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Week 9-10 Assignment

DSC 540 Data Preparation

Professor Williams

Activity 7.01

In [70]:
```python
# import libraries
from bs4 import BeautifulSoup
import requests
import pandas as pd
import numpy as np
import re
import matplotlib.pyplot as plt
import seaborn as sns
import googlemaps
import pprint
import urllib.request, urllib.parse, urllib.error
import json
```

In [ ]:
```python
# This saves the website url for call
url = 'https://www.gutenberg.org/browse/scores/top'
```

In [ ]:
```python
# This code saves the url to a response object
data = requests.get(url)
```

In [ ]:
```python
# This code creates a function to check connection to link
def status_check(r):
    if r.status_code==200:
        print('Good')
        return 1
    else:
        print('No good')
        return -1
```

In [ ]:
```python
# This code calls the function and produces either a good or no good response
status_check(data)
```

```
Good
```

Out[ ]:
```
1
```

In [ ]:
```python
# This code calls the website html and parses the data
books = data.content.decode(data.encoding)
soup = BeautifulSoup(books, 'html.parser')
```

In [ ]:
```
# This code prints the html and gives proper indents for better readability
print(soup.prettify())
```

In [ ]:
```
# This code finds all the book links and appends it to the data_links list
data_links = []

for link in soup.find_all('a'):
    data_links.append(link.get('href'))
```

In [ ]:
```
# This code prints the list
data_links[:30]
```

Out[ ]:
```
['/',
 '/about/',
 '/about/',
 '/policy/collection_development.html',
 '/about/contact_information.html',
 '/about/background/',
 '/policy/permission.html',
 '/policy/privacy_policy.html',
 '/policy/terms_of_use.html',
 '/ebooks/',
 '/ebooks/',
 '/ebooks/categories',
 '/ebooks/bookshelf/',
 '/browse/scores/top',
 '/ebooks/offline_catalogs.html',
 '/help/',
 '/help/',
 '/help/copyright.html',
 '/help/errata.html',
 '/help/file_formats.html',
 '/help/faq.html',
 '/policy/',
 '/help/public_domain_ebook_submission.html',
 '/help/submitting_your_own_work.html',
 '/help/mobile.html',
 '/attic/',
 '/donate/',
 '/donate/',
 'pretty-pictures',
 '#books-last1']
```

In [ ]:
```
# This code pulls a list of book numbers and appends it to the book_numbers list
book_numbers = []

for i in range(19, 119):
    link = data_links[i]
    link = link.strip()
    n = re.findall('[0-9]+', link)
    if len(n)==1:
        book_numbers.append(int(n[0]))
```

```
In [ ]: # This code prints the book numbers
        print('\n The file numbers for the top 100 ebooks are\n' +'-'* 510)
        print(book_numbers)
```

```

 The file numbers for the top 100 ebooks are
------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
------------------------------------------------------------------------------------
------
[1, 1, 7, 7, 30, 30, 84, 2701, 1023, 1342, 1513, 11, 2542, 64317, 844, 100, 145, 17
4, 2641, 37106, 43, 67979, 16389, 2554, 345, 98, 394, 21144, 6761, 2160, 4085, 1259,
6593, 5197, 1998, 1260, 5200, 1400, 76, 1080, 21143, 26184, 16328, 1661, 1232, 3207,
28054, 25344, 1952, 3296, 41445, 2000, 4300, 76087, 45, 2591, 205, 76086, 1184, 613
0, 74, 768, 34901, 4363, 1727, 36034, 135, 219, 2600, 408, 5740, 7370, 3201, 8800, 2
650, 8492, 1600, 1497, 35899, 76085, 46, 76079, 25717, 2148, 514, 244, 730, 55, 285
2, 30254]
```

```
In [ ]: # This code prints the top 100 books
        print(soup.text[:2000])
```

```
In [ ]: # This code creates an empty list for the book titles
        book_titles = []
```

```
In [ ]: # This code splits the titles into different lines
        title_index = soup.text.splitlines().index('Top 100 EBooks yesterday')
```

```
In [ ]: # This code appends the book titles to the list
        for i in range(100):
            book_titles.append(soup.text.splitlines()[title_index+2+i])
```

```
In [32]: new_book_titles = []
         for i in range(100):
             id1,id2 = re.match('^[a-zA-Z]*', book_titles[i]).span()
             new_book_titles.append(book_titles[i][id1:id2])
```

```
In [ ]: # This code iterates through the list and prints the book titles
        for l in new_book_titles:
            print(l)
```

