```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.tsa.arima.model import ARIMA
from sklearn.metrics import mean_squared_error
```

```
df = pd.read_csv('/content/Crypto.csv')
df.head()
```

	unix	date	symbol	open	high	low	close	Volume XRP	Volume USDT
0	1.640000e+12	12/27/2021	XRP-USDT	0.9200	0.9237	0.9200	0.9226	2384512.0	2.198450e+06
1	1.640000e+12	12/26/2021	XRP-USDT	0.9252	0.9334	0.9052	0.9200	163438501.0	1.499400e+08
2	1.640000e+12	12/25/2021	XRP-USDT	0.9114	0.9350	0.8981	0.9252	250074945.0	2.302303e+08
3	1.640000e+12	12/24/2021	XRP-USDT	0.9941	0.9966	0.8964	0.9115	567234092.0	5.377035e+08
4	1.640000e+12	12/23/2021	XRP-USDT	0.9538	1.0167	0.9372	0.9941	479436230.0	4.729372e+08

Next steps: Generate code with df | View recommended plots | New interactive sheet

```
# Basic Data Exploration
print(df.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1334 entries, 0 to 1333
Data columns (total 9 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   unix         1334 non-null   float64
 1   date         1334 non-null   object
 2   symbol       1334 non-null   object
 3   open         1334 non-null   float64
 4   high         1334 non-null   float64
 5   low          1334 non-null   float64
 6   close        1334 non-null   float64
 7   Volume XRP   1334 non-null   float64
 8   Volume USDT  1334 non-null   float64
dtypes: float64(7), object(2)
memory usage: 93.9+ KB
None
```

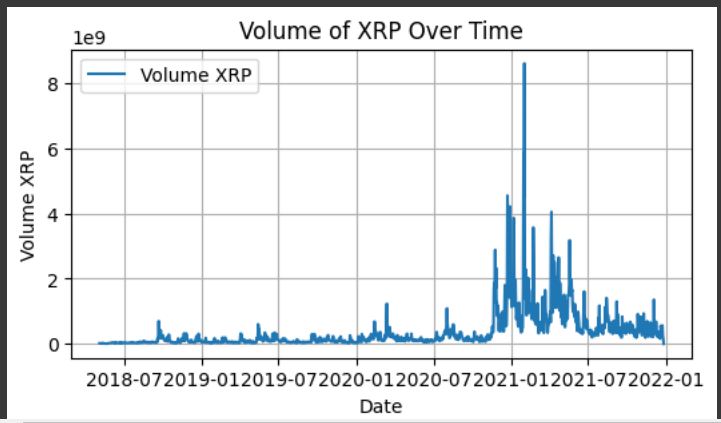
```
# Data Cleaning
# Convert the 'date' column to datetime
df['date'] = pd.to_datetime(df['date'])
```

```
# Check for missing values
print(df.isnull().sum())
```

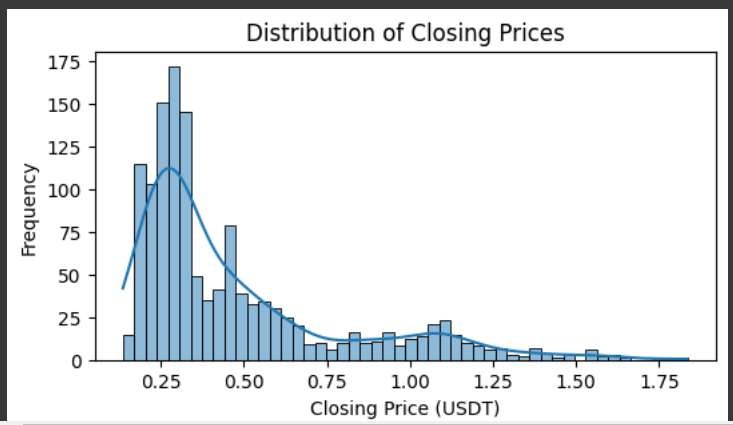
```
unix           0
date           0
symbol         0
open           0
high           0
low            0
close          0
Volume XRP     0
Volume USDT    0
dtype: int64
```

```
# Plot the closing price over time
plt.figure(figsize=(6, 3))
plt.plot(df['date'], df['close'])
plt.title('Closing Price Over Time')
plt.xlabel('Date')
plt.ylabel('Closing Price (USDT)')
plt.grid(True)
plt.show()
```

