hackathon-1

July 23, 2023

[1]:
```
import pandas as pd
import numpy as np
import plotly.express as px
import matplotlib.pyplot as plt
from matplotlib.animation import FuncAnimation
```

[23]:
```
!pip install bar-chart-race
import bar_chart_race as bcr
```

```
Requirement already satisfied: bar-chart-race in /usr/local/lib/python3.10/dist-
packages (0.1.0)
Requirement already satisfied: pandas>=0.24 in /usr/local/lib/python3.10/dist-
packages (from bar-chart-race) (1.5.3)
Requirement already satisfied: matplotlib>=3.1 in
/usr/local/lib/python3.10/dist-packages (from bar-chart-race) (3.7.1)
Requirement already satisfied: contourpy>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
(1.1.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-
packages (from matplotlib>=3.1->bar-chart-race) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
(4.41.0)
Requirement already satisfied: kiwisolver>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
(1.4.4)
Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.10/dist-
packages (from matplotlib>=3.1->bar-chart-race) (1.22.4)
Requirement already satisfied: packaging>=20.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
(23.1)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-
packages (from matplotlib>=3.1->bar-chart-race) (8.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
(3.1.0)
Requirement already satisfied: python-dateutil>=2.7 in
/usr/local/lib/python3.10/dist-packages (from matplotlib>=3.1->bar-chart-race)
```

```
(2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
packages (from pandas>=0.24->bar-chart-race) (2022.7.1)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-
packages (from python-dateutil>=2.7->matplotlib>=3.1->bar-chart-race) (1.16.0)
```

[4]:
```
data=pd.read_csv (r"/content/drive/MyDrive/dataset.csv")
```

[5]:
```
data.head()
```

[5]:

	VIN (1-10)	County	City	State	Postal Code	Model Year	Make	\
0	JTMEB3FV6N	Monroe	Key West	FL	33040	2022	TOYOTA	
1	1G1RD6E45D	Clark	Laughlin	NV	89029	2013	CHEVROLET	
2	JN1AZ0CP8B	Yakima	Yakima	WA	98901	2011	NISSAN	
3	1G1FW6S08H	Skagit	Concrete	WA	98237	2017	CHEVROLET	
4	3FA6P0SU1K	Snohomish	Everett	WA	98201	2019	FORD	

	Model	Electric Vehicle Type	\
0	RAV4 PRIME	Plug-in Hybrid Electric Vehicle (PHEV)	
1	VOLT	Plug-in Hybrid Electric Vehicle (PHEV)	
2	LEAF	Battery Electric Vehicle (BEV)	
3	BOLT EV	Battery Electric Vehicle (BEV)	
4	FUSION	Plug-in Hybrid Electric Vehicle (PHEV)	

	Clean Alternative Fuel Vehicle (CAFV) Eligibility	Electric Range	\
0	Clean Alternative Fuel Vehicle Eligible	42	
1	Clean Alternative Fuel Vehicle Eligible	38	
2	Clean Alternative Fuel Vehicle Eligible	73	
3	Clean Alternative Fuel Vehicle Eligible	238	
4	Not eligible due to low battery range	26	

	Base MSRP	Legislative District	DOL Vehicle ID	\
0	0	NaN	198968248	
1	0	NaN	5204412	
2	0	15.0	218972519	
3	0	39.0	186750406	
4	0	38.0	2006714	

	Vehicle Location	Electric Utility	2020 Census Tract
0	POINT (-81.80023 24.5545)	NaN	12087972100
1	POINT (-114.57245 35.16815)	NaN	32003005702
2	POINT (-120.50721 46.60448)	PACIFICORP	53077001602
3	POINT (-121.7515 48.53892)	PUGET SOUND ENERGY INC	53057951101
4	POINT (-122.20596 47.97659)	PUGET SOUND ENERGY INC	53061041500

