DSC 540-Week 5 & 6 Exercises

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Data Wrangling with Python: Activity 5.01

create a soup with bs4 and load the data

In [12]:
```
## Loading the required packages
from bs4 import BeautifulSoup
import pandas as pd
import warnings
warnings.filterwarnings("ignore")
```

In [13]:
```
## Reading the html file
fd = open('./datasets/countries_gdp.htm', 'r', encoding="utf-8")
soup = BeautifulSoup(fd)
fd.close()
```

In [14]:
```
## Fetch all tables using the 'table' tag
all_tables = soup.find_all('table')
count=len(all_tables)
print(f"Total number of tables {count}")
```

```
Total number of tables 9
```

In [16]:
```
## Using the class attribute to find the right table
data_table = soup.find("table", {"class": '"wikitable"|}'})
## this prints data type of the returned object
dp=type(data_table)
print(f"data type of the returned object : {dp} ")
```

```
data type of the returned object : <class 'bs4.element.Tag'>
```

In [20]:
```
## Separating the source names and their corresponding data
sources = data_table.tbody.findAll('tr', recursive=False)[0]
sources_list = [td for td in sources.findAll('td')]
### This shows data is from three sources
print(len(sources_list))
```

```
3
```

In [21]:
```
data = data_table.tbody.findAll('tr', recursive=False)[1].findAll('td', rec
ursive=False)
## type of the actual data
type(data)
```

Out[21]:
```
bs4.element.ResultSet
```

In [31]:
```
## Get the source names from the list of sources you have created
data_tables = []
[data_tables.append(td.findAll('table')) for td in data]
len(data_tables)
```

Out[31]:
```
3
```

Separating the header and data from the data for the first source only

In [32]:
```
# extracting source names with the help of getText() by passing the values
from sources_list in a loop
source_names = [source.findAll('a')[0].getText() for source in sources_lis
t]
print(source_names)
```

```
['International Monetary Fund', 'World Bank', 'United Nations']
```

In [34]:
```
## Extracting the column headers for the data
header1 = [th.getText().strip() for th in data_tables[0][0].findAll('thea
d')[0].findAll('th')]
header1
```

Out[34]:
```
['Rank', 'Country', 'GDP(US$MM)']
```

In [76]:
```
## Extracting the actual data from the first source
rows1 = data_tables[0][0].findAll('tbody')[0].findAll('tr')[1:]
```

In [78]:
```
### Removing the tags to remain with the actual observations by passing the
values from "rows1" derived from above step
data_rows1 = [[td.get_text().strip() for td in tr.findAll('td')] for tr in
rows1]
data_rows1[10]
```

Out[78]:
```
['11', 'South Korea', '1,538,030']
```

In [38]:
```
## Creating the data frame from the observations  and headers from the firs
t column
df1 = pd.DataFrame(data_rows1, columns=header1)
df1.head()
```

Out[38]:

	Rank	Country	GDP(US$MM)
0	1	United States	19,390,600
1	2	China[n 1]	12,014,610
2	3	Japan	4,872,135
3	4	Germany	3,684,816
4	5	United Kingdom	2,624,529

In [39]:
```
## Extracting the column header for the data from the second source
header2 = [th.getText().strip() for th in data_tables[1][0].findAll('thea
d')[0].findAll('th')]
header2
```

Out[39]:
```
['Rank', 'Country', 'GDP(US$MM)']
```

In [79]:
```
### Extracting the observations with all elements and attributes from the s
econd data source
rows2 = data_tables[1][0].findAll('tbody')[0].findAll('tr')[1:]
rows2[1]
```

Out[79]:
```
<tr style="background-color:#eaecf0">
<td align="right" data-sort-value="0"> </td>
<td><i><span class="flagicon"><img alt="" class="thumbborder" data-file-hei
ght="540" data-file-width="810" height="15" src="./List of countries by GDP
(nominal) - Wikipedia_files/23px-Flag_of_Europe.svg.png" srcset="//upload.w
ikimedia.org/wikipedia/commons/thumb/b/b7/Flag_of_Europe.svg/35px-Flag_of_E
urope.svg.png 1.5x, //upload.wikimedia.org/wikipedia/commons/thumb/b/b7/Fla
g_of_Europe.svg/45px-Flag_of_Europe.svg.png 2x" width="23"/> </span><a href
="https://en.wikipedia.org/wiki/European_Union" title="European Union">Euro
pean Union</a></i><sup class="reference" id="cite_ref-26"><a href="https://
en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)#cite_note-26">[2
3]</a></sup></td>
<td align="right"><span class="sortkey" style="display:none">70071727769800
00000♠</span>17,277,698
</td></tr>
```