Frankenstein
Moby
Bleak
Pride
Romeo
Alice
A
The
The
The
Middlemarch
The
A
Little
The
The
The
Crime
Dracula
A
Cranford
Las
The
The
The
Twenty
History
My
Thus
Jane
Metamorphosis
Great
Adventures
A
Las
Simple
Beowulf
The
The
Leviathan
The
The
The
The
Frankenstein
Don
Ulysses
A
Anne
Grimms
Walden
Garry
The
The
The
Wuthering

```
On
Beyond
The
White
Les
Heart
War
The
Tractatus
Second
Moby
The
Du
The
Symposium
The
The
Rival
A
A
The
The
Little
A
Oliver
The
The
The
Treasure
Dubliners
Doctrina
The
Gulliver
Le
Las
Emma
The
Don
An
One
The
The
The
Plays
```

Activity 7.02

In [ ]:

```
# This code opens and reads the api keys file
with open (r"APIkeys.json") as f:
    keys = json.load(f)
    omdbapi = keys['OMDBapi']
```

In [ ]:

```
# This code creates an object to store the web address
```

```
url= 'https://www.omdbapi.com/?'
```

In [ ]:
```
# This code stores the api key
api= '22acd6d'+ omdbapi
```

In [ ]:
```
# This code creates a key for movie features
def print_json(json_data):
    list_keys = ['Title', 'Year', 'Rated', 'Released',
                'Runtime', 'Genre', 'Director', 'Writer',
                'Actors', 'Plot', 'Language', 'Country',
                'Awards', 'Ratings', 'Metascore', 'imdbRating',
                'imdbVotes', 'imdbID']
    print('-'*25)
    for k in list_keys:
        if k in list(json_data.keys()):
            print(f"{k}: {json_data[k]}")
    print('-'*25)
```

In [ ]:
```
# This code creates a function to pull data from the website
def save_poster(json_data):
    import os
    title = json_data['Title']
    poster_url = json_data['Poster']
    poster_file_extension=poster_url.split('.')[-1]
    poster_data = urllib.request.urlopen(poster_url).read()

    save_location=os.getcwd()+'\\'+'Posters'+'\\'
    if not os.path.isdir(save_location):
        os.mkdir(save_location)

    file_name=save_location+str(title)+'.'+poster_file_extension
    f=open(file_name, 'wb')
    f.write(poster_data)
    f.close()
```

In [ ]:
```
# This code creates a function that searches the movie database
# and provides either the movie data or a failure response

def search_movie(title):
    try:
        url_movie = url+ urllib.parse.urlencode({'t': str(title)})+api
        print(f'Acquiring movie data"{title}"...')
        print(url_movie)
        uh = urllib.request.urlopen(url_movie)
        data = uh.read()
        json_data = json.loads(data)

        if json_data['Response']=='True':
            print_json(json_data)

            if json_data['Poster']!='N/A':
                save_poster(json_data)

        else:
            print('Failure!: ', json_data['ERROR'])

    except urllib.error.URLError as e:
        print(f'ERROR: {e.reason}')
```

In [ ]:
```
# This code calls movie data
search_movie('Titanic')
```

```
Acquiring movie data"Titanic"...
https://www.omdbapi.com/?t=Titanic22acd6denterapikeyhere
ERROR: Unauthorized
```

In [ ]:
```
# This code forces an error
search_movie('random_error')
```

```
Acquiring movie data"random_error"...
https://www.omdbapi.com/?t=random_error22acd6denterapikeyhere
ERROR: Unauthorized
```

API Assignment

In [ ]:
```
# This code stores the google api key
api_key = 'AIzaSyABHacnwGG_yVv-afZV_8jsVNpErCXztE8'
```

In [ ]:
```
# This code creates a connection with the google maps client
map_client = googlemaps.Client(api_key)
```

In [ ]:
```
# This code stores my address
address = '1023 Cerro Alto Dr, San Antonio TX 78213'
```

In [ ]:
```
# This code creates a response object to locate my address
response = map_client.geocode(address)
```