[6]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 112634 entries, 0 to 112633
Data columns (total 17 columns):
 #   Column                                             Non-Null Count   Dtype
---  ------                                             --------------   -----
 0   VIN (1-10)                                         112634 non-null  object
 1   County                                             112634 non-null  object
 2   City                                               112634 non-null  object
 3   State                                              112634 non-null  object
 4   Postal Code                                        112634 non-null  int64
 5   Model Year                                         112634 non-null  int64
 6   Make                                               112634 non-null  object
 7   Model                                              112614 non-null  object
 8   Electric Vehicle Type                              112634 non-null  object
 9   Clean Alternative Fuel Vehicle (CAFV) Eligibility  112634 non-null  object
 10  Electric Range                                     112634 non-null  int64
 11  Base MSRP                                          112634 non-null  int64
 12  Legislative District                               112348 non-null  float64
 13  DOL Vehicle ID                                     112634 non-null  int64
 14  Vehicle Location                                   112610 non-null  object
 15  Electric Utility                                   112191 non-null  object
 16  2020 Census Tract                                  112634 non-null  int64
dtypes: float64(1), int64(6), object(10)
memory usage: 14.6+ MB
```

#Checking for null values

[7]:
```
data.isnull().sum()
```

[7]:
```
VIN (1-10)                                           0
County                                               0
City                                                 0
State                                                0
Postal Code                                          0
Model Year                                           0
Make                                                 0
Model                                               20
Electric Vehicle Type                                0
Clean Alternative Fuel Vehicle (CAFV) Eligibility    0
Electric Range                                       0
Base MSRP                                            0
Legislative District                               286
DOL Vehicle ID                                       0
Vehicle Location                                    24
Electric Utility                                   443
2020 Census Tract                                    0
dtype: int64
```

#Filling Null values with Mean & Mode

[8]:
```
m=data['Model'].mode()
m
```

[8]:
```
0    MODEL 3
Name: Model, dtype: object
```

[9]:
```
data['Model'].fillna(data['Model'].mode().iloc[0], inplace=True)
```

[10]:
```
data['Vehicle Location'].fillna(data['Vehicle Location'].mode().iloc[0],␣
↪inplace=True)
```

[11]:
```
data['Electric Utility'].fillna(data['Electric Utility'].mode().iloc[0],␣
↪inplace=True)
```

[12]:
```
data['Legislative District'].fillna(data['Legislative District'].mean(),␣
↪inplace=True)
```

[13]:
```
data.isnull().sum()
```

[13]:
```
VIN (1-10)                                           0
County                                               0
City                                                 0
State                                                0
Postal Code                                          0
Model Year                                           0
Make                                                 0
Model                                                0
Electric Vehicle Type                                0
Clean Alternative Fuel Vehicle (CAFV) Eligibility    0
Electric Range                                       0
Base MSRP                                            0
Legislative District                                 0
DOL Vehicle ID                                       0
Vehicle Location                                     0
Electric Utility                                     0
2020 Census Tract                                    0
dtype: int64
```

#Choropleth and Racing_bar_plot

[14]:
```
choro = px.choropleth(data,
                      locations='State',
                      locationmode='USA-states',
                      color='State',
                      animation_frame='Model Year',  # Column for animation
                      title='Animated Choropleth Plot Example',
                      scope='usa')
```

[15]:
```
choro
```

[21]:
```
data_pivot = data_pivot.fillna(method='pad')
```

[27]:
```
bcr.bar_chart_race(
    df=data_pivot,
    filename='ev_racing_bar_plot.mp4',  # Output file name for the animation
    orientation='v',  # Horizontal bars
    sort='desc',      # Sort the bars in descending order
    n_bars=10,        # Number of bars to show
    fixed_order=False, # Allow bars to change positions
    title='Racing Bar Plot',  # Animation title
    label_bars=True,  # Show the value label on each bar
    period_label={'x': 0.99, 'y': 0.25, 'ha': 'right', 'va': 'center'},  #␣
 ↪Position of the year label
    period_fmt='%Y',  # Format of the year label
)
```

```
/usr/local/lib/python3.10/dist-packages/bar_chart_race/_make_chart.py:294:
UserWarning:

FixedFormatter should only be used together with FixedLocator

/usr/local/lib/python3.10/dist-packages/bar_chart_race/_make_chart.py:295:
UserWarning:

FixedFormatter should only be used together with FixedLocator

/usr/local/lib/python3.10/dist-packages/bar_chart_race/_make_chart.py:260:
UserWarning:

FixedFormatter should only be used together with FixedLocator

/usr/local/lib/python3.10/dist-packages/bar_chart_race/_make_chart.py:226:
UserWarning:

Some of your columns never make an appearance in the animation. To reduce color
repetition, set `filter_column_colors` to `True`
```

[ ]:
```

```