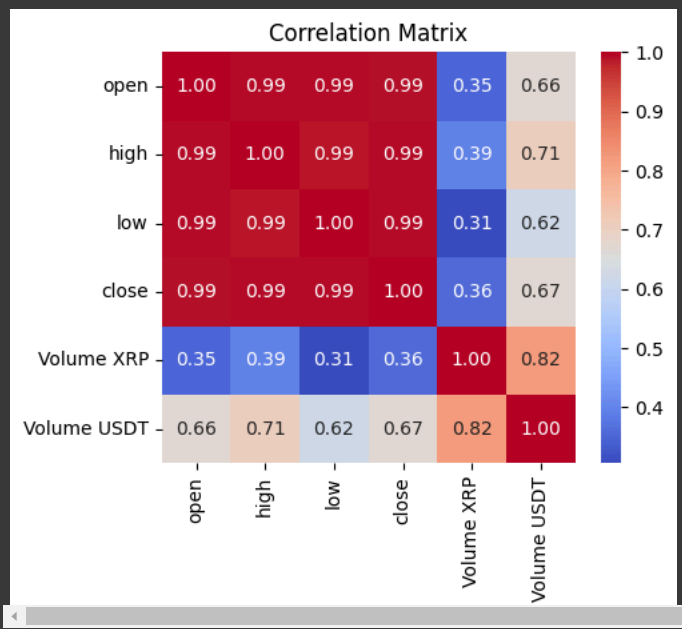

```
# Volume of XRP over time
plt.figure(figsize=(6, 3))
plt.plot(df['date'], df['Volume XRP'], label='Volume XRP')
plt.title('Volume of XRP Over Time')
plt.xlabel('Date')
plt.ylabel('Volume XRP')
plt.legend()
plt.grid(True)
plt.show()
```




```
# Distribution of closing prices
plt.figure(figsize=(6, 3))
sns.histplot(df['close'], bins=50, kde=True)
plt.title('Distribution of Closing Prices')
plt.xlabel('Closing Price (USDT)')
plt.ylabel('Frequency')
plt.show()
```



```
# Correlation Heatmap
plt.figure(figsize=(5, 4))
corr = df[['open', 'high', 'low', 'close', 'Volume XRP', 'Volume USDT']].corr()
sns.heatmap(corr, annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Correlation Matrix')
plt.show()
```




```
# Time Series Modeling with ARIMA
# Split the data into train and test sets
train_size = int(len(df) * 0.8)
train, test = df['close'][:train_size], df['close'][train_size:]
```

```
# Fit the ARIMA model
model = ARIMA(train, order=(5, 1, 0))
model_fit = model.fit()
```

```
# Print the model summary
print(model_fit.summary())
```