In [ ]:
```
# This code prints my address information
pprint.pprint(response)
```

```
[{'address_components': [{'long_name': '1023',
                          'short_name': '1023',
                          'types': ['street_number']},
                         {'long_name': 'Cerro Alto Drive',
                          'short_name': 'Cerro Alto Dr',
                          'types': ['route']},
                         {'long_name': 'San Antonio International Airport '
                                       'Vicinity',
                          'short_name': 'San Antonio International Airport '
                                        'Vicinity',
                          'types': ['neighborhood', 'political']},
                         {'long_name': 'San Antonio',
                          'short_name': 'San Antonio',
                          'types': ['locality', 'political']},
                         {'long_name': 'Bexar County',
                          'short_name': 'Bexar County',
                          'types': ['administrative_area_level_2',
                                    'political']},
                         {'long_name': 'Texas',
                          'short_name': 'TX',
                          'types': ['administrative_area_level_1',
                                    'political']},
                         {'long_name': 'United States',
                          'short_name': 'US',
                          'types': ['country', 'political']},
                         {'long_name': '78213',
                          'short_name': '78213',
                          'types': ['postal_code']},
                         {'long_name': '1704',
                          'short_name': '1704',
                          'types': ['postal_code_suffix']}],
  'formatted_address': '1023 Cerro Alto Dr, San Antonio, TX 78213, USA',
  'geometry': {'bounds': {'northeast': {'lat': 29.5380614, 'lng': -98.5091776},
                          'southwest': {'lat': 29.5379327, 'lng': -98.5093414}},
               'location': {'lat': 29.538003, 'lng': -98.50925289999999},
               'location_type': 'ROOFTOP',
               'viewport': {'northeast': {'lat': 29.53927293029151,
                                          'lng': -98.5079105197085},
                            'southwest': {'lat': 29.53657496970851,
                                          'lng': -98.51060848029151}}},
  'navigation_points': [{'location': {'latitude': 29.5378494,
                                      'longitude': -98.5092626}}],
  'place_id': 'ChIJl_zZYGpgXIYRCO-OEwvAZFQ',
  'types': ['premise', 'street_address']}]
```

```
In [ ]: # This code prints the latitude and longitude of my address
        print(response[0]['navigation_points'])
```

```
[{'location': {'latitude': 29.5378494, 'longitude': -98.5092626}}]
```

Data Visualization

```
In [ ]: # This code reads in the file and stores it in the sales object.
        # It also displays the first five rows.
```

```
sales= pd.read_excel(r"Customer_demographics_and_sales_Lab5.xlsx")
sales.head()
```

Out[ ]:

	CUST_NAME	Gender_Code	ADDRESS1	CITY	STATE	COUNTRY_CODE	POSTAL_CODE
0	Allen Perl	Mr.	4707 Hillcrest Lane	Abeto	PG	IT	6040
1	Allen Perl	Mr.	4707 Hillcrest Lane	Abeto	PG	IT	6040
2	Allen Perl	Mr.	4707 Hillcrest Lane	Abeto	PG	IT	6040
3	Allen Perl	Mr.	4707 Hillcrest Lane	Abeto	PG	IT	6040
4	Allen Perl	Mr.	4707 Hillcrest Lane	Abeto	PG	IT	6040

5 rows × 62 columns

In [ ]:

