

# Project 1 (Advanced)

Using numpy and pandas to build trading algorithms (backtesting)

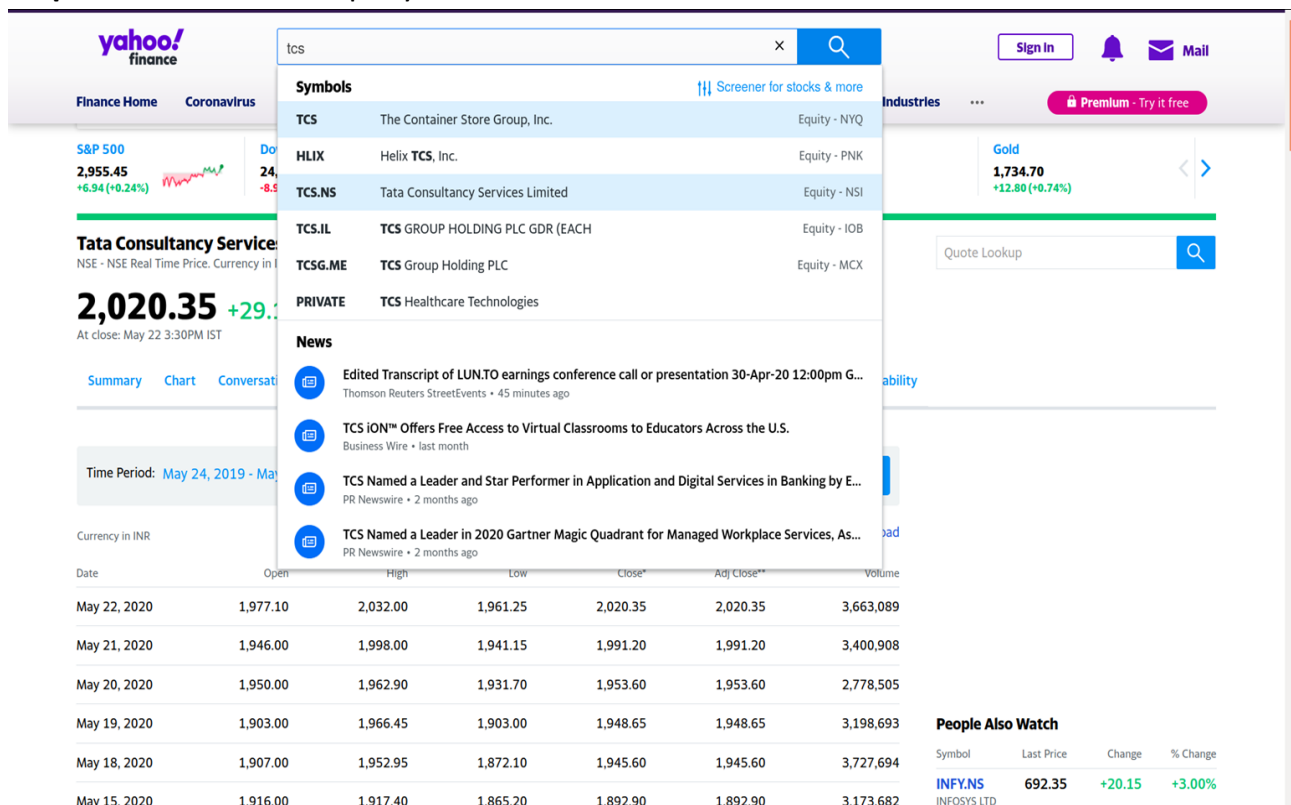
Data Sources:

Gold prices: <https://datahub.io/core/gold-prices#data>

Stock prices (Ex. TCS): <https://finance.yahoo.com/quote/TCS.NS/history?p=TCS.NS>

Steps to download stock prices:

## Step 1: Search for a company



The screenshot shows the Yahoo Finance website with a search bar at the top. The search results for 'TCS' are displayed, showing a list of symbols and their corresponding companies. The selected symbol is TCS.NS, Tata Consultancy Services Limited. The page also displays the current price of TCS.NS at 2,020.35 INR, along with a chart and a table of historical prices. The table shows the Open, High, Low, Close, Adj Close, and Volume for TCS.NS from May 15, 2020, to May 22, 2020.

| Date         | Open     | High     | Low      | Close*   | Adj Close** | Volume    |
|--------------|----------|----------|----------|----------|-------------|-----------|
| May 22, 2020 | 1,977.10 | 2,032.00 | 1,961.25 | 2,020.35 | 2,020.35    | 3,663,089 |
| May 21, 2020 | 1,946.00 | 1,998.00 | 1,941.15 | 1,991.20 | 1,991.20    | 3,400,908 |
| May 20, 2020 | 1,950.00 | 1,962.90 | 1,931.70 | 1,953.60 | 1,953.60    | 2,778,505 |
| May 19, 2020 | 1,903.00 | 1,966.45 | 1,903.00 | 1,948.65 | 1,948.65    | 3,198,693 |
| May 18, 2020 | 1,907.00 | 1,952.95 | 1,872.10 | 1,945.60 | 1,945.60    | 3,727,694 |
| May 15, 2020 | 1,916.00 | 1,917.40 | 1,865.20 | 1,892.90 | 1,892.90    | 3,173,682 |

