API_data_wrangling_mini_project

June 11, 2024

[81]:
```python
# # First, import the relevant modules.

import requests
import json
import operator
import numpy as np
```

[82]:
```python
# API key for Nasdaq website
api_key = '...'
```

[83]:
```python
# Call the Nasdaq API and pull out a small sample of the data (only one day) to␣
↪get a glimpse
# into the JSON structure that will be returned.

url = 'https://data.nasdaq.com/api/v3/datasets/FSE/AFX_X/data.json?
↪&start_date=2017-01-02&end_date=2017-01-02&api_key=' + api_key
r = requests.get(url)
r_json = r.json()
```

[84]:
```python
# Inspect the JSON structure of the object r_json, and take note of how nested␣
↪it is,
# as well as the overall structure

print(type(r_json))
r_json
```

```
<class 'dict'>
```

[84]:
```
{'dataset_data': {'limit': None,
  'transform': None,
  'column_index': None,
  'column_names': ['Date',
   'Open',
   'High',
   'Low',
   'Close',
   'Change',
   'Traded Volume',
```

```
  'Turnover',
  'Last Price of the Day',
  'Daily Traded Units',
  'Daily Turnover'],
 'start_date': '2017-01-02',
 'end_date': '2017-01-02',
 'frequency': 'daily',
 'data': [['2017-01-02',
   34.99,
   35.94,
   34.99,
   35.8,
   None,
   44700.0,
   1590561.0,
   None,
   None,
   None]],
 'collapse': None,
 'order': None}}
```

[85]:
```
## 1. Collect data from the Franfurt Stock Exchange, for the ticker AFX_X, for
↪the whole year 2017.
```

[86]:
```
# Set the start and end dates for the year 2017.

url = 'https://data.nasdaq.com/api/v3/datasets/FSE/AFX_X/data.json?
↪&start_date=2017-01-01&end_date=2017-12-31&api_key=' + api_key
r = requests.get(url)
```

[87]:
```
# Check the status code to ensure the request was successfully received
r.status_code
```

[87]: 200

[88]:
```
## 2. Convert the returned JSON object into a Python dictionary.
r_json = r.json()
type(r_json)
```

[88]: dict

[89]:
```
print(r_json)
```

{'dataset_data': {'limit': None, 'transform': None, 'column_index': None, 'column_names': ['Date', 'Open', 'High', 'Low', 'Close', 'Change', 'Traded Volume', 'Turnover', 'Last Price of the Day', 'Daily Traded Units', 'Daily Turnover'], 'start_date': '2017-01-01', 'end_date': '2017-12-31', 'frequency': 'daily', 'data': [['2017-12-29', 51.76, 51.94, 51.45, 51.76, None, 34640.0, 1792304.0, None, None, None], ['2017-12-28', 51.65, 51.82, 51.43, 51.6, None, 40660.0, 2099024.0, None, None, None], ['2017-12-27', 51.45, 51.89, 50.76, 51.82, None, 57452.0, 2957018.0, None, None, None], ['2017-12-22', 51.05, 51.5, 50.92, 51.32, None, 71165.0, 3641949.0, None, None, None], ['2017-12-21', 51.16, 51.52, 50.9, 51.4, None, 120649.0, 6179433.0, None, None, None], ['2017-12-20', 51.88, 52.04, 51.2, 51.27, None, 50587.0, 2610258.0, None, None, None], ['2017-12-19', 52.73, 52.73, 51.07, 51.66, None, 137313.0, 7102361.0, None, None, None], ['2017-12-18', 52.37, 52.75, 51.61, 52.62, None, 129733.0, 6770499.0, None, None, None], ['2017-12-15', 52.7, 52.7, 51.64, 52.01, None, 204080.0, 10596319.0, None, None, None], ['2017-12-14', 53.11, 53.54, 52.15, 52.67, None, 132981.0, 7016953.0, None, None, None], ['2017-12-13', 52.64, 53.35, 52.48, 53.09, None, 128434.0, 6801159.0, None, None, None], ['2017-12-12', 52.29, 53.1, 51.82, 52.43, None, 87911.0, 4615924.0, None, None, None], ['2017-12-11', 52.28, 52.45, 51.26, 52.14, None, 71817.0, 3724193.0, None, None, None], ['2017-12-08', 51.5, 52.83, 51.28, 52.12, None, 109157.0, 5690648.0, None, None, None], ['2017-12-07', 50.89, 51.47, 50.81, 51.47, None, 48123.0, 2463848.0, None, None, None], ['2017-12-06', 50.8, 51.11, 50.39, 50.89, None, 88730.0, 4504075.0, None, None, None], ['2017-12-05', 51.21, 51.38, 50.4, 51.25, None, 83023.0, 4231971.0, None, None, None], ['2017-12-04', 49.5, 51.23, 49.5, 51.14, None, 94385.0, 4800027.0, None, None, None], ['2017-12-01', 49.52, 50.49, 49.17, 49.86, None, 101733.0, 5065932.0, None, None, None], ['2017-11-30', 48.64, 49.84, 48.28, 49.7, None, 123019.0, 6085171.0, None, None, None], ['2017-11-29', 49.64, 49.64, 48.7, 48.75, None, 67342.0, 3292223.0, None, None, None], ['2017-11-28', 49.09, 49.89, 49.03, 49.25, None, 42669.0, 2107358.0, None, None, None], ['2017-11-27', 49.13, 49.73, 48.96, 49.2, None, 102180.0, 5055762.0, None, None, None], ['2017-11-24', 49.11, 49.41, 48.87, 49.11, None, 50350.0, 2472842.0, None, None, None], ['2017-11-23', 48.8, 49.46, 48.45, 49.2, None, 38834.0, 1909352.0, None, None, None], ['2017-11-22', 48.4, 49.61, 48.39, 48.8, None, 91142.0, 4478093.0, None, None, None], ['2017-11-21', 47.25, 48.59, 46.78, 48.39, None, 78502.0, 3782098.0, None, None, None], ['2017-11-20', 46.57, 47.38, 46.54, 47.04, None, 97252.0, 4563515.0, None, None, None], ['2017-11-17', 47.03, 47.15, 46.8, 46.84, None, 54107.0, 2540820.0, None, None, None], ['2017-11-16', 47.09, 47.23, 46.55, 47.03, None, 89373.0, 4195732.0, None, None, None], ['2017-11-15', 47.98, 48.01, 46.75, 47.05, None, 67593.0, 3188321.0, None, None, None], ['2017-11-14', 48.4, 48.9, 47.84, 48.0, None, 67672.0, 3259979.0, None, None, None], ['2017-11-13', 48.38, 48.61, 47.76, 48.34, None, 76286.0, 3681337.0, None, None, None], ['2017-11-10', 47.3, 48.89, 47.16, 48.34, None, 90245.0, 4361552.0, None, None, None], ['2017-11-09', 47.65, 48.06, 47.09, 47.21, None, 120268.0, 5712034.0, None, None, None], ['2017-11-08', 46.42, 47.72, 46.42, 47.47, None, 94195.0, 4463935.0, None, None, None], ['2017-11-07', 46.16, 46.33, 45.84, 46.26, None, 48152.0, 2224221.0, None, None, None], ['2017-11-06', 45.81, 46.09, 45.76, 45.99, None, 60716.0, 2789220.0, None, None, None], ['2017-11-03', 45.0, 46.04, 44.83, 45.97, None, 56911.0, 2603498.0, None, None, None], ['2017-11-02', 45.88, 46.06, 45.18, 45.27, None, 37958.0, 1724840.0, None, None, None], ['2017-11-01', 46.29, 46.55, 45.97, 46.04, None, 56319.0, 2603859.0, None, None, None], ['2017-10-30', 46.53, 46.65, 45.61, 45.76, None, 56245.0, 2585397.0, None, None, None], ['2017-10-27', 45.48, 46.42, 45.46, 46.41, None, 74472.0, 3434087.0, None, None, None],

