What is financial trading

FINANCIAL TRADING IN PYTHON

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The concept of financial trading

Financial trading is the buying and selling of financial assets

Various financial instruments to trade:

- Equities
- Bonds
- Forex
- Commodities
- Cryptocurrencies

Why people trade

To make a profit by taking calculated risks

- Long positions: profit from upward price movement
- Short positions: profit from downward price movement

Market participants:

- Institutional traders
- Retail traders

Trading vs. investing

Trading:

- Shorter holding period
- Focus on short-term trends or price fluctuations
- Take both long and short positions

Investing:

- Longer holding period
- Focus on market fundamentals
- Take mostly long positions

Financial time series data

Time series data: a sequence of data points indexed in time order

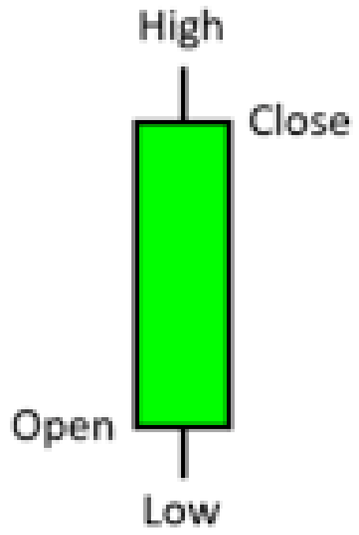
```
import pandas as pd
# Load the data
bitcoin_data = pd.read_csv("bitcoin_data.csv", index_col='Date', parse_dates=True)
print(bitcoin_data.head())
```

```
                Open      High       Low     Close       Volume
Date
2019-01-01  3746.71  3850.91  3707.23  3843.52  4324200990
2019-01-02  3849.22  3947.98  3817.41  3943.41  5244856835
2019-01-03  3931.05  3935.69  3826.22  3836.74  4530215218
2019-01-04  3832.04  3865.93  3783.85  3857.72  4847965467
2019-01-05  3851.97  3904.90  3836.90  3845.19  5137609823
```

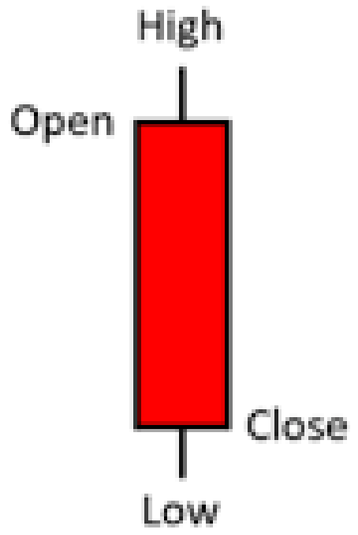
Plot line chart of time series data

```
import matplotlib.pyplot as plt
plt.plot(bitcoin_data['Close'], color='red')
plt.title("Daily close price")
plt.show()
```

Candlestick chart



Bullish candlestick



Bearish candlestick

- Each candlestick displays high, low, open, and close
- The color indicates bullish (rising prices) or bearish (falling prices) movement

Plot candlestick chart with Python

```
import plotly.graph_objects as go
# Define the candlestick
candlestick = go.Candlestick(
    x = bitcoin_data.index,
    open = bitcoin_data['Open'],
    high = bitcoin_data['High'],
    low = bitcoin_data['Low'],
    close = bitcoin_data['Close'])
# Create a plot
fig = go.Figure(data=[candlestick])
# Show the plot
fig.show()
```

Let's practice!

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Getting familiar with your trading data

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Different types of traders

- Day Trader: holds positions throughout the day but usually not overnight
- Swing Trader: holds positions from a few days to several weeks
- Position Trader: holds positions from a few months to several years

Resample the data

```
Date                 Close
2019-11-29 04:00:00  1.1010
2019-11-29 08:00:00  1.1005
2019-11-29 12:00:00  1.0993
2019-11-29 16:00:00  1.1016
2019-11-29 20:00:00  1.1020
```

```
# Resample from hourly to daily
eurusd_daily = eurusd_h.resample('D').mean()
```

```
Date        Close
2019-11-25  1.10165
2019-11-26  1.10165
2019-11-27  1.10058
2019-11-28  1.10083
2019-11-29  1.10093
```

```
# Resample from hourly to weekly
eurusd_weekly = eurusd_h.resample('W').mean()
```

