```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from xgboost import XGBClassifier
from sklearn import metrics

import warnings
warnings.filterwarnings('ignore')

df = pd.read_csv("E:/Excel files/tata revised data.csv")
df.head()
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	03-01-2000	207.4	217.25	207.4	216.75	217.0	676126
1	04-01-2000	217.0	219.00	206.0	208.20	211.9	679215
2	05-01-2000	194.0	217.80	194.0	213.25	213.1	1120951
3	06-01-2000	215.0	229.90	215.0	222.10	222.0	1968998
4	07-01-2000	224.0	239.90	223.1	239.90	239.9	2199431

```
df.shape
```

```
(5306, 7)
```

```
df.describe()
```

	Open	High	Low	Close	Adj Close
count	5306.000000	5306.000000	5306.000000	5306.000000	5306.000000
mean	410.152752	417.122512	402.179438	409.450264	409.451828
std	272.966475	277.018798	268.028297	272.473264	272.516903
min	58.000000	60.700000	57.550000	58.800000	58.750000
25%	174.762500	178.825000	171.012500	174.600000	174.725000
50%	378.900000	384.750000	372.600000	377.250000	377.525000
75%	523.475000	530.800000	515.912500	523.150000	523.487500
max	1361.000000	1382.000000	1347.000000	1365.150000	1362.000000

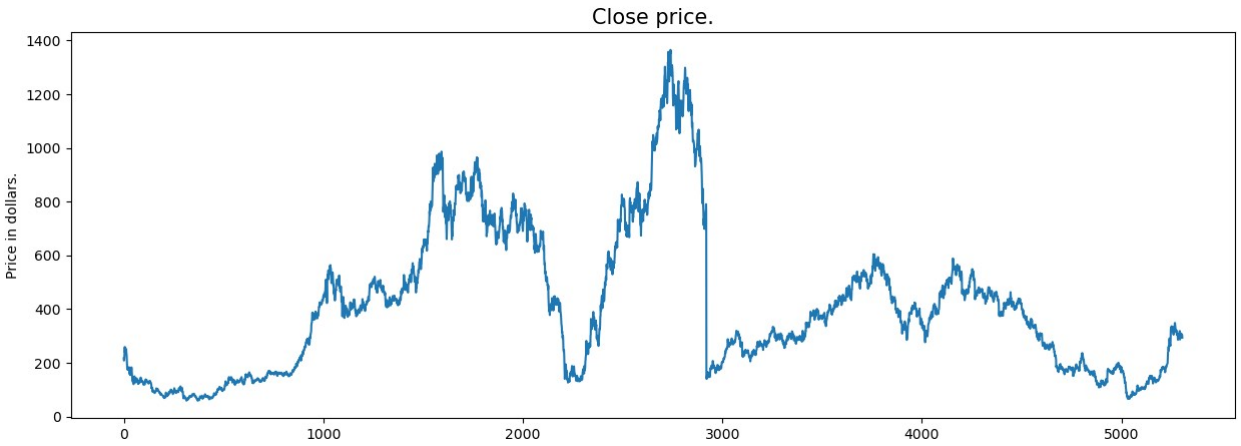
	Volume
count	5.306000e+03

```
mean    1.046560e+07
std     2.185034e+07
min     1.235100e+04
25%     1.668994e+06
50%     4.141648e+06
75%     8.706037e+06
max     3.905778e+08
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5306 entries, 0 to 5305
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Date       5306 non-null   object 
 1   Open       5306 non-null   float64
 2   High       5306 non-null   float64
 3   Low        5306 non-null   float64
 4   Close      5306 non-null   float64
 5   Adj Close  5306 non-null   float64
 6   Volume     5306 non-null   int64  
dtypes: float64(5), int64(1), object(1)
memory usage: 290.3+ KB
```

```
plt.figure(figsize=(15,5))
plt.plot(df['Close'])
plt.title('Close price.', fontsize=15)
plt.ylabel('Price in dollars.')
plt.show()
```




```
df.head()
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	03-01-2000	207.4	217.25	207.4	216.75	217.0	676126
1	04-01-2000	217.0	219.00	206.0	208.20	211.9	679215

```
2  05-01-2000  194.0  217.80  194.0  213.25      213.1  1120951
3  06-01-2000  215.0  229.90  215.0  222.10      222.0  1968998
4  07-01-2000  224.0  239.90  223.1  239.90      239.9  2199431
```