In [41]:
```
def find_right_text(i, td):
    if i == 0:
        return td.getText().strip()
    elif i == 1:
        return td.getText().strip()
    else:
        index = td.text.find('♠')
        return td.text[index+1:].strip()
```

In [42]:
```
### Extracting only the useful data from the above row information to be us
ed in creating the data frame
data_rows2 = [[find_right_text(i, td) for i, td in enumerate(tr.findAll('t
d'))] for tr in rows2]
```

In [43]:
```
### Combining the column headers and the row observations to form the secon
d data frame
df2 = pd.DataFrame(data_rows2, columns=header2)
df2.head()
```

Out[43]:

	Rank	Country	GDP(US$MM)
0	1	United States	19,390,604
1		European Union[23]	17,277,698
2	2	China[n 4]	12,237,700
3	3	Japan	4,872,137
4	4	Germany	3,677,439

In [44]:
```
## Extracting the column headers from the third source
header3 = [th.getText().strip() for th in data_tables[2][0].findAll('thea
d')[0].findAll('th')]
header3
```

Out[44]:
```
['Rank', 'Country', 'GDP(US$MM)']
```

In [45]:
```
## Extracting the row information from the third source
rows3 = data_tables[2][0].findAll('tbody')[0].findAll('tr')[1:]
```

In [46]:
```
## Extracting the row information from row3
data_rows3 = [[find_right_text(i, td) for i, td in enumerate(tr.findAll('t
d'))] for tr in rows3]
```

In [47]:
```
## Creating a data frame using the column headers and the row informartion
(observations)
df3 = pd.DataFrame(data_rows3, columns=header3)
df3.head()
```

Out[47]:

	Rank	Country	GDP(US$MM)
0	1	United States	18,624,475
1	2	China[n 4]	11,218,281
2	3	Japan	4,936,211
3	4	Germany	3,477,796
4	5	United Kingdom	2,647,898

Data Wrangling with Python: Activity 6.0

Load data from Comma Delimited Data (CSV)

In [58]:
```
## Loading the required packages
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
```

In [48]:
```
## Read csv using pandas
visitors_data= pd.read_csv('./datasets/visit_data.csv')
## show the first five observations of the dataset
visitors_data.head(5)
```

Out[48]:

	id	first_name	last_name	email	gender	ip_address	visit
0	1	Sonny	Dahl	sdahl0@mysql.com	Male	135.36.96.183	1225.0
1	2	NaN	NaN	dhoovart1@hud.gov	NaN	237.165.194.143	919.0
2	3	Gar	Armal	garmal2@technorati.com	NaN	166.43.137.224	271.0
3	4	Chiarra	Nulty	cnulty3@newyorker.com	NaN	139.98.137.108	1002.0
4	5	NaN	NaN	sleaver4@elegantthemes.com	NaN	46.117.117.27	2434.0

In [52]:
```
#Number of duplicates in each field
## Try to find duplicates in the columns first_name, last_name, email and i
p_address using duplicated method
## value_counts() provides the counts of duplicate values in a given colum
n.
## using the filter to check the True values (indicated with 1) returned fr
om duplicated() function, to identify counts.

print('Number of duplicates in the First Name field: {}'.format(visitors_da
ta.first_name.duplicated().sum()))
print('Number of duplicates in the Last Name field: {}'.format(visitors_dat
a.last_name.duplicated().sum()))

print('Number of duplicates in the Email field: {}'.format(visitors_data.em
ail.duplicated().sum()))
print('Number of duplicates in the IP Address field: {}'.format(visitors_da
ta.ip_address.duplicated().sum()))
```

```
Number of duplicates in the First Name field: 320
Number of duplicates in the Last Name field: 299
Number of duplicates in the Email field: 0
Number of duplicates in the IP Address field: 0
```

In [53]:
```
# Number of duplicate rows

print('Number of duplicates rows present in the dataset: {}'.format(visitor
s_data.duplicated().sum()))
```

```
Number of duplicates rows present in the dataset: 0
```

In [54]:
```
### Checking whether there are any NAN in essential
visit = visitors_data.visit.isnull().values.any()
email = visitors_data.email.isnull().values.any()
ip_address = visitors_data.ip_address.isnull().values.any()
print("The column Email contains NaN - {}".format(email))
print("The column IP Address contains NaN - {}".format(ip_address))
print("The column Visit contains NaN - {}".format(visit))
## Only visits has NAN
```

```
The column Email contains NaN - False
The column IP Address contains NaN - False
The column Visit contains NaN - True
```