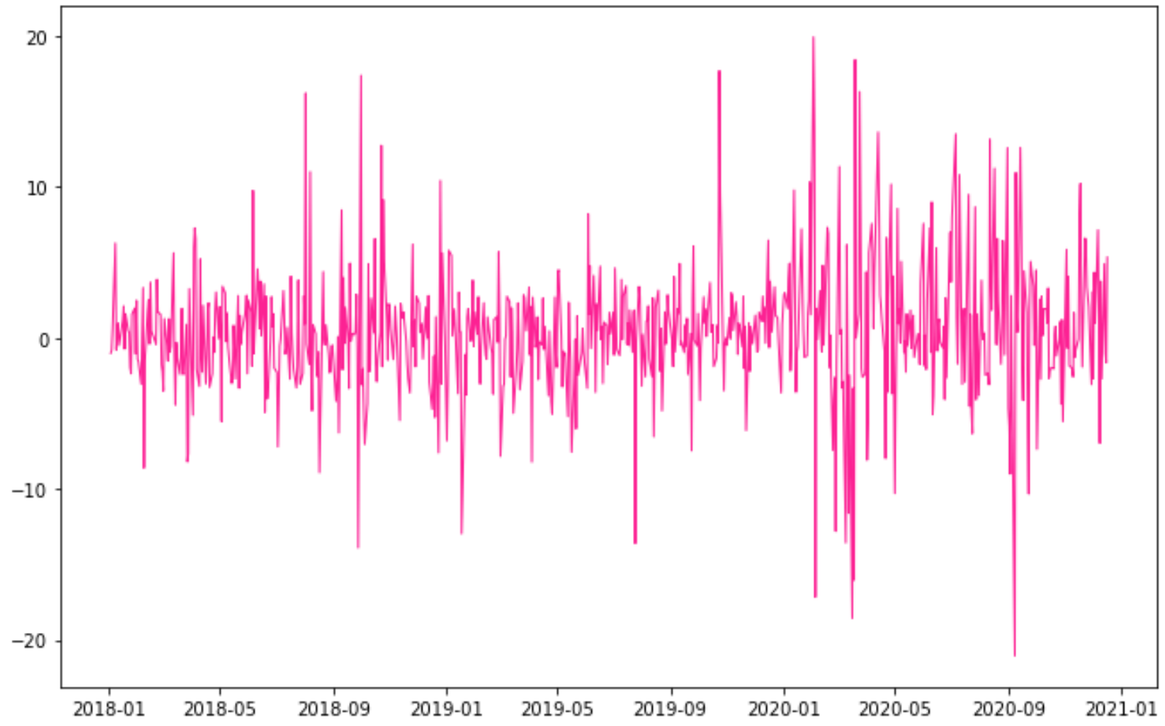
```
Date        Close
2019-11-03  1.11248
2019-11-10  1.10860
2019-11-17  1.10208
2019-11-24  1.10659
2019-12-01  1.10113
```

Calculate daily returns

```
# Calculate daily returns
stock_data['daily_return']
= stock_data['Close'].pct_change() * 100
```