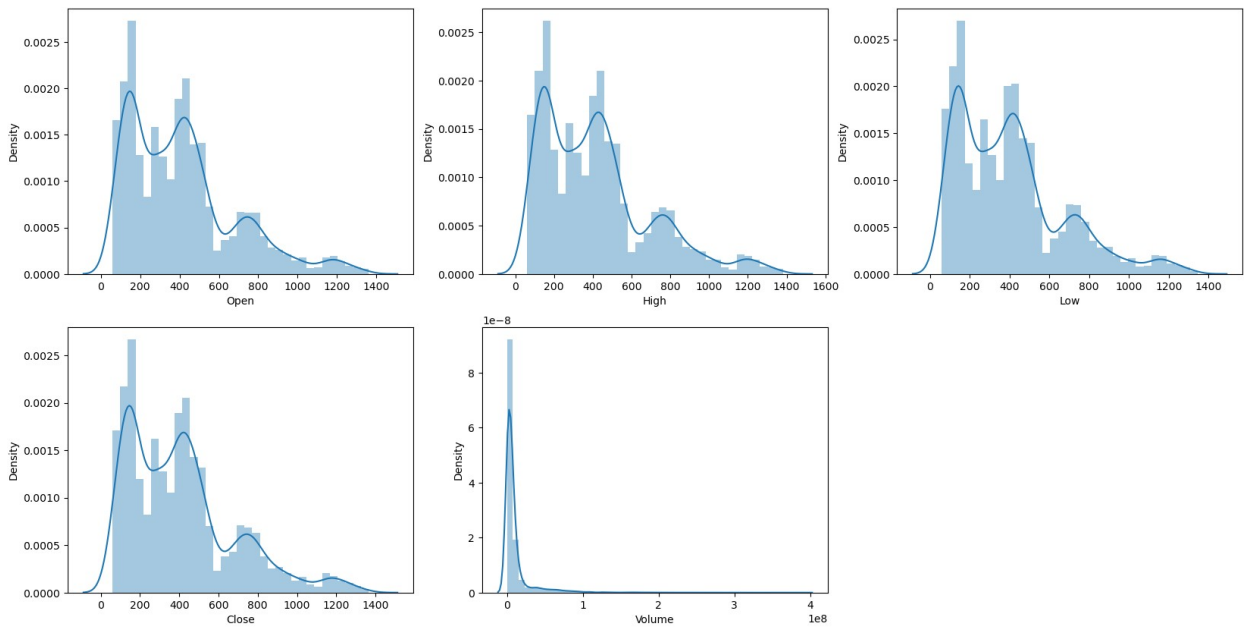
```
df[df['Close'] == df['Adj Close']].shape
```

```
(150, 7)
```

```
df.isnull().sum()
```

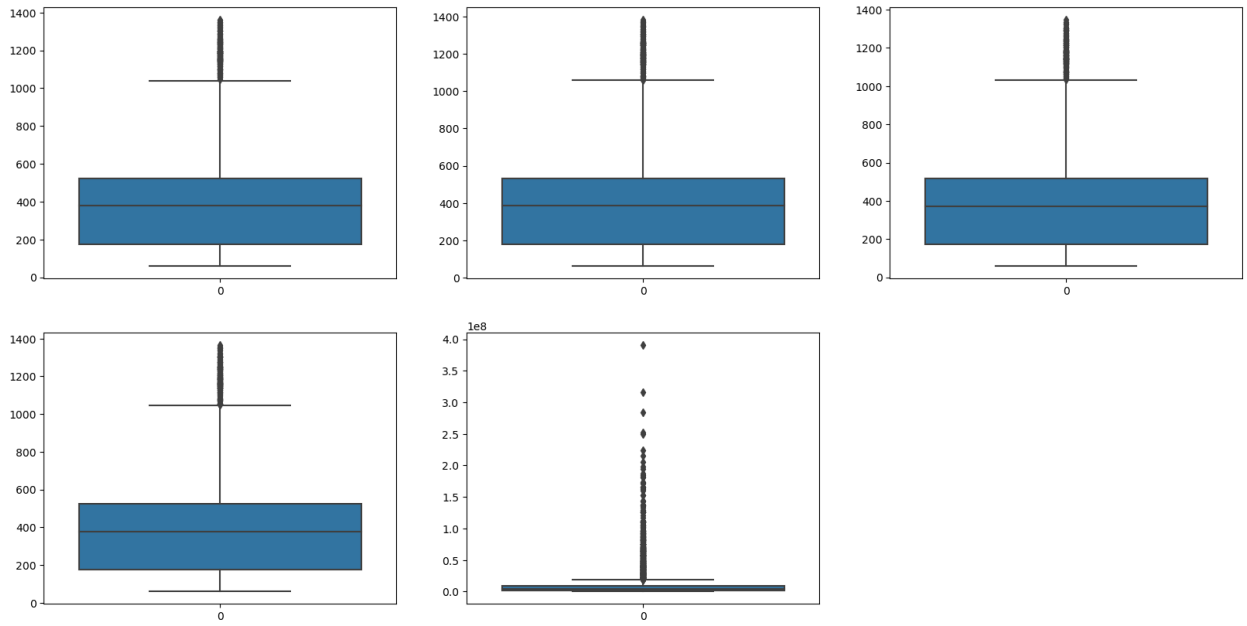
```
Date         0
Open         0
High         0
Low          0
Close        0
Adj Close    0
Volume       0
dtype: int64
```

```
features = ['Open', 'High', 'Low', 'Close', 'Volume']

plt.subplots(figsize=(20,10))

for i, col in enumerate(features):
    plt.subplot(2,3,i+1)
    sb.distplot(df[col])
plt.show()
```




```
plt.subplots(figsize=(20,10))
for i, col in enumerate(features):
    plt.subplot(2,3,i+1)
```

```
    sb.boxplot(df[col])
plt.show()
```




```
df['Date'] = pd.to_datetime(df['Date'])

df['day'] = df['Date'].dt.day
df['month'] = df['Date'].dt.month
df['year'] = df['Date'].dt.year

df.head()
```

