```



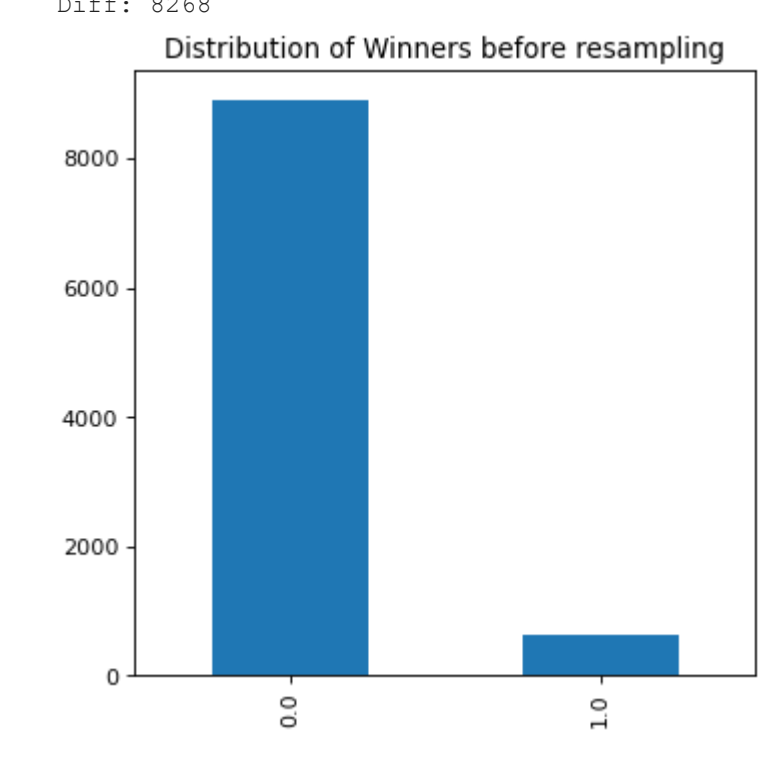
Solving for Imbalanced Classes

```
from matplotlib import pyplot
from matplotlib.pyplot import figure

print('Non-Winners Count: '+str(len(df[df['winner']==0])))
print('Winners Count:'+ str(len(df[df['winner']==1])))
df_win = df[df['winner']==1]
df_nom = df[df['winner']==0]
diff = len(df[df['winner']==0]) - len(df[df['winner']==1])
print("Diff: "+str(diff))
figure(figsize=(5, 5), dpi=80)
df['winner'].value_counts().plot(kind='bar')

pyplot.xticks(rotation = 90)
plt.title("Distribution of Winners before resampling")
pyplot.show()
```

```
Non-Winners Count: 8909
Winners Count:641
Diff: 8268
```



Random Sampling with Replacement

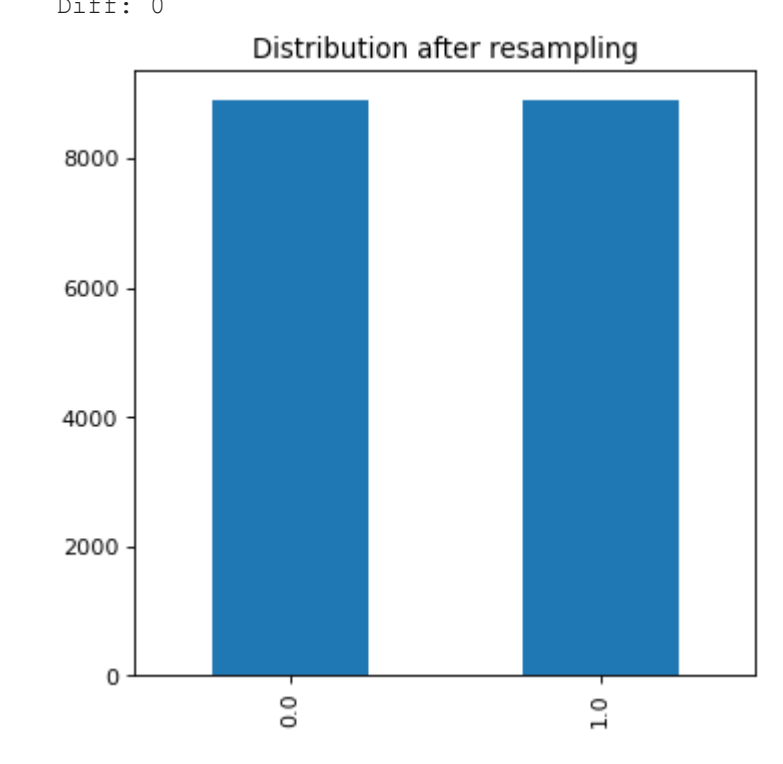
```
from random import choices
df_smpld = df_win.iloc[np.random.randint(0, len(df_win), size=diff)]
print(len(df_smpld))
df = pd.concat([df, df_smpld], axis=0)
```