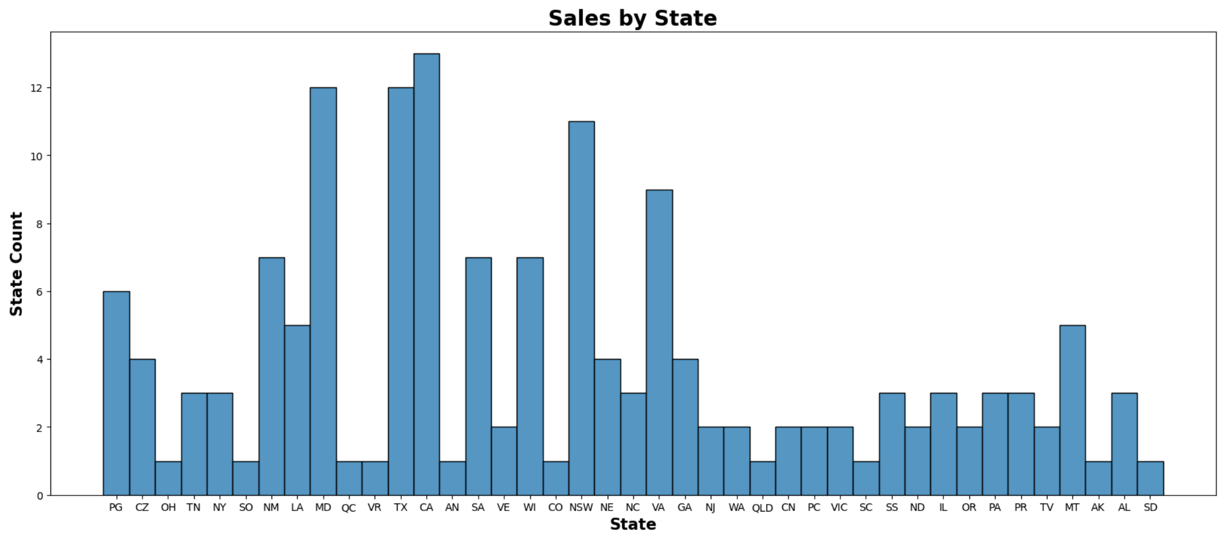
```
# This code displays the list of columns and data types in the dataframe
sales.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 195 entries, 0 to 194
Data columns (total 59 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   CUST_NAME            194 non-null    object
 1   Gender_Code          194 non-null    object
 2   ADDRESS1             194 non-null    object
 3   CITY                 194 non-null    object
 4   STATE                158 non-null    object
 5   COUNTRY_CODE         194 non-null    object
 6   POSTAL_CODE          194 non-null    object
 7   POSTAL_CODE_PLUS4    194 non-null    float64
 8   EMAIL_ADDRESS        194 non-null    object
 9   PHONE_NUMBER         194 non-null    object
 10  CREDITCARD_TYPE      194 non-null    object
 11  SALESMAN_ID          194 non-null    object
 12  NATIONALITY          194 non-null    object
 13  NATIONAL_ID          194 non-null    object
 14  CREDITCARD_NUMBER    194 non-null    float64
 15  CUST_ID              194 non-null    float64
 16  ORDER_ID             194 non-null    float64
 17  ORDER_DATE           194 non-null    object
 18  ORDER_TIME           194 non-null    object
 19  FREIGHT_CHARGES      194 non-null    float64
 20  ORDER_SALESMAN       194 non-null    object
 21  ORDER_POSTED_DATE    194 non-null    object
 22  ORDER_SHIP_DATE      194 non-null    datetime64[ns]
 23  AGE                  170 non-null    object
 24  ORDER_VALUE          194 non-null    float64
 25  T_TYPE               194 non-null    object
 26  PURCHASE_TOUCHPOINT  194 non-null    object
 27  PURCHASE_STATUS      194 non-null    object
 28  ORDER_TYPE           194 non-null    object
 29  GENERATION           194 non-null    object
 30  Baby Food            194 non-null    float64
 31  Diapers              194 non-null    float64
 32  Formula              194 non-null    float64
 33  Lotion               194 non-null    float64
 34  Baby wash            194 non-null    float64
 35  Wipes                194 non-null    float64
 36  Fresh Fruits         194 non-null    float64
 37  Fresh Vegetables     194 non-null    float64
 38  Beer                 194 non-null    float64
 39  Wine                 194 non-null    float64
 40  Club Soda            194 non-null    float64
 41  Sports Drink         194 non-null    float64
 42  Chips                194 non-null    float64
 43  Popcorn              194 non-null    float64
 44  Oatmeal              194 non-null    float64
 45  Medicines            194 non-null    float64
 46  Canned Foods         194 non-null    float64
 47  Cigarettes           194 non-null    float64
 48  Cheese               194 non-null    float64
 49  Cleaning Products    194 non-null    float64
 50  Condiments           194 non-null    float64
 51   Frozen Foods         194 non-null    float64
 52   Kitchen Items        194 non-null    float64
 53   Meat                 194 non-null    float64
 54   Office Supplies      194 non-null    float64
 55   Personal Care        194 non-null    float64
 56   Pet Supplies         194 non-null    float64
 57   Sea Food             194 non-null    float64
 58   Spices               194 non-null    float64
dtypes: datetime64[ns](1), float64(35), object(23)
memory usage: 90.0+ KB
```

In [ ]:
```python
# This code drops rows with null values
sales.drop(columns=['LOCALITY', 'DRIVER_LICENSE', 'ADDRESS2'], axis= 1, inplace=Tru
```