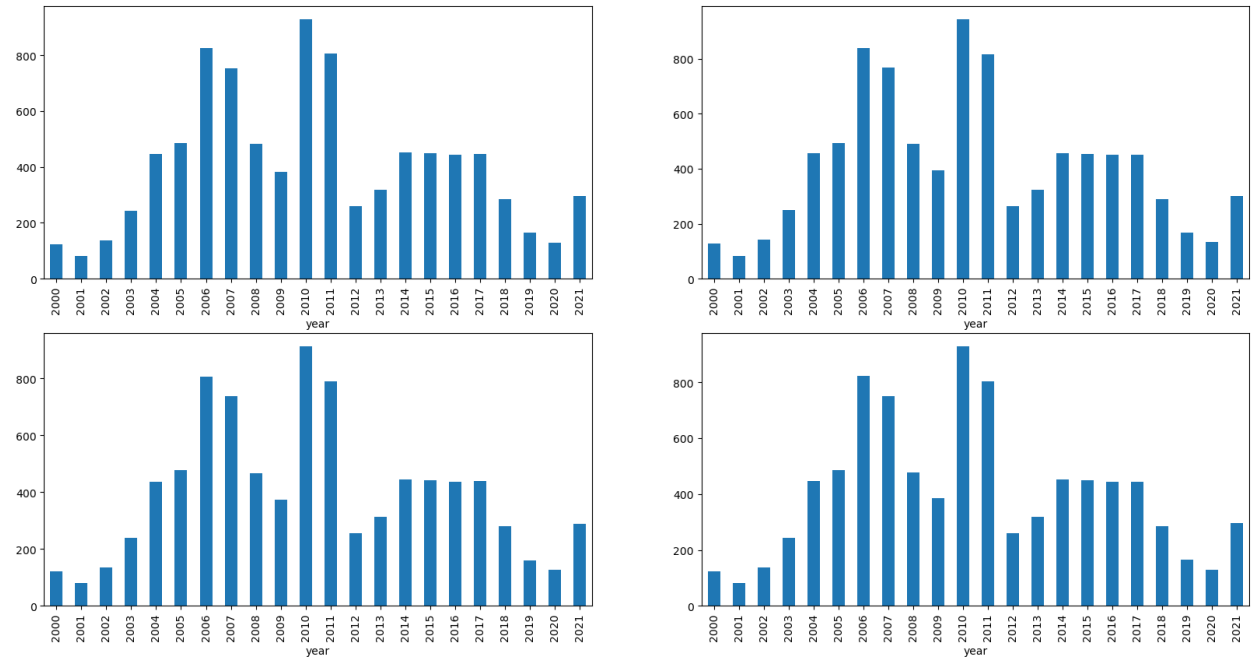
```
        Date   Open    High    Low   Close  Adj Close    Volume  day
month  \
0 2000-03-01  207.4  217.25  207.4  216.75      217.0    676126    1
3
1 2000-04-01  217.0  219.00  206.0  208.20      211.9    679215    1
4
2 2000-05-01  194.0  217.80  194.0  213.25      213.1   1120951    1
5
3 2000-06-01  215.0  229.90  215.0  222.10      222.0   1968998    1
6
4 2000-07-01  224.0  239.90  223.1  239.90      239.9   2199431    1
7

   year
0  2000
1  2000
2  2000
3  2000
4  2000
```

```
df['is_quarter_end'] = np.where(df['month']%3==0,1,0)
df.head()
```

```
        Date   Open    High    Low   Close  Adj Close   Volume  day
month  \
0 2000-03-01  207.4  217.25  207.4  216.75      217.0   676126    1
3
1 2000-04-01  217.0  219.00  206.0  208.20      211.9   679215    1
4
2 2000-05-01  194.0  217.80  194.0  213.25      213.1  1120951    1
5
3 2000-06-01  215.0  229.90  215.0  222.10      222.0  1968998    1
6
4 2000-07-01  224.0  239.90  223.1  239.90      239.9  2199431    1
7
```

```
   year  is_quarter_end
0  2000               1
1  2000               0
2  2000               0
3  2000               1
4  2000               0
```