## Step 2: Select "Historical Prices"

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COVID-19 Confirmed Cases: 1,613,680 US | 5,242,727 Global >

U.S. markets closed

**S&P 500**  
2,955.45  
+6.34 (+0.24%)

**Dow 30**  
24,465.16  
-8.96 (-0.04%)

**Nasdaq**  
9,324.59  
+39.71 (+0.43%)

**Russell 2000**  
1,355.53  
+7.97 (+0.59%)

**Crude Oil**  
33.56  
-0.36 (-1.06%)

**Gold**  
1,734.70  
+12.80 (+0.74%)

**Tata Consultancy Services Limited (TCS.NS)** [Add to watchlist](#) [Quote Lookup](#)

NSE - NSE Real Time Price. Currency in INR

**2,020.35** +29.15 (+1.46%)  
At close: May 22 3:30PM IST

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Time Period: May 24, 2019 - May 24, 2020 Show: Historical Prices Frequency: Daily Apply

Currency in INR [Download](#)

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|--------------|----------|----------|----------|----------|-------------|-----------|
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| May 20, 2020 | 1,950.00 | 1,962.90 | 1,931.70 | 1,953.60 | 1,953.60    | 2,778,505 |
| May 19, 2020 | 1,903.00 | 1,966.45 | 1,903.00 | 1,948.65 | 1,948.65    | 3,198,693 |

<https://finance.yahoo.com/quote/TCS.NS/history?p=TCS.NS>

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## Step 3: Select the timeframe

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Time Period: May 24, 2019 - May 24, 2020 Show: Historical Prices Frequency: Daily Apply

Currency in INR [Download](#)

1D 5D 3M 6M  
YTD 1Y **5Y** Max

Start Date 24 / 05 / 2019

End Date 24 / 05 / 2020

Done Cancel

| Date         | High | Low      | Close*   | Adj Close** | Volume    |
|--------------|------|----------|----------|-------------|-----------|
| May 22, 2020 | 2.00 | 1,961.25 | 2,020.35 | 2,020.35    | 3,663,089 |
| May 21, 2020 | 8.00 | 1,941.15 | 1,991.20 | 1,991.20    | 3,400,908 |
| May 20, 2020 | 2.90 | 1,931.70 | 1,953.60 | 1,953.60    | 2,778,505 |
| May 19, 2020 | 6.45 | 1,903.00 | 1,948.65 | 1,948.65    | 3,198,693 |

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#### Step 4: Click on apply and then click on download

COVID-19 Confirmed Cases: 1,613,6800 US | 5,242,727 Global >

S&P 500 2,955.45 +6.94 (+0.24%) | Dow 30 24,465.16 -8.96 (-0.04%) | Nasdaq 9,324.59 +39.71 (+0.43%) | Russell 2000 1,355.53 +7.97 (+0.59%) | Crude Oil 33.56 -0.36 (-1.06%) | Gold 1,734.70 +12.80 (+0.74%)

**Tata Consultancy Services Limited (TCS.NS)** ☆ Add to watchlist

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**2,020.35** +29.15 (+1.46%)

At close: May 22 3:30PM IST

Summary Chart Conversations Statistics **Historical Data** Profile Financials Analysis Options Holders Sustainability

Time Period: May 24, 2015 - May 24, 2020 Show: Historical Prices Frequency: Daily Apply

Currency in INR

| Date         | Open     | High     | Low      | Close*   | Adj Close** | Volume    |
|--------------|----------|----------|----------|----------|-------------|-----------|
| May 22, 2020 | 1,977.10 | 2,032.00 | 1,961.25 | 2,020.35 | 2,020.35    | 3,663,089 |
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| May 20, 2020 | 1,950.00 | 1,962.90 | 1,931.70 | 1,953.60 | 1,953.60    | 2,778,505 |
| May 19, 2020 | 1,903.00 | 1,966.45 | 1,903.00 | 1,948.65 | 1,948.65    | 3,198,693 |

<https://query1.finance.yahoo.com/v7/finance/download/TCS.NS?period1=1432425600&period2=1590278400&interval=1d&events=history>

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#### Understanding the downloaded dataset

Date: The day the data was collected  
Volume: The number of stocks sold that day  
Open: Stock price when the stock market opened  
High: The highest price the stock was sold for that day  
Low: The lowest price the stock was sold for that day  
Close: The stock price when the stock market closed

#### What you are expected to do:

Using the downloaded dataset, come up with algorithms that determine when to buy or sell a stock and calculate the profit/loss your trading algorithm achieves for the past year. Remember that you cannot use the high or low data for today while buying stock today as you will not know if the price might increase today or decrease. You can, however, use the high or low data from yesterday. At the end plot the profit or loss of your algorithm for a whole year.

Some sample algorithms:

<https://www.pythonforfinance.net/2017/02/20/intraday-stock-mean-reversion-trading-backtest-in-python/>

<https://www.pythonforfinance.net/2017/07/31/bollinger-band-trading-strategy-backtest-in-python/>

Some other advanced algos:

<https://www.pythonforfinance.net/category/trading-strategy-backtest/>