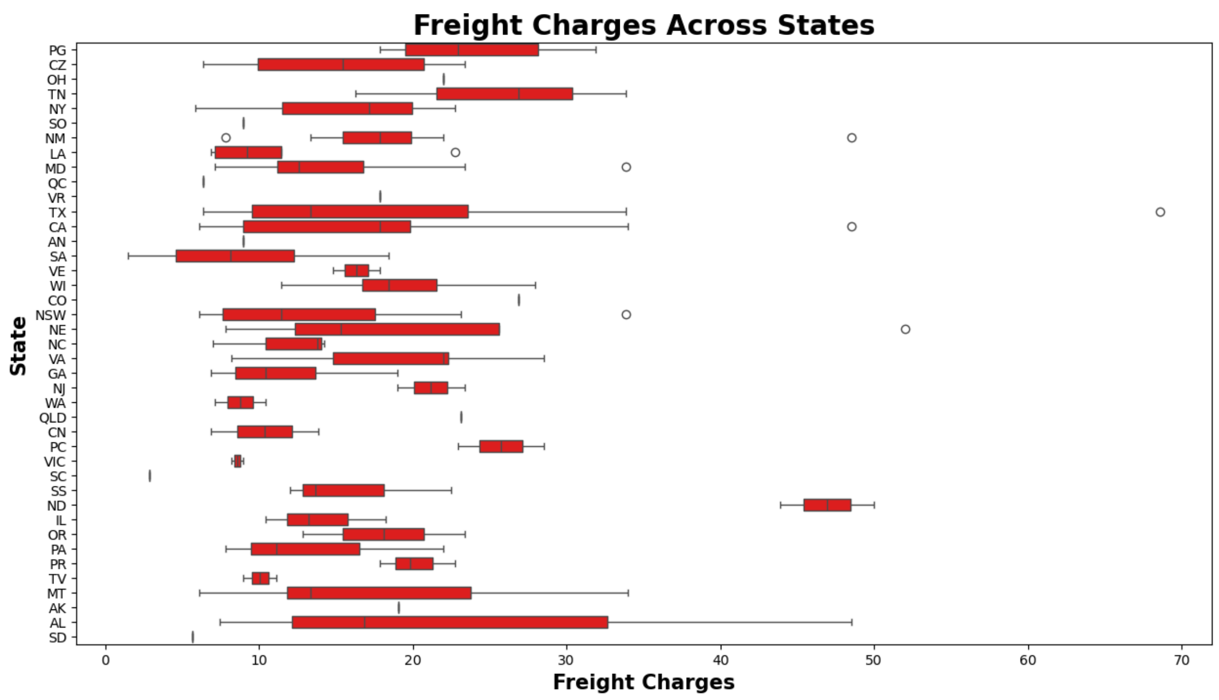
In [ ]:
```python
# This code displays a histogram of the sales by state
plt.figure(figsize= (20,8))
sns.histplot(sales, x ='STATE', bins=50)
plt.title('Sales by State', fontsize= 20, weight= 'bold')
plt.ylabel('State Count', fontsize = 15, weight = 'bold')
plt.xlabel('State', fontsize = 15, weight = 'bold')
```

Out[ ]:
```
Text(0.5, 0, 'State')
```



In [ ]:
```python
# This code creates a box plot comparing the freight charges across states
plt.figure(figsize=(15,8))
sns.boxplot(sales, x = 'FREIGHT_CHARGES', y = 'STATE', color= 'red' )
plt.title('Freight Charges Across States', fontsize = 20, weight = 'bold')
plt.ylabel('State', fontsize = 15, weight = 'bold')
plt.xlabel('Freight Charges', fontsize = 15, weight = 'bold')
```

