Python Assignment Solutions

Question 9 Write a program to read the data from the following link, perform data analysis and answer the following questions

Note -

1. Write code comments wherever required for code understanding

Link - https://data.wa.gov/api/views/f6w7-q2d2/rows.csv?accessType=DOWNLOAD (https://data.wa.gov/api/views/f6w7-q2d2/rows.csv?accessType=DOWNLOAD)

Insights to be drawn -

- Get all the cars and their types that do not qualify for clean alternative fuel vehicle
- Get all TESLA cars with the model year, and model type made in Bothell City.
- Get all the cars that have an electric range of more than 100, and were made after 2015
- Draw plots to show the distribution between city and electric vehicle type

In [1]:

```
Link = "https://data.wa.gov/api/views/f6w7-q2d2/rows.csv?accessType=DOWNLOAD"
```

In [2]:

```
import requests
import csv
import pandas as pd
```

In [3]:

```
def get_data_as_df(link):
    with requests.get(link, stream=True) as r:
        lines = (line.decode('utf-8') for line in r.iter_lines())
        data = []
        for row in csv.reader(lines):
            data.append(row)
    df = pd.DataFrame(data)
    df.columns = df.loc[0]
    df.drop(index=0, axis=0, inplace=True)
    return df
```

In [4]:

```
df = get_data_as_df(Link)
df.head()
```

Out[4]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	Base MSRP	Legislative District	DOL Vehicle ID
1	5YJXCAE26J	Yakima	Yakima	WA	98908	2018	TESLA	MODEL X	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	238	0	14	141151601
2	JHMZC5F37M	Kitsap	Poulsbo	WA	98370	2021	HONDA	CLARITY	Plug-in Hybrid Electric Vehicle (PHEV)	Clean Alternative Fuel Vehicle Eligible	47	0	23	171566447
3	5YJ3E1EB0K	King	Seattle	WA	98199	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	220	0	36	9426525
4	1N4AZ0CP5D	King	Seattle	WA	98119	2013	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	75	0	36	211807760
5	5YJSA1E21H	Thurston	Lacey	WA	98516	2017	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	210	0	22	185810306

In [5]:

```
df.shape
```

Out[5]:

```
(130443, 17)
```

In [6]:

```
df1 = df.copy()
```

In [7]:

```
# Get all the cars and their types that do not qualify for clean alternative fuel vehicle
df1["clean_fuel"] = df["Clean Alternative Fuel Vehicle (CAFV) Eligibility"] != "Clean Alternative Fuel Vehicle Eligible"
```

In [8]:

```
df1.loc[df1["clean_fuel"] == True]
```

Out[8]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	Base MSRP	Legislative District	Ve
7	3FA6P0PU1G	Thurston	Tumwater	WA	98501	2016	FORD	FUSION	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	19	0	22	347
8	WA1F2AFY8P	Thurston	Lacey	WA	98516	2023	AUDI	Q5 E	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	23	0	22	227
9	1FADP5CU0E	Thurston	Rochester	WA	98579	2014	FORD	C-MAX	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	19	0	20	229
12	7SAYGDEF4N	Yakima	Yakima	WA	98908	2022	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	14	187
15	1FADP5FU4H	Thurston	Lacey	WA	98513	2017	FORD	C-MAX	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	20	0	22	139
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
130438	WBA13AG06M	Thurston	Olympia	WA	98501	2021	BMW	530E	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	21	0	22	196
130439	7SAYGDEE6P	Pierce	Gig Harbor	WA	98335	2023	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	26	231
130440	1N4BZ1CV7N	Pierce	Tacoma	WA	98408	2022	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	29	185
130441	5YJYGDEE8M	King	Seattle	WA	98109	2021	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	36	176
130443	5YJ3E1EA5M	Pierce	Puyallup	WA	98375	2021	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	2	180