In [55]:
```
## Eliminating Outliers:: We consider the NaN in Visits as the outliers

New_visitors_df = visitors_data[np.isfinite(visitors_data['visit'])]
New_visitors_df.head()
```

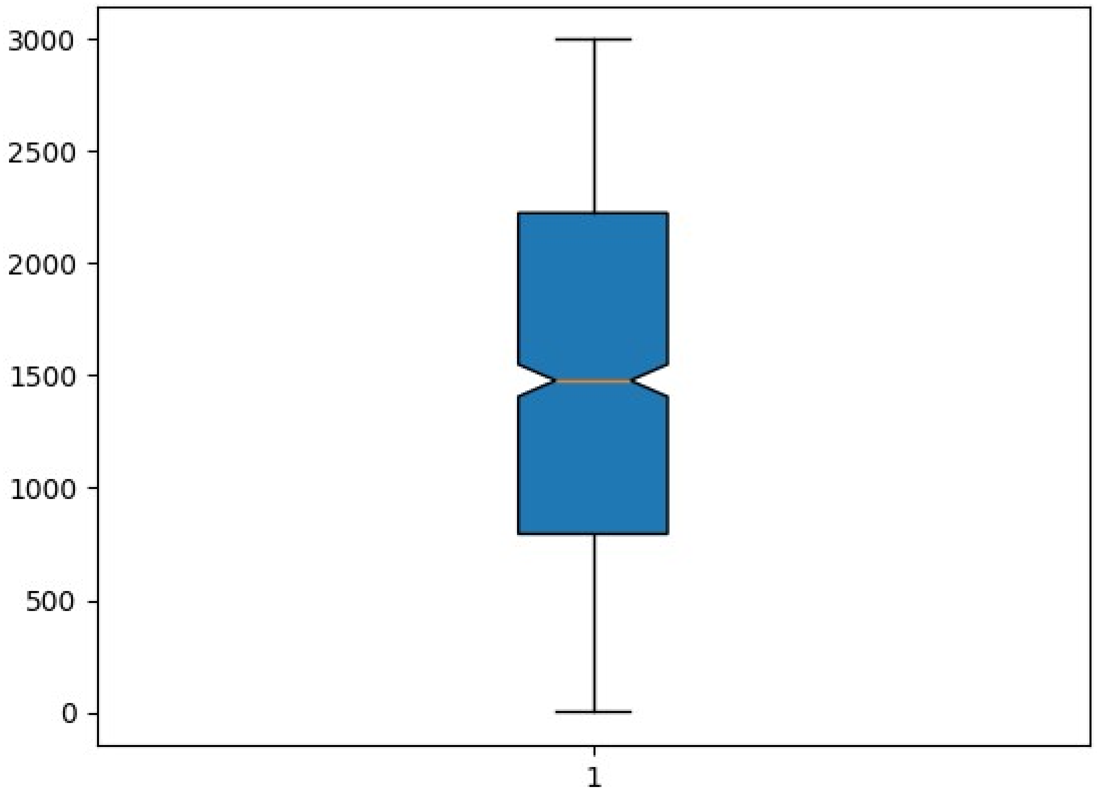
Out[55]:

	id	first_name	last_name	email	gender	ip_address	visit
0	1	Sonny	Dahl	sdahl0@mysql.com	Male	135.36.96.183	1225.0
1	2	NaN	NaN	dhoovart1@hud.gov	NaN	237.165.194.143	919.0
2	3	Gar	Armal	garmal2@technorati.com	NaN	166.43.137.224	271.0
3	4	Chiarra	Nulty	cnulty3@newyorker.com	NaN	139.98.137.108	1002.0
4	5	NaN	NaN	sleaver4@elegantthemes.com	NaN	46.117.117.27	2434.0

In [56]:
```
# reporting size difference
### before and after removing the outliers
df_size_before = visitors_data.shape[0]
df_size_after = New_visitors_df.shape[0]
print("The size of previous data was - {} rows".format(df_size_before))
print("The size of the new data is - {} rows".format(df_size_after))
```

```
The size of previous data was - 1000 rows
The size of the new data is - 974 rows
```

In [59]:
```
## Boxplot for checking outliers
bp=plt.boxplot(New_visitors_df.visit, patch_artist = True,
                notch ='True', vert = 1)
```



In [68]:
```
from scipy import stats
cos_arr_z_score = stats.zscore(New_visitors_df.visit)
```

In [69]:
```
#Any data point with a z-score greater than +3 or less then -3 is considere
d an outlier
#Creating dataframe with zscore filter conditions
cos_arr_without_outliers = New_visitors_df[(cos_arr_z_score < 3)]
```

