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Branch: MCA **Section/Group: 3(A)**

Semester: 3 **Date of Performance: 25/10/2024**

Subject Name: Business Analytics **Subject Code: 23CAH-701**

1. Aim/Overview of the practical:

Data analysis of electric vehicle population using Tableau.

2. Task to be done:

- **Data Collection and Import:** Obtain data related to electric vehicle populations, including vehicle type (BEV or PHEV), model year, and distribution by state.
- **Data Cleaning and Preparation:** Organize and preprocess the data to ensure that it is suitable for visualization in Tableau.
- **Dashboard Creation:** Design a Tableau dashboard that includes:
- A chart displaying the total number of electric vehicles by model year.
- A map visualizing the distribution of electric vehicles by state.

- Key performance indicators (KPIs) such as the average electric range, total number of vehicles, total BEV vehicles, and total PHEV vehicles.
- **Data Analysis:** Analyze the data to identify trends, patterns, and insights into the adoption of electric vehicles across different states and over time.
- **Presentation of Results:** Summarize findings through interactive visualizations and KPIs on the Tableau dashboard.

3. Program Logic:

This project uses Tableau's drag-and-drop interface for data visualization, with the following steps:

- **Data Importation:**
  - The electric vehicle data is imported into Tableau from a CSV or Excel file.
  - Data is structured into categories such as state, vehicle type (BEV/PHEV), model year, and total number of vehicles.
- **Data Processing:**
  - Tableau is used to clean and organize the data. For example, fields for vehicle types (BEV and PHEV) are aggregated to provide total numbers.
  - Calculations are made to derive key statistics such as the average electric range and percentage of BEV vs. PHEV vehicles.
- **Dashboard Design:**
  - KPI Cards: Created for key metrics such as average electric range, total vehicles, and the proportion of BEV and PHEV vehicles.

- Line Chart: Plots total vehicles by model year to track the growth of EVs.

- **Map Visualization:** Displays the total number of vehicles by state, allowing for an easy geographic comparison.

- **Interactivity:** Filters and dynamic controls allow users to explore the data in more detail, such as isolating certain states or years.

- **Formulas and Calculations:**
  - Calculated fields are created to derive metrics like the percentage of BEVs and PHEVs.
  - Aggregations are performed for total vehicles across years and states.

The final output is an interactive Tableau dashboard, which includes:

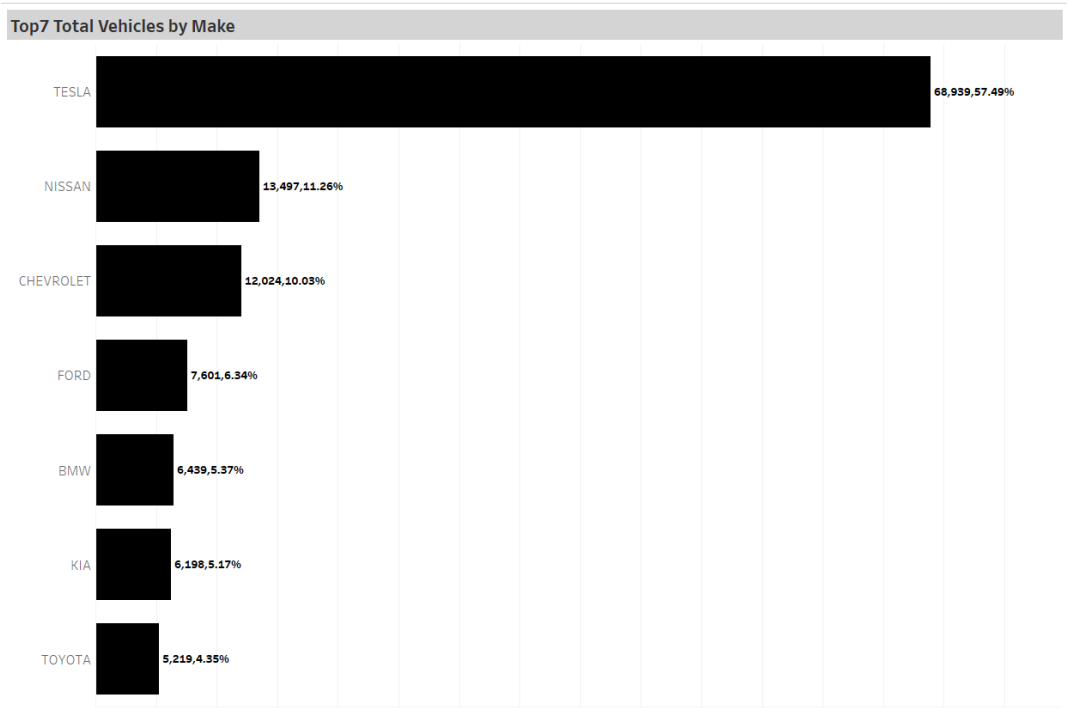
- **KPIs** that display:
  - Average Electric Range: 67.83 miles
  - Total Vehicles: 1,50,422
  - Total BEV Vehicles: 1,16,750 (77.6%)
  - Total PHEV Vehicles: 33,672 (22.4%)