```
8268
```

```
print('Non-Winners Count: '+str(len(df[df['winner']==0])))
print('Winners Count:'+ str(len(df[df['winner']==1])))
diff = len(df[df['winner']==0]) - len(df[df['winner']==1])
print("Diff: "+str(diff))
figure(figsize=(5, 5), dpi=80)
df['winner'].value_counts().plot(kind='bar')

pyplot.xticks(rotation = 90)
plt.title("Distribution after resampling")
pyplot.show()
```

```
Non-Winners Count: 8909
Winners Count:8909
Diff: 0
```



Encode non-numeric features

```
from sklearn import preprocessing

le = preprocessing.LabelEncoder()
le.fit(df["country"])
df['country_enc']=(le.transform(df["country"]))

le.fit(df["average_color"])
df['average_color_enc']=(le.transform(df["average_color"]))

le.fit(df["dominant_color"])
df['dominant_color_enc']=(le.transform(df["dominant_color"]))
```

```
df.head()
```

	hash	site_nm	date	country	img_url	img_
0	f810500fcf4ffdbd89571a469951c835	July	2022-06-10	United States	https://assets.awwwards.com/awards/media/cache...	f810500fcf4ffdbd89571a469951c8
1	147fd1ccb1a369fa1663d26dfff9bdd9	Shaping Better Maritime World	2022-05-06	France	https://assets.awwwards.com/awards/media/cache...	147fd1ccb1a369fa1663d26dfff9b
2	e077a8deb52eb3dc2560248fb6b2fb2f	No Fun Studio	2022-03-30	United States	https://assets.awwwards.com/awards/media/cache...	e077a8deb52eb3dc2560248fb6b2f
3	9313bd9422860e60229e52f2f5f8dafd	Dynamic Solution	2022-03-29	Germany	https://assets.awwwards.com/awards/media/cache...	9313bd9422860e60229e52f2f5f8
4	f14a4c67cadf1cfb5d6b9cb8ec2c432a	AllCaps	2022-03-28	Czech Republic	https://assets.awwwards.com/awards/media/cache...	f14a4c67cadf1cfb5d6b9cb8ec2c4

Remove unnecessary columns

```
corr_cols = ['winner', 'day','month','year','country_enc','average_color_enc','dominant_color_enc', 'unique_col
cols = ['day','month','year','country_enc','average_color_enc','dominant_color_enc', 'unique_color_count_50']
data = df[cols]
target = df['winner']
```

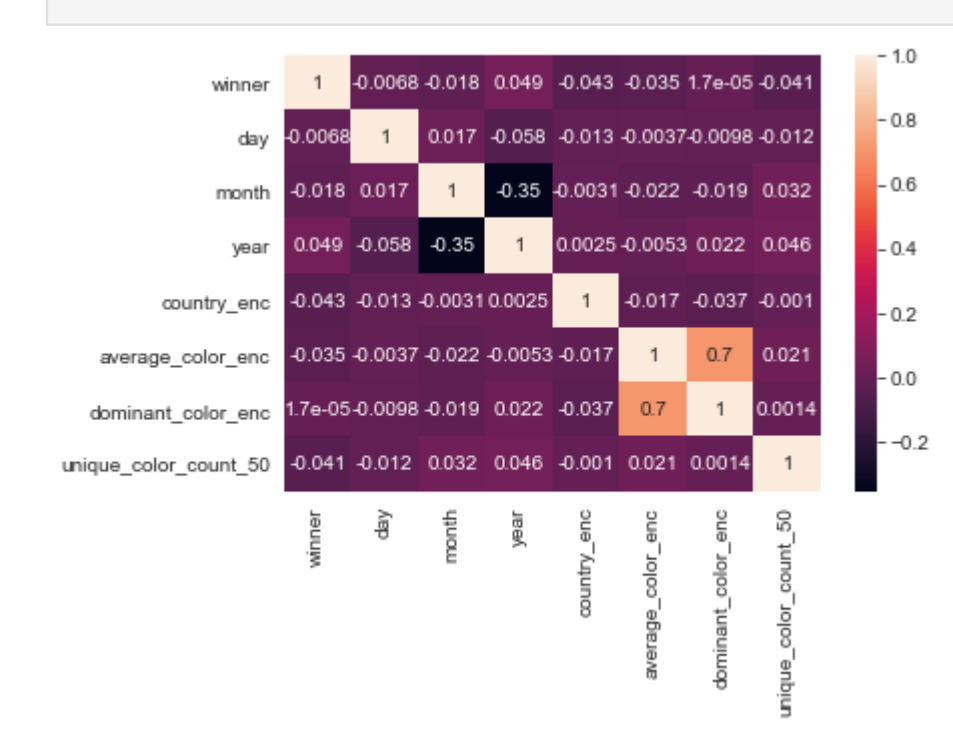
```
data.shape
```