In [70]:
```
# Identifying the shape of dataframe to see if any record has been filtered
out as part of outliers
#Using zscore method, we could see that there is no outliers to be filtered
out in the data
cos_arr_without_outliers.shape
```

Out[70]:
```
(974, 7)
```

Alternative method for outliers

In [74]:
```
## We will look to use minimum value of 150 and maximum value of 2900 as ou
r potential valid range of values for visit column.
## any other values outside this range will be considered as potential outl
iers for this exercise.

cleaned_visit_df = New_visitors_df[(New_visitors_df.visit >= 150) & (New_vi
sitors_df.visit <= 2900)]
```

In [75]:
```
## shape function provides the number of rows and columns information
cleaned_visit_df.shape
```

Out[75]:
```
(907, 7)
```

Looking at above, with certain assumption about potential outlier values (as values below 150 and values above 2900 considered as outliers), we can see that the clean dataframe has 907 rows in it

3. Insert data into a SQL Lite database – create a table with the following data (Hint: Python for Data Analysis page 191):

a. Name, Address, City, State, Zip, Phone Number

b. Add at least 10 rows of data and submit your code with a query generating your results.

In [61]:
```
## load the sql library
import sqlite3
```

In [62]:
```
# making a connection to sql lite db

con = sqlite3.connect('./datasets/mydata.sqlite')

#defining DDL query

query = "CREATE TABLE UserDataTable (Name VARCHAR(50), Address VARCHAR(50
0),City VARCHAR(50), State VARCHAR(50),PhoneNumber VARCHAR(50),Zip INTEGE
R);"

#execute the query to create the table

con.execute(query)

con.commit()
```

In [63]:
```
# Add data into table

data = [('James Butt', '6649 N Blue Gum St', 'New Orleans', 'LA', 70116, '5
04-621-8927'), ('Josephine Darakjy','4 B Blue Ridge Blvd','Brighton','MI',4
8116,'810-292-9388'), ('Art Venere','8 W Cerritos Ave␣ , #54','Bridgepor
t','NJ',8014,'856-636-8749'),  ('Lenna Paprocki','639 Main St','Anchorag
e','AK',99501,'907-385-4412'), ('Donette Foller','34 Center St','Hamilto
n','OH',45011,'513-570-1893'), ('Simona Morasca','3 Mcauley Dr','Ashlan
d','OH',44805,'419-503-2484'), ('Mitsue Tollner','7 Eads St','Chicago','I
L',60632,'773-573-6914'), ('Leota Dilliard','7 W Jackson Blvd','San␣ , Jos
e','CA',95111,'408-752-3500'), ('Sage Wieser','5 Boston Ave #88','Sioux ,
Falls','SD',57105,'605-414-2147'), ('Kris Marrier','228 Runamuck Pl , #280
8','Baltimore','MD',21224,'410-655-8723')]

stmt = "INSERT INTO UserDataTable VALUES(?, ?, ?, ?, ?, ?)"

con.executemany(stmt, data)
#Dont forget to commit your transaction
con.commit()
```

In [64]:
```
## import the pandas data frame
import pandas as pd
```

In [65]:
```
stm='select * from UserDataTable'
```

In [66]:
```
cursor = con.execute(stm)
rows = cursor.fetchall()
rows[1]
```

Out[66]:
```
('Josephine Darakjy',
 '4 B Blue Ridge Blvd',
 'Brighton',
 'MI',
 '48116',
 '810-292-9388')
```

In [67]:
```
## sql query for selecting all the columns data
pd.read_sql_query(stm, con)
```

Out[67]:

	Name	Address	City	State	PhoneNumber	Zip
0	James Butt	6649 N Blue Gum St	New Orleans	LA	70116	504-621-8927
1	Josephine Darakjy	4 B Blue Ridge Blvd	Brighton	MI	48116	810-292-9388
2	Art Venere	8 W Cerritos Ave␣ , #54	Bridgeport	NJ	8014	856-636-8749
3	Lenna Paprocki	639 Main St	Anchorage	AK	99501	907-385-4412
4	Donette Foller	34 Center St	Hamilton	OH	45011	513-570-1893
5	Simona Morasca	3 Mcauley Dr	Ashland	OH	44805	419-503-2484
6	Mitsue Tollner	7 Eads St	Chicago	IL	60632	773-573-6914
7	Leota Dilliard	7 W Jackson Blvd	San␣ , Jose	CA	95111	408-752-3500
8	Sage Wieser	5 Boston Ave #88	Sioux , Falls	SD	57105	605-414-2147
9	Kris Marrier	228 Runamuck Pl , #2808	Baltimore	MD	21224	410-655-8723