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[90]:
```
## 3. Calculate what the highest and lowest opening prices were for the stock␣
↪in this period.
```

[91]:
```
# Review the data
r_json.keys()
```

[91]:
```
dict_keys(['dataset_data'])
```

[92]:
```
r_json['dataset_data'].keys()
```

[92]:
```
dict_keys(['limit', 'transform', 'column_index', 'column_names', 'start_date',
'end_date', 'frequency', 'data', 'collapse', 'order'])
```

[93]:
```
r_json['dataset_data']['column_names']
```

[93]:
```
['Date',
 'Open',
 'High',
 'Low',
 'Close',
 'Change',
 'Traded Volume',
 'Turnover',
 'Last Price of the Day',
 'Daily Traded Units',
 'Daily Turnover']
```

[94]:
```
r_json['dataset_data']['data'][0:2]
```

[94]:
```
[['2017-12-29',
  51.76,
  51.94,
  51.45,
  51.76,
  None,
  34640.0,
  1792304.0,
  None,
  None,
  None],
 ['2017-12-28',
  51.65,
  51.82,
  51.43,
  51.6,
  None,
  40660.0,
  2099024.0,
```

```
None,
None,
None]]
```

[95]:
```
# Solve for highest and lowest opening prices

# Creating a dictionary for opening values to corresponding each day
data_json = r_json['dataset_data']['data']

opening = [row[1] for row in data_json if row[1] != None]
print("The highest opening price: " + str(max(opening)))
print("The lowest opening price: " + str(min(opening)))
```

```
The highest opening price: 53.11
The lowest opening price: 34.0
```

[96]:
```
## 4. What was the largest change in any one day (based on High and Low price)?
```

[97]:
```
# Use list comprehension to iterate through each row of data_json to filter␣
↪hout any missing high price data.
high = [row[2] for row in data_json if row[2] != None]

# Use list comprehension to iterate through each row of data_json to filter␣
↪hout any missing low price data.
low = [row[3] for row in data_json if row[3] != None]

ziphighlow = zip(high, low)

# Calculate the absolute difference in closing prices for each day
difference = [abs(x1 - x2) for (x1, x2) in ziphighlow]

print ("The largest change in price in any one day is:" + str(max(difference)))
```

```
The largest change in price in any one day is:2.8100000000000023
```

[98]:
```
## 5. What was the largest change between any two days (based on Closing Price)?
```

[99]:
```
#Use list comprehension to iterate through each row in data_json
# to filter any rows with missing closing price data.
closing_first = [row[4] for row in data_json if row[4] != None]

#Filters using same method above, but slices the resulting list
# to remove the first element from the list.
closing_remaining = [row[4] for row in data_json if row[4] != None][1:]

# Calculate the absolute difference in closing prices between consecutive days␣
↪within a year.
```

```
difference = [abs(x1 - x2) for (x1, x2) in zip(closing_first,
 ↪closing_remaining)]

print ("The largest change in closing price between two days is:" +
 ↪str(max(difference)))
```

```
The largest change in closing price between two days is:2.559999999999995
```

[100]:
```
## 6. What was the average daily trading volume during this year?

trading_volume = [row[6] for row in data_json]

volume_average = sum(trading_volume) / len(trading_volume)

print ("The avarage daily trading volume in 2017 was: " + str(volume_average))
```

```
The avarage daily trading volume in 2017 was: 89124.33725490196
```

[101]:
```
## 7. (Optional) What was the median trading volume during this year. (Note:
 ↪you may need to implement your own function for calculating the median.)

# from statistics import median
```