```
(17818, 7)
```

```
target.shape
```

```
(17818,)
```

```
import seaborn as sn
corrMatrix = df[corr_cols].corr()
sn.heatmap(corrMatrix, annot=True)
plt.show()
```




```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(
    data, target, random_state=0)
```

```
print("X_train shape:", X_train.shape)
print("y_train shape:", y_train.shape)
```

```
X_train shape: (13363, 7)
y_train shape: (13363,)
```

```
print("X_test shape:", X_test.shape)
print("y_test shape:", y_test.shape)
```

```
X_test shape: (4455, 7)
y_test shape: (4455,)
```

```
from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier(n_neighbors=3)

knn.fit(X_train, y_train)
```

```
KNeighborsClassifier(n_neighbors=3)
```

```
print("Model score:")
print(knn.score(X_test,y_test))
```

```
Model score:
0.9099887766554433
```

```
no_neighbors = np.arange(2, 20)
train_accuracy = np.empty(len(no_neighbors))
test_accuracy = np.empty(len(no_neighbors))
```

```
data.columns
```

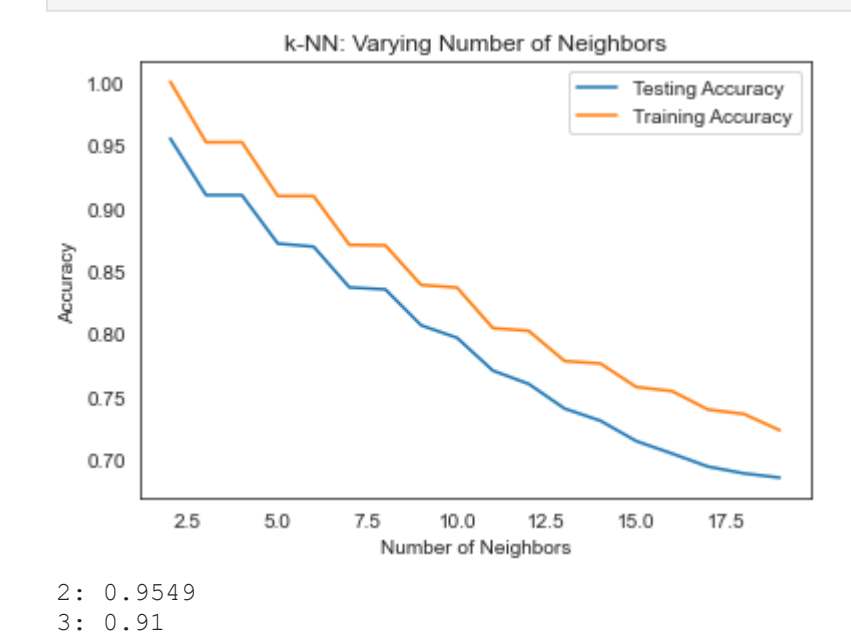
```
Index(['day', 'month', 'year', 'country_enc', 'average_color_enc',
       'dominant_color_enc', 'unique_color_count_50'],
      dtype='object')
```

```
for i, k in enumerate(no_neighbors):
    knn = KNeighborsClassifier(n_neighbors=k)
    knn.fit(X_train,y_train)

    # Compute accuracy on the training set
    train_accuracy[i] = knn.score(X_train, y_train)
    # Compute accuracy on the testing set
    test_accuracy[i] = knn.score(X_test, y_test)

# Visualization of k values vs accuracy
plt.title('k-NN: Varying Number of Neighbors')
plt.plot(no_neighbors, test_accuracy, label = 'Testing Accuracy')
plt.plot(no_neighbors, train_accuracy, label = 'Training Accuracy')
plt.legend()
plt.xlabel('Number of Neighbors')
plt.ylabel('Accuracy')
plt.show()

n=0
for i in test_accuracy:
    print(str(no_neighbors[n])+": "+str(round(i,4)))
    n = n+1
```




```
2: 0.9549
3: 0.91
4: 0.91
5: 0.8716
6: 0.8691
7: 0.8368
8: 0.8352
9: 0.8067
10: 0.7969
11: 0.7708
12: 0.7603
13: 0.7407
14: 0.7311
15: 0.7149
16: 0.7051
17: 0.6947
18: 0.6893
19: 0.686
```

```
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix

model = KNeighborsClassifier(n_neighbors = 2)
model.fit(X_train, y_train)
predictions = model.predict(X_test)
print(classification_report(y_test, predictions))
```

```
              precision    recall  f1-score   support

         0.0       1.00      0.91      0.95      2204
         1.0       0.92      1.00      0.96      2251

    accuracy                           0.95      4455
   macro avg       0.96      0.95      0.95      4455
weighted avg       0.96      0.95      0.95      4455
```