- **Line Chart** showing the growth of electric vehicle adoption by model year, highlighting a spike in 2023.
- **Map** displaying the distribution of total vehicles across different states, with states like California leading in EV adoption.
- **Insightful Visualizations** that help stakeholders quickly understand the key metrics of EV adoption and distribution across the U.S.

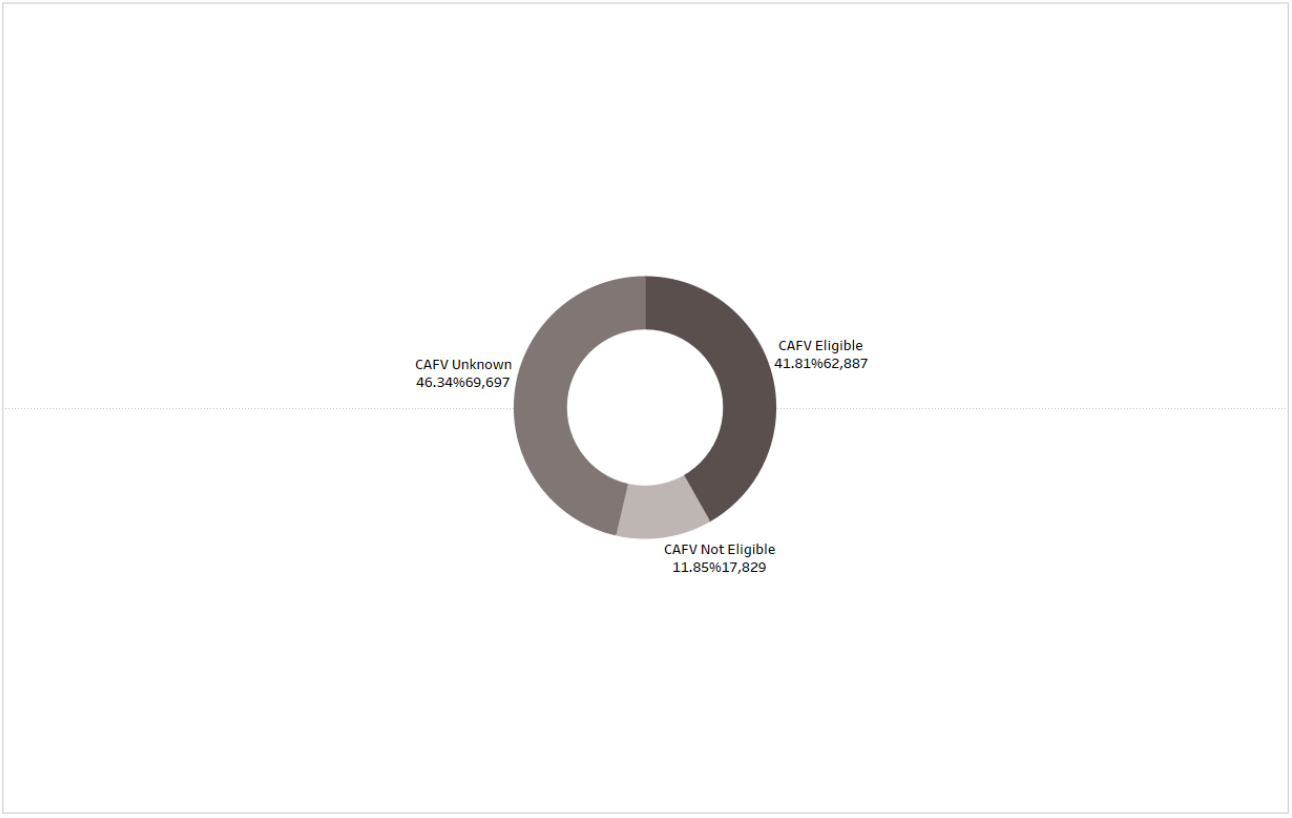
4. Input:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
VIN (1-10)	County	City	State	Postal Cod	Model Yea	Make	Model	Electric Ve	Clean Alte	Electric Ra	Base MSRI	Legislative	DOL Vehic	Vehicle Lo	Electric Ut	2020 Census Tract	
KM8K33AC	King	Seattle	WA	98103	2020	HYUNDAI	KONA	Battery Ele	Clean Alte	258	0	43	2.5E+08	POINT (-12	CITY OF SE	5.3E+10	
1C4RJYB6	King	Bothell	WA	98011	2022	JEEP	GRAND CH	Plug-in Hyb	Not eligibl	25	0	1	2.34E+08	POINT (-12	PUGET SO	5.3E+10	
1C4RJYD6	Yakima	Yakima	WA	98908	2023	JEEP	GRAND CH	Plug-in Hyb	Not eligibl	25	0	14	2.3E+08	POINT (-12	PACIFICOR	5.31E+10	
5YJ3E1EA7	King	Kirkland	WA	98034	2018	TESLA	MODEL 3	Battery Ele	Clean Alte	215	0	45	1.05E+08	POINT (-12	PUGET SO	5.3E+10	
WBY7Z8C5	Thurston	Olympia	WA	98501	2018	BMW	I3	Plug-in Hyb	Clean Alte	97	0	22	1.85E+08	POINT (-12	PUGET SO	5.31E+10	
5YJ3E1EAX	Snohomish	Marysville	WA	98271	2020	TESLA	MODEL 3	Battery Ele	Clean Alte	266	0	38	1.25E+08	POINT (-12	PUGET SO	5.31E+10	
2C4RC1N7	King	Kent	WA	98042	2017	CHRYSLER	PACIFICA	Plug-in Hyb	Clean Alte	33	0	47	1815593	POINT (-12	PUGET SO	5.3E+10	