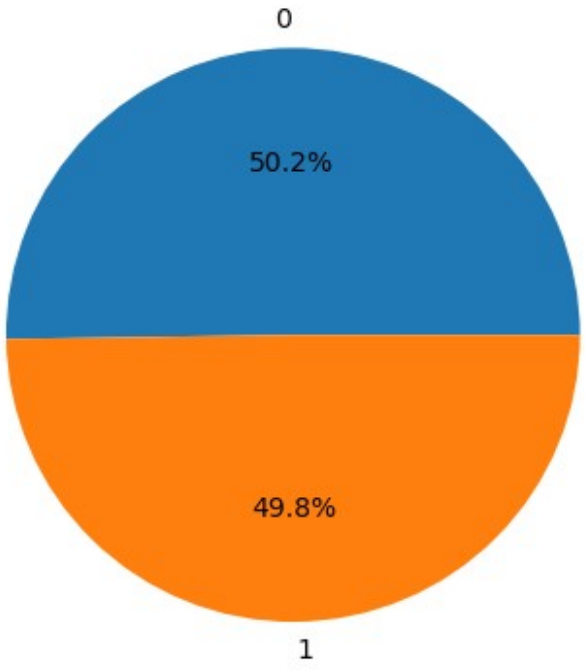
```
data_grouped = df.groupby('year').mean()
plt.subplots(figsize=(20,10))

for i, col in enumerate(['Open', 'High', 'Low', 'Close']):
    plt.subplot(2,2,i+1)
    data_grouped[col].plot.bar()
plt.show()
```