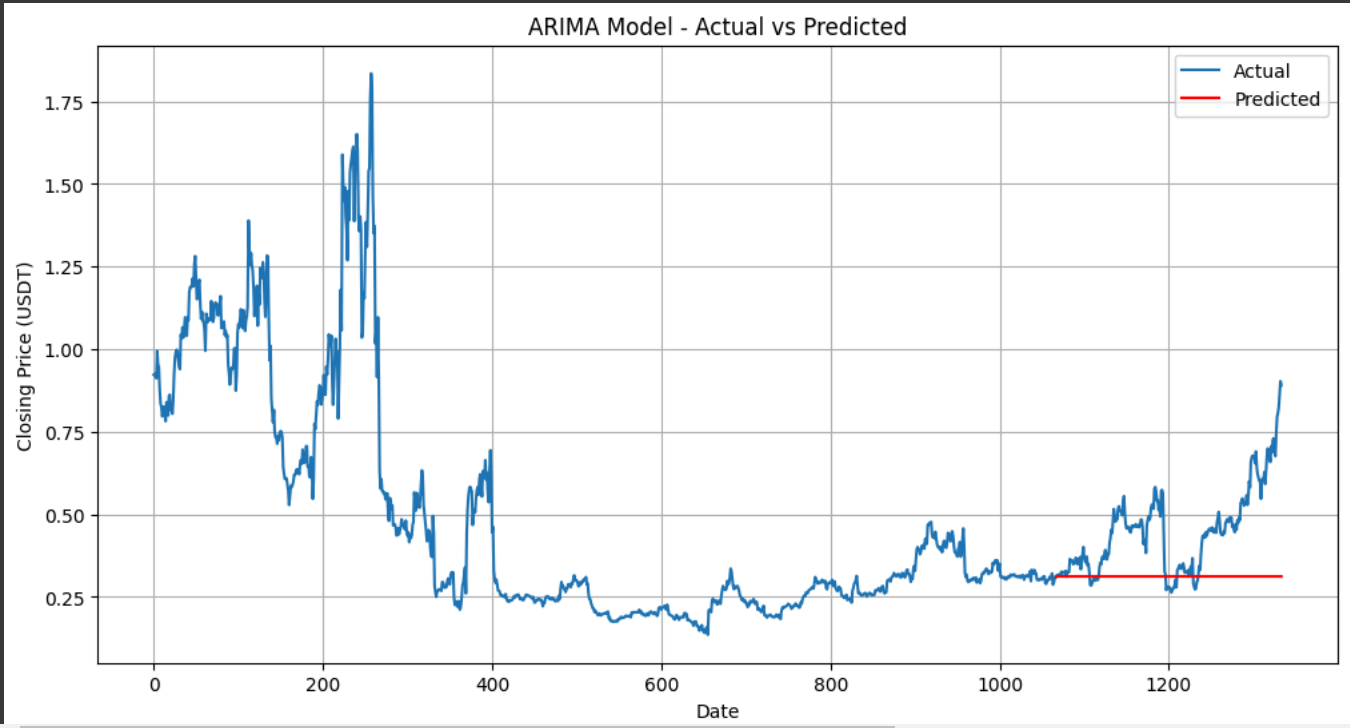
```
                               SARIMAX Results
==============================================================================
Dep. Variable:                  close   No. Observations:                 1067
Model:                 ARIMA(5, 1, 0)   Log Likelihood                1782.988
Date:                Thu, 25 Jul 2024   AIC                          -3553.977
Time:                        17:10:04   BIC                          -3524.147
Sample:                             0   HQIC                         -3542.674
                                - 1067
Covariance Type:                  opg
==============================================================================
                 coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------
ar.L1         -0.0644      0.018     -3.565      0.000      -0.100      -0.029
ar.L2          0.0021      0.016      0.131      0.896      -0.029       0.033
ar.L3          0.0165      0.012      1.354      0.176      -0.007       0.040
ar.L4          0.0618      0.015      4.235      0.000       0.033       0.090
ar.L5         -0.0339      0.014     -2.494      0.013      -0.061      -0.007
sigma2         0.0021   2.62e-05     78.675      0.000       0.002       0.002
===================================================================================
Ljung-Box (L1) (Q):                   0.01   Jarque-Bera (JB):             36131.30
Prob(Q):                              0.93   Prob(JB):                         0.00
Heteroskedasticity (H):               0.03   Skew:                             0.05
Prob(H) (two-sided):                  0.00   Kurtosis:                        31.52
===================================================================================

Warnings:
[1] Covariance matrix calculated using the outer product of gradients (complex-step).
```

```
# Make predictions
start = len(train)
end = len(train) + len(test) - 1
predictions = model_fit.predict(start=start, end=end, typ='levels')
```

```
/usr/local/lib/python3.10/dist-packages/statsmodels/tsa/statespace/representation.py:374: FutureWarning: Unknown keyword arguments: dict
  warnings.warn(msg, FutureWarning)
```

```
# Plot the predictions against the actual values
plt.figure(figsize=(12, 6))
plt.plot(df.index, df['close'], label='Actual')
plt.plot(df.index[start:end+1], predictions, color='red', label='Predicted')
plt.title('ARIMA Model - Actual vs Predicted')
plt.xlabel('Date')
plt.ylabel('Closing Price (USDT)')
plt.legend()
plt.grid(True)
plt.show()
```




```
# Calculate and print the mean squared error
mse = mean_squared_error(test, predictions)
print(f'Mean Squared Error: {mse}')
```

```
Mean Squared Error: 0.03538190888201755
```