5YJYGDEE	King	Woodinvill	WA	98072	2020	TESLA	MODEL Y	Battery Ele	Clean Alte	291	0	45	1.25E+08	POINT (-12	PUGET SO	5.3E+10	
5YJ3E1EA1	Island	Coupeville	WA	98239	2018	TESLA	MODEL 3	Battery Ele	Clean Alte	215	0	10	1.25E+08	POINT (-12	PUGET SO	5.3E+10	
7SAYGDEF	King	Bellevue	WA	98004	2023	TESLA	MODEL Y	Battery Ele	Eligibility u	0	0	48	2.4E+08	POINT (-12	PUGET SO	5.3E+10	
5YJ3E1EA7	King	Kirkland	WA	98033	2018	TESLA	MODEL 3	Battery Ele	Clean Alte	215	0	48	2.31E+08	POINT (-12	PUGET SO	5.3E+10	
3FA6P0SU	Kitsap	Port Orcha	WA	98367	2016	FORD	FUSION	Plug-in Hyb	Not eligibl	19	0	26	2.13E+08	POINT (-12	PUGET SO	5.3E+10	
JTDKARFP	Kitsap	Port Orcha	WA	98366	2017	TOYOTA	PRIUS PRI	Plug-in Hyb	Not eligibl	25	0	26	2.3E+08	POINT (-12	PUGET SO	5.3E+10	
5YJ3E1EB8	Snohomish	Mukilteo	WA	98275	2019	TESLA	MODEL 3	Battery Ele	Clean Alte	220	0	21	1.8E+08	POINT (-12	PUGET SO	5.31E+10	
5YJ3E1EA5	King	Redmond	WA	98052	2019	TESLA	MODEL 3	Battery Ele	Clean Alte	220	0	45	1.21E+08	POINT (-12	PUGET SO	5.3E+10	
3FA6P0SU	Thurston	Rochester	WA	98579	2013	FORD	FUSION	Plug-in Hyb	Not eligibl	19	0	20	1.39E+08	POINT (-12	PUGET SO	5.31E+10	
WA1VABG	King	Seattle	WA	98112	2019	AUDI	E-TRON	Battery Ele	Clean Alte	204	0	43	4.75E+08	POINT (-12	CITY OF SE	5.3E+10	
1N4AZ0CP	King	Seattle	WA	98125	2015	NISSAN	LEAF	Battery Ele	Clean Alte	84	0	46	2.53E+08	POINT (-12	CITY OF SE	5.3E+10	
KNDCC3LE	Kitsap	Bremertor	WA	98311	2019	KIA	NIRO	Plug-in Hyb	Not eligibl	26	0	23	2148170	POINT (-12	PUGET SO	5.3E+10	
1N4AZ0CP	Kitsap	Poulsbo	WA	98370	2014	NISSAN	LEAF	Battery Ele	Clean Alte	84	0	23	2.58E+08	POINT (-12	PUGET SO	5.3E+10	