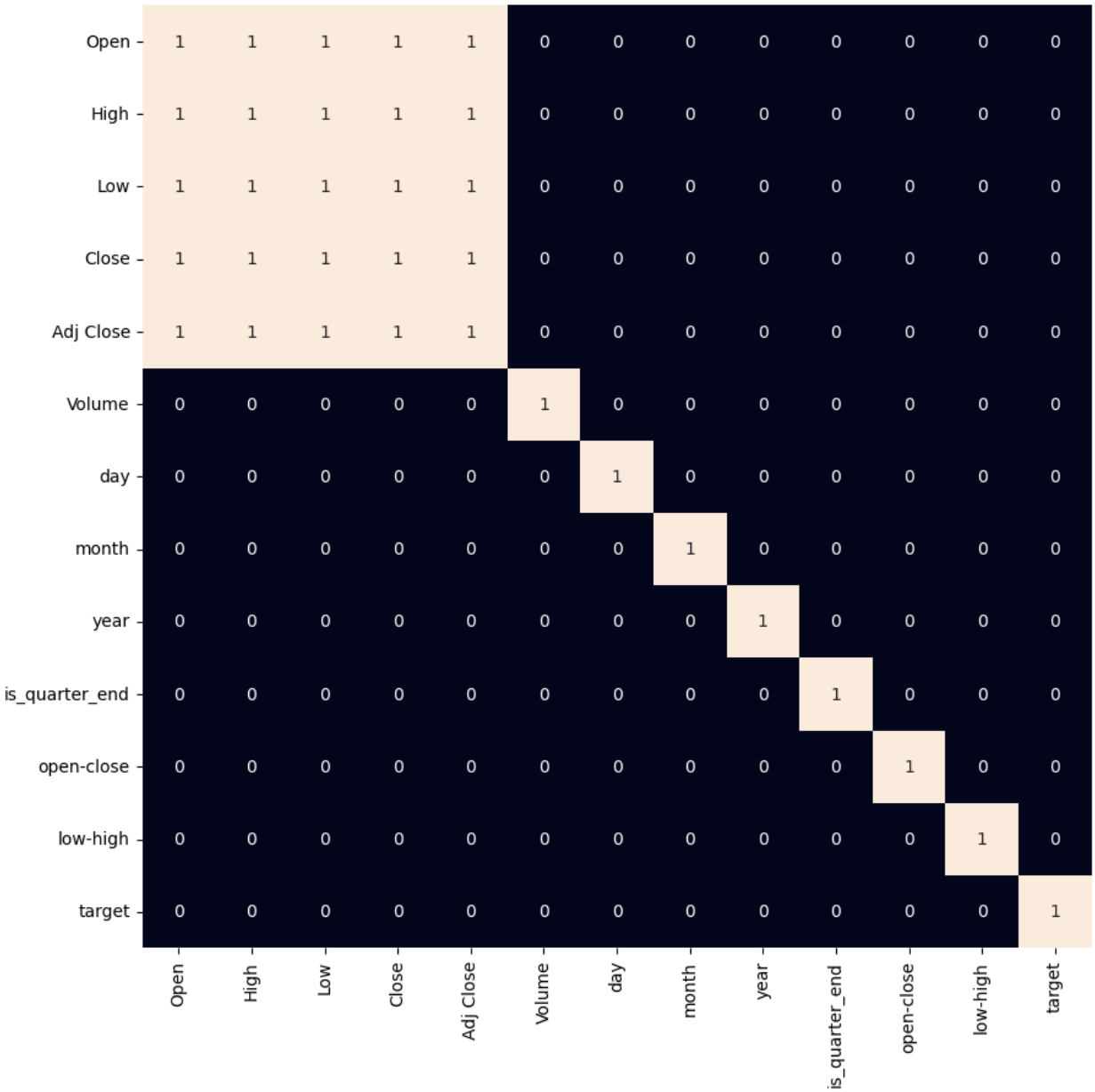
```
df.groupby('is_quarter_end').mean()
```

```
                        Open        High         Low       Close   Adj
Close  \
is_quarter_end

0                410.523839  417.591827  402.232960  409.651303
409.658796
1                409.415175  416.189696  402.073057  409.050676
409.040456

                        Volume        day     month         year
is_quarter_end
0                1.049099e+07  15.767139  6.041643  2010.153258
1                1.041513e+07  15.639077  7.451014  2010.104730
```

```
df['open-close'] = df['Open'] - df['Close']
df['low-high'] = df['Low'] - df['High']
df['target'] = np.where(df['Close'].shift(-1) > df['Close'], 1, 0)

plt.pie(df['target'].value_counts().values,
        labels=[0, 1], autopct='%1.1f%%')
plt.show()
```




```
plt.figure(figsize=(10, 10))
sb.heatmap(df.corr() > 0.9, annot=True, cbar=False)
plt.show()
```




```
features = df[['open-close', 'low-high', 'is_quarter_end']]
target = df['target']

scaler = StandardScaler()
features = scaler.fit_transform(features)

X_train, X_valid, Y_train, Y_valid = train_test_split(
    features, target, test_size=0.1, random_state=2022)
print(X_train.shape, X_valid.shape)
```

```
(4775, 3) (531, 3)
```

```
models = [LogisticRegression(), SVC(
kernel='poly', probability=True), XGBClassifier()]

for i in range(3):
        models[i].fit(X_train, Y_train)

print(f'{models[i]} : ')
print('Training Accuracy : ', metrics.roc_auc_score(Y_train,
models[i].predict_proba(X_train)[:,1]))
print('Validation Accuracy : ', metrics.roc_auc_score(Y_valid,
models[i].predict_proba(X_valid)[:,1]))
print()
```

```
XGBClassifier(base_score=None, booster=None, callbacks=None,
              colsample_bylevel=None, colsample_bynode=None,
              colsample_bytree=None, early_stopping_rounds=None,
              enable_categorical=False, eval_metric=None,
feature_types=None,
              gamma=None, gpu_id=None, grow_policy=None,
importance_type=None,
              interaction_constraints=None, learning_rate=None,
max_bin=None,
              max_cat_threshold=None, max_cat_to_onehot=None,
              max_delta_step=None, max_depth=None, max_leaves=None,
              min_child_weight=None, missing=nan,
monotone_constraints=None,
              n_estimators=100, n_jobs=None, num_parallel_tree=None,
              predictor=None, random_state=None, ...) :
Training Accuracy :  0.8699798388299365
Validation Accuracy :  0.5498978491572555
```