69892 rows × 18 columns

In [9]:

```
# Get all TESLA cars with the model year, and model type made in Bellevue City
df1["bellevue_city"] = df["City"] == "Bellevue"
df1.loc[df1["bellevue_city"] == True]
```

Out[9]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	Base MSRP	Legislative District	Vehic
126	5YJ3E1EC4M	King	Bellevue	WA	98006	2021	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	41	18068
131	5YJSA1E25L	King	Bellevue	WA	98005	2020	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	330	0	41	10319
139	5YJSA1E23L	King	Bellevue	WA	98006	2020	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	330	0	41	874
143	5YJ3E1EB0N	King	Bellevue	WA	98004	2022	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	48	18757
162	WBA33AG09N	King	Bellevue	WA	98005	2022	BMW	530E	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	18	0	41	19397
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
130109	5YJSA1E69N	King	Bellevue	WA	98004	2022	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	41	20583
130187	7SAXCDE5XN	King	Bellevue	WA	98005	2022	TESLA	MODEL X	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	48	21817
130219	5YJYGDEF4M	King	Bellevue	WA	98007	2021	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	48	17892
130286	7SAYGDEE6N	King	Bellevue	WA	98027	2022	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Eligibility unknown as battery range has not b...	0	0	41	22016
130329	JTDKN3DP6D	King	Bellevue	WA	98006	2013	TOYOTA	PRIUS PLUG-IN	Plug-in Hybrid Electric Vehicle (PHEV)	Not eligible due to low battery range	6	0	41	25401

6748 rows × 19 columns

In [10]:

```
# Get all the cars that have an electric range of more than 100, and were made after
# 2015
df["Electric Range"] = df["Electric Range"].astype(int)
df["Model Year"] = df["Model Year"].astype(int)
```

In [11]:

```
df1["range_100"] = df["Electric Range"] > 100
df1["year_2015"] = df["Model Year"] > 2015
```

In [12]:

```
df1.loc[(df1["range_100"] & df1["year_2015"]) == True]
```

Out[12]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	Model	Electric Vehicle Type	Clean Alternative Fuel Vehicle (CAFV) Eligibility	...	Base MSRP	Legislative District	DOL Vehicle ID
1	5YJXCAE26J	Yakima	Yakima	WA	98908	2018	TESLA	MODEL X	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	14	141151601
3	5YJ3E1EB0K	King	Seattle	WA	98199	2019	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	36	9426525
5	5YJSA1E21H	Thurston	Lacey	WA	98516	2017	TESLA	MODEL S	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	22	185810306
13	5YJ3E1EC7L	Thurston	Lacey	WA	98503	2020	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	22	2135486
14	5YJ3E1EB2L	Thurston	Olympia	WA	98516	2020	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	22	124645363
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
130418	5YJYGDEE5L	Pierce	Tacoma	WA	98444	2020	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	29	112591538
130429	1N4AZ1CP0J	Clallam	Sequim	WA	98382	2018	NISSAN	LEAF	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	24	290405174
130433	5YJYGDEEXL	King	Vashon	WA	98070	2020	TESLA	MODEL Y	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	34	112734723
130437	5YJ3E1EB0J	Whatcom	Blaine	WA	98230	2018	TESLA	MODEL 3	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	42	103521302
130442	5YJXCBE22L	Island	Camano Island	WA	98282	2020	TESLA	MODEL X	Battery Electric Vehicle (BEV)	Clean Alternative Fuel Vehicle Eligible	...	0	10	102834938

34066 rows × 21 columns

In [13]:

```
# Draw plots to show the distribution between city and electric vehicle type
df.groupby("City")["Electric Vehicle Type"].count()
```

Out[13]:

```
City
                  3
Aberdeen        115
Acme              7
Addy              2
Aiea              1
               ...
Yacolt           32
Yakima          471
Yarrow Point    126
Yelm            197
Zillah           23
Name: Electric Vehicle Type, Length: 657, dtype: int64
```

In [14]:

```
top_20 = df.groupby("City")["Electric Vehicle Type"].count().sort_values(ascending=False)[:20]
```