5UXKT0C5	King	Kent	WA	98042	2018	BMW	X5	Plug-in Hyb	Not eligibl	13	0	47	2.92E+08	POINT (-12	PUGET SO	5.3E+10	
5YJSA1E22	Snohomish	Marysville	WA	98271	2018	TESLA	MODEL S	Battery Ele	Clean Alte	249	0	39	1.73E+08	POINT (-12	PUGET SO	5.31E+10	
1G1RB6E4	Kitsap	Bremertor	WA	98312	2013	CHEVROLE	VOLT	Plug-in Hyb	Clean Alte	38	0	35	1.39E+08	POINT (-12	PUGET SO	5.3E+10	
2T3YL4DV	King	Seattle	WA	98108	2014	TOYOTA	RAV4	Battery Ele	Clean Alte	103	0	11	1.84E+08	POINT (-12	CITY OF SE	5.3E+10	
JTDKARFP	Snohomish	Lake Steve	WA	98258	2017	TOYOTA	PRIUS PRI	Plug-in Hyb	Not eligibl	25	0	44	1.6E+08	POINT (-12	PUGET SO	5.31E+10	
5YJ3E1EB6	Kitsap	Silverdale	WA	98383	2020	TESLA	MODEL 3	Battery Ele	Clean Alte	322	0	23	6335647	POINT (-12	PUGET SO	5.3E+10	
5YJ3E1EB3	King	Kirkland	WA	98033	2018	TESLA	MODEL 3	Battery Ele	Clean Alte	215	0	45	2.06E+08	POINT (-12	PUGET SO	5.3E+10	
1FADP5CU	Kitsap	Kingston	WA	98346	2016	FORD	C-MAX	Plug-in Hyb	Not eligibl	19	0	23	1465033	POINT (-12	PUGET SO	5.3E+10	
WVWKR7A	King	Kirkland	WA	98033	2019	VOLKSWA	E-GOLF	Battery Ele	Clean Alte	125	0	45	3.07E+08	POINT (-12	PUGET SO	5.3E+10	
5YJSA1E29	Kitsap	Kingston	WA	98346	2020	TESLA	MODEL S	Battery Ele	Clean Alte	330	0	23	1.11E+08	POINT (-12	PUGET SO	5.3E+10	
1N4AZ0CP	Thurston	Olympia	WA	98506	2015	NISSAN	LEAF	Battery Ele	Clean Alte	84	0	22	1.42E+08	POINT (-12	PUGET SO	5.31E+10	
WA1LAAG	Yakima	Yakima	WA	98908	2021	AUDI	E-TRON	Battery Ele	Clean Alte	222	0	14	1.45E+08	POINT (-12	PACIFICOR	5.31E+10	