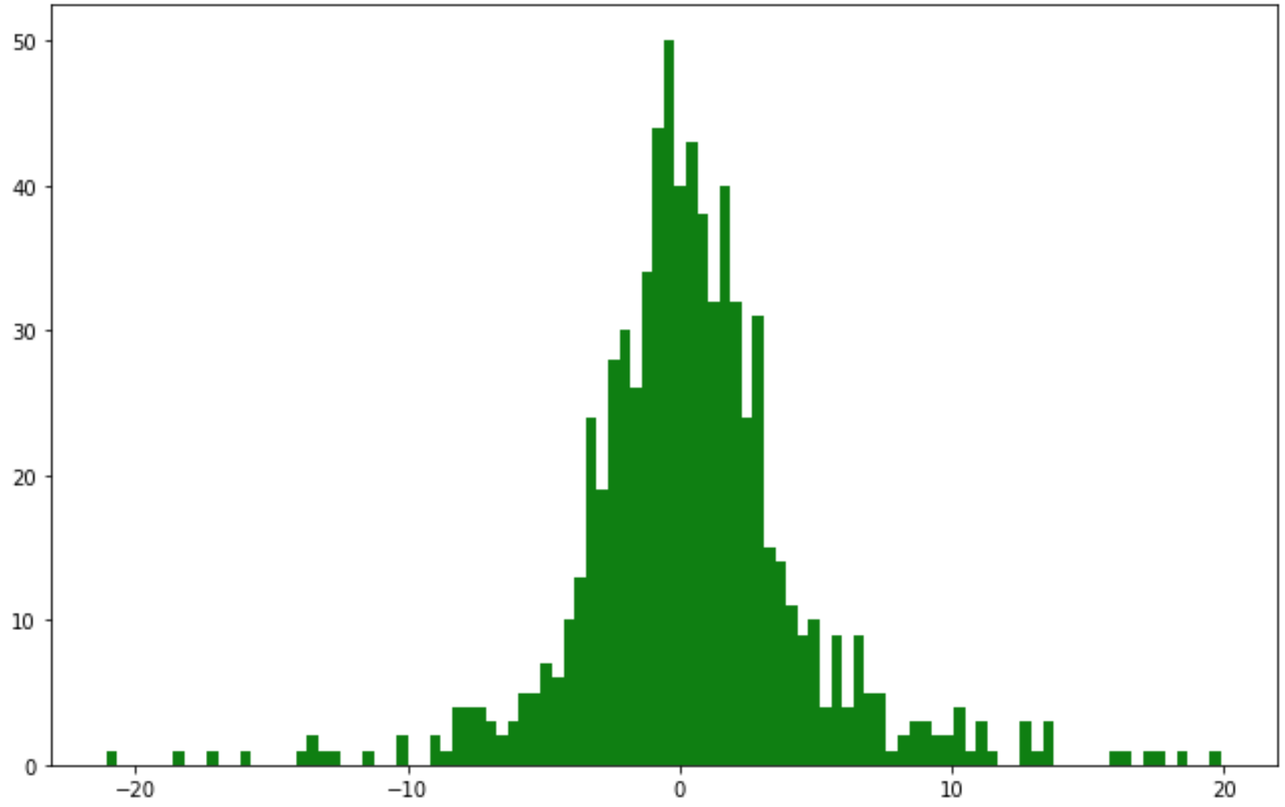
```
# Plot the data
plt.plot(stock_data['daily_return'])
plt.show()
```

Date	Close	daily_return
2020-12-11	609.99	-2.723779
2020-12-14	639.83	4.891883
2020-12-15	633.25	-1.028398
2020-12-16	622.77	-1.654955
2020-12-17	655.90	5.319781



Plot a histogram of daily returns

```
stock_data['daily_return'].hist(bins=100)
plt.show()
```



Data transformation

Technical indicators: various types of data transformations

Simple moving average (SMA): arithmetic mean price over a specified n-period

```
stock_data['sma_50'] = stock_data['Close'].rolling(window=50).mean()
```

```
             Close    sma_50
Date
2020-12-11  122.41   117.7474
2020-12-14  121.78   117.9226
2020-12-15  127.88   118.1502
2020-12-16  127.81   118.4432
2020-12-17  128.70   118.7156
```

Plot the rolling average

```
import matplotlib.pyplot as plt

plt.plot(stock_data['Close'],
         label='Close')
plt.plot(stock_data['sma_50'],
         label='SMA_50')
plt.legend()
plt.show()
```

Let's practice!

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Financial trading with bt

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The bt package

A flexible framework for defining and backtesting trading strategies

- Strategy: a method of buying and selling financial assets based on predefined rules
- Strategy backtesting: a way to assess the effectiveness of a strategy by testing it on historical data

```
import bt
```

The bt process

- Step 1: Get the historical price data
- Step 2: Define the strategy
- Step 3: Backtest the strategy with the data
- Step 4: Evaluate the result