Out[ ]:
```
Text(0.5, 0, 'Freight Charges')
```



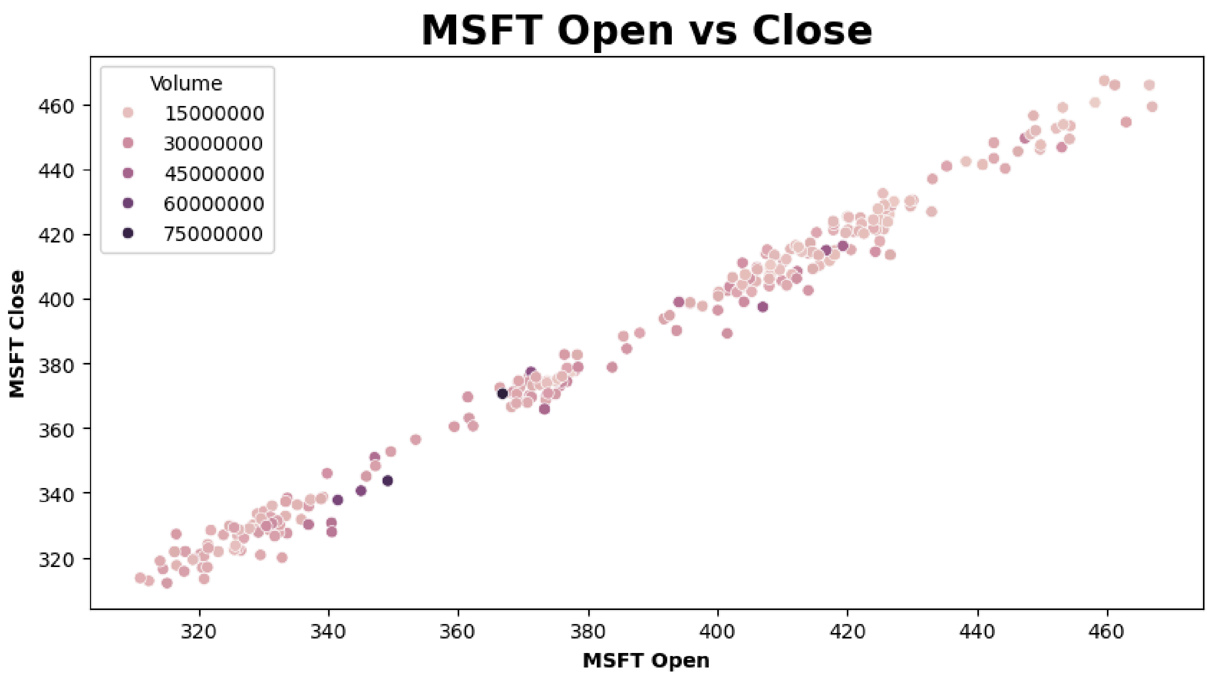
```
In [ ]: # This code imports microsoft stock data and renames columns
        msft = pd.read_excel(r'MSFT 1year.xlsx')
        msft.rename(columns={'Open': 'msft_open', 'High':'msft_high',
                             'Low': 'msft_low', 'Close': 'msft_close',
                             'Adj Close': 'msft_adj', 'Volume': 'msft_volume'},inplace=True)
        msft.head()
```

Out[ ]:

	Date	msft_open	msft_high	msft_low	msft_close	msft_adj	msft_volume
0	2023-07-21	349.149994	350.299988	339.829987	343.769989	341.101685	69368900
1	2023-07-24	345.850006	346.920013	342.309998	345.109985	342.431274	26678100
2	2023-07-25	347.109985	351.890015	345.070007	350.980011	348.255707	41637700
3	2023-07-26	341.440002	344.670013	333.109985	337.769989	335.148224	58383700
4	2023-07-27	340.480011	341.329987	329.049988	330.720001	328.152954	39635300

```
In [ ]: # This code creates a scatter plot comparing microsoft's stock open and close data
        plt.figure(figsize=(10,5))
        sns.scatterplot(msft, x='Open', y='Close', hue = 'Volume')
        plt.title('MSFT Open vs Close', fontsize = 20, weight= 'bold')
        plt.ylabel('MSFT Close', fontsize = 10, weight = 'bold')
        plt.xlabel('MSFT Open', fontsize = 10, weight = 'bold')
```

```
Out[ ]: Text(0.5, 0, 'MSFT Open')
```



```
In [ ]: # This code imports apple's stock data and changes the column titles
        aapl = pd.read_excel(r'AAPL 1year.xlsx')
        aapl.rename(columns={'Open': 'aapl_open', 'High':'aapl_high',
                             'Low': 'aapl_low', 'Close': 'aapl_close',
                             'Adj Close': 'aapl_adj', 'Volume': 'aapl_volume'},inplace=True)
        aapl.head()
```

Out[ ]:

	Date	aapl_open	aapl_high	aapl_low	aapl_close	aapl_adj	aapl_volume
0	2023-07-21	194.100006	194.970001	191.229996	191.940002	190.926041	71917800
1	2023-07-24	193.410004	194.910004	192.250000	192.750000	191.731766	45377800
2	2023-07-25	193.330002	194.440002	192.919998	193.619995	192.597153	37283200
3	2023-07-26	193.669998	195.639999	193.320007	194.500000	193.472519	47471900
4	2023-07-27	196.020004	197.199997	192.550003	193.220001	192.199280	47460200

```
In [ ]: # This creates a subset of microsoft and apple's adjusted close data
        subset = pd.concat([msft['msft_adj'], aapl['aapl_adj']], axis=1)
        subset.head()
```

Out[ ]:

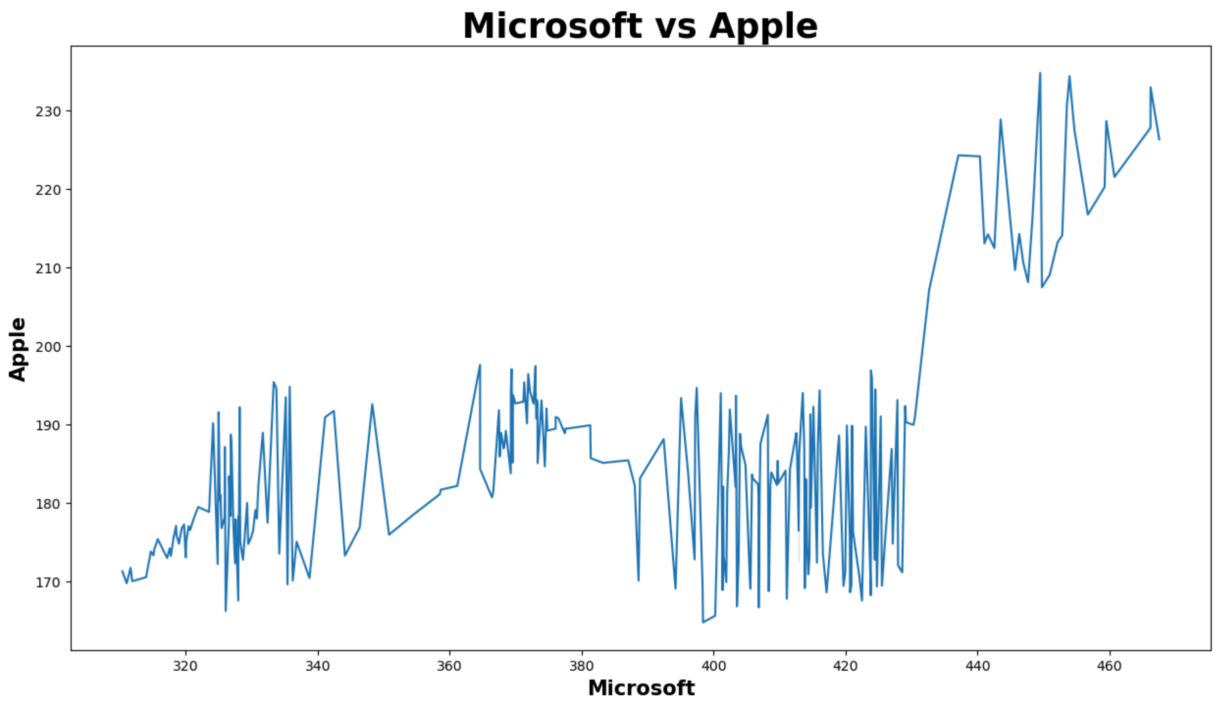
	msft_adj	aapl_adj
0	341.101685	190.926041
1	342.431274	191.731766
2	348.255707	192.597153
3	335.148224	193.472519
4	328.152954	192.199280

In [ ]:

```
# This code creates a line plot comparing microsoft and apple adjusted close
plt.figure(figsize=(15,8))
sns.lineplot(subset, x = 'msft_adj', y = 'aapl_adj')
plt.title('Microsoft vs Apple', fontsize= 25, weight = 'bold')
plt.ylabel('Apple', fontsize= 15, weight = 'bold')
plt.xlabel('Microsoft', fontsize= 15, weight = 'bold')
```

Out[ ]:

```
Text(0.5, 0, 'Microsoft')
```


Microsoft vs Apple
Apple
Microsoft