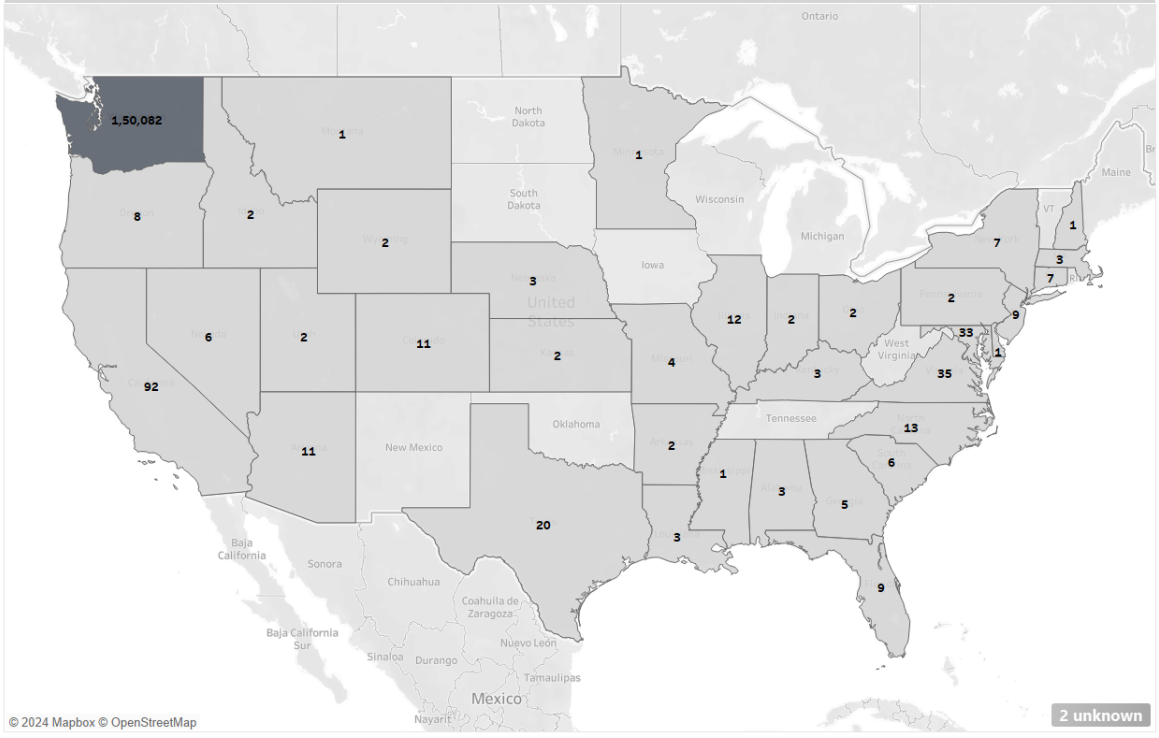
5. Output:

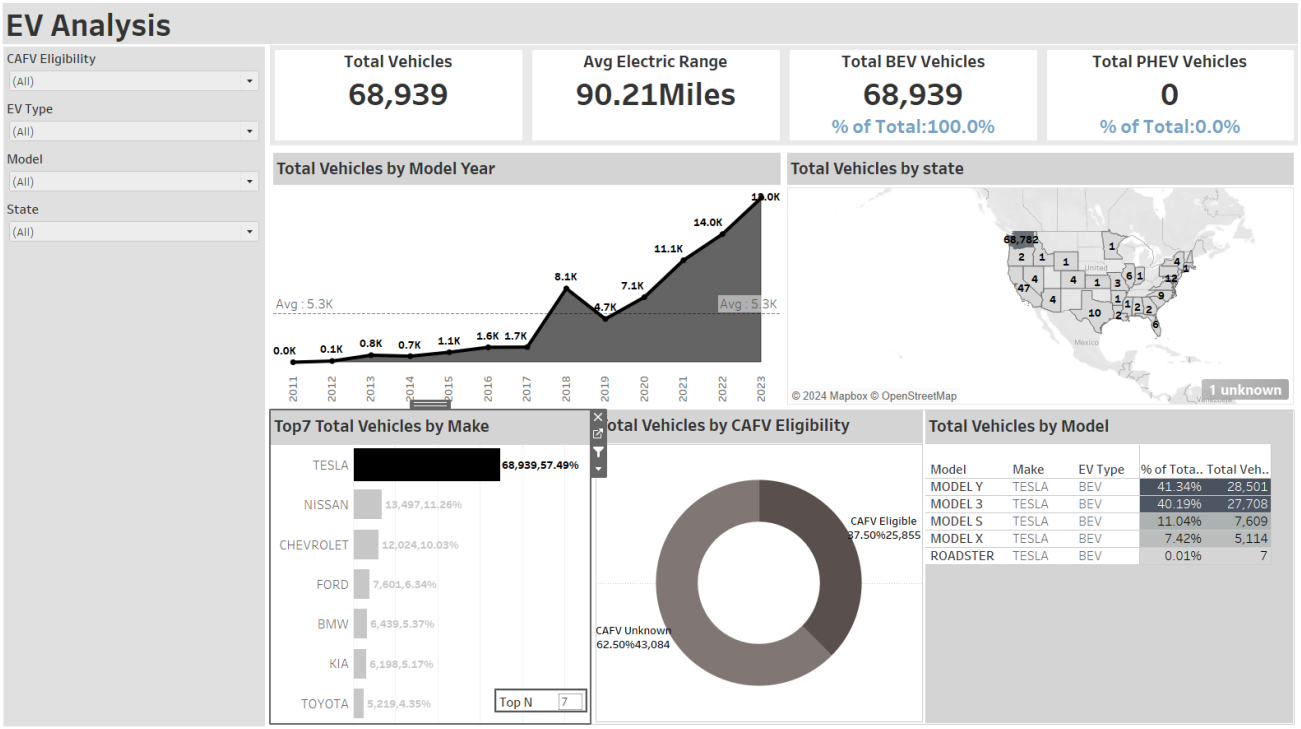


Total Vehicles by CAFV Eligibility



Total Vehicles by state





6. Learning Outcomes:

From this project, the following insights were gained:

- **Data Analysis Skills:** Tableau provides powerful tools for visualizing complex data sets, allowing for easy identification of patterns and trends.
- **Understanding EV Adoption:** The dashboard provides a clear view of how EVs have grown in popularity over time, especially in specific states.
- **Visual Storytelling:** The ability to create compelling visual narratives is enhanced through the use of KPIs and intuitive charts/maps.
- **Data-Driven Insights:** By focusing on different dimensions (model year, state, vehicle type), key insights into electric vehicle trends, including their geographic spread and growth, can be derived.