Get the data

```
# Download historical prices
bt_data = bt.get('goog, amzn, tsla',
                 start='2020-6-1', end='2020-12-1')
print(bt_data.head())
```

```
                goog         amzn        tsla
Date
2020-06-01  1431.819946  2471.040039  179.619995
2020-06-02  1439.219971  2472.409912  176.311996
2020-06-03  1436.380005  2478.399902  176.591995
2020-06-04  1412.180054  2460.600098  172.876007
2020-06-05  1438.390015  2483.000000  177.132004
```

Define the strategy

```
# Define the strategy
bt_strategy = bt.Strategy('Trade_Weekly',
                          [bt.algos.RunWeekly(), # Run weekly
                           bt.algos.SelectAll(), # Use all data
                           bt.algos.WeighEqually(), # Maintain equal weights
                           bt.algos.Rebalance()]) # Rebalance
```

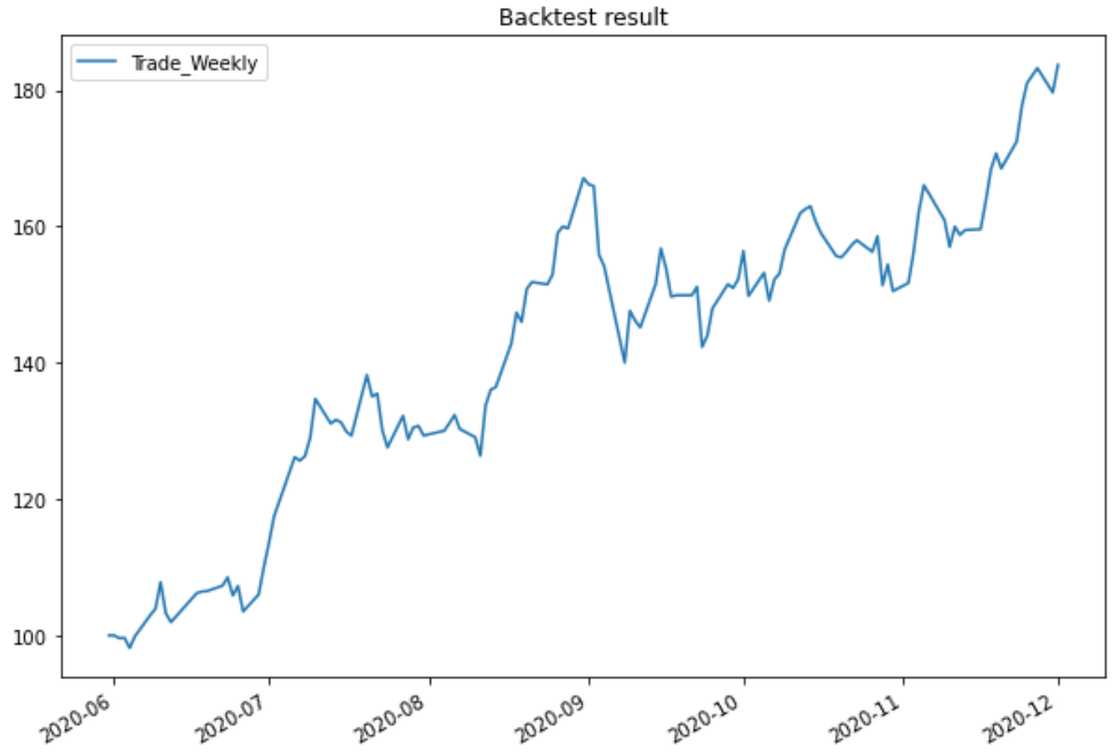
Backtest

```
# Create a backtest
bt_test = bt.Backtest(bt_strategy, bt_data)

# Run the backtest
bt_res = bt.run(bt_test)
```

Evaluate the result

```
# Plot the result
bt_res.plot(title="Backtest result")
```




```
# Get trade details
bt_res.get_transactions()
```

		price	quantity
Date	**Security**		
2020-06-01	**amaz**	0.015000	22222222.0
	goog	1431.819946	232.0
	tsla	179.619995	1855.0
2020-06-08	**amaz**	0.011200	5700757.0
	goog	1446.609985	-16.0
...	**...**	...	...
2020-11-23	**goog**	1734.859985	23.0
	tsla	521.849976	-132.0
2020-11-30	**amaz**	0.004900	458015.0
	goog	1760.739990	7.0
	tsla	567.599976	-27.0

Let's practice!

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