In [15]:

```
x = list(dict(top_20).keys())
y = list(dict(top_20).values())
```

In [16]:

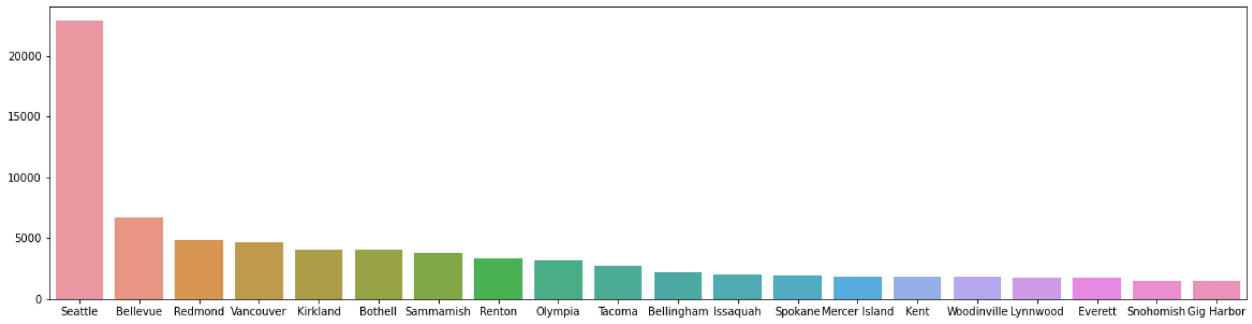
```
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [17]:

```
fig, ax = plt.subplots(figsize=(20,5))
sns.barplot(x=x, y=y)
```

Out[17]:

```
<AxesSubplot:>
```



Question 10 Write a program to count the number of verbs, nouns, pronouns, and adjectives in a given particular phrase orparagraph, and return their respective count as a dictionary.

Note -

1. Write code comments wherever required for code
2. You have to write at least 2 additional test cases in which your program will run successfully and provide an explanation for the same.

In [20]:

```
import re

def count_pos_tags(text):
    # Define regular expressions for matching different parts of speech
    noun_pattern = re.compile(r'\b[A-Za-z]+[s]?\b', re.IGNORECASE)
    pronoun_pattern = re.compile(r'\b(I|me|my|mine|you|your|yours|he|him|his|she|her|hers|it|its|we|us|our|ours|they|the
    verb_pattern = re.compile(r'\b[A-Za-z]+(?:s|ed|ing)?\b', re.IGNORECASE)
    adjective_pattern = re.compile(r'\b[A-Za-z]+\b', re.IGNORECASE)

    # Initialize counts
    noun_count = 0
    pronoun_count = 0
    verb_count = 0
    adjective_count = 0

    # Find matches for each part of speech
    noun_matches = re.findall(noun_pattern, text)
    pronoun_matches = re.findall(pronoun_pattern, text)
    verb_matches = re.findall(verb_pattern, text)
    adjective_matches = re.findall(adjective_pattern, text)

    # Count the matches
    noun_count = len(noun_matches)
    pronoun_count = len(pronoun_matches)
    verb_count = len(verb_matches)
    adjective_count = len(adjective_matches)

    # Create and return the dictionary
    pos_counts = {
        'nouns': noun_count,
        'pronouns': pronoun_count,
        'verbs': verb_count,
        'adjectives': adjective_count
    }
    return pos_counts


```

In [21]:

```
# Test case 1
text = "I love to eat pizza."
result = count_pos_tags(text)
print(result)
```

```
{'nouns': 5, 'pronouns': 1, 'verbs': 5, 'adjectives': 5}
```

In [22]:

```
#Test case 2
text = "The cat chased the mouse. It was quick and agile. The dog barked loudly."
result = count_pos_tags(text)
print(result)

```

```
{'nouns': 14, 'pronouns': 1, 'verbs': 14, 'adjectives': 14}
```

In [ ]:

```

```