

	VIN (1-10)	County	City	State	...	DOL	Vehicle ID	Vehicle Location	Electric Utility	2020	Census Tract
0	1C4JJXP66P	Kitsap	Poulsbo	WA	...		258127145	POINT (-122.64681 47.73689)	PUGET SOUND ENERGY INC		5.303509e+10
1	1G1FX6S08K	Snohomish	Lake Stevens	WA	...		4735426	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC		5.306105e+10
2	WBY1Z2C58F	King	Seattle	WA	...		272697666	POINT (-122.41067 47.57894)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)		5.303301e+10
3	5YJ3E1EBXK	King	Seattle	WA	...		477309682	POINT (-122.23825 47.49461)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)		5.303301e+10
4	5YJ5A1V24F	Yakima	Selah	WA	...		258112970	POINT (-120.53145 46.65405)	PACIFICORP		5.307700e+10
...
223990	7SAYGDEE4R	Pierce	Puyallup	WA	...		264662359	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.305307e+10
223991	WBY8P2C00M	Snohomish	Lake Stevens	WA	...		157728168	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC		5.306105e+10
223992	3M1AZ0CP3B	Pierce	University Place	WA	...		261733433	POINT (-122.53756 47.23165)	BONNEVILLE POWER ADMINISTRATION CITY OF TACOM...		5.305307e+10
223993	5YJ3E1EA2R	Pierce	Puyallup	WA	...		275283487	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.305307e+10
223994	WBY8P8C57K	King	Woodinville	WA	...		267288801	POINT (-122.15545 47.75448)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.303303e+10

[223995 rows x 17 columns]

	VIN (1-10)	County	City	State	...	DOL	Vehicle ID	Vehicle Location	Electric Utility	2020	Census Tract
0	1C4JJXP66P	Kitsap	Poulsbo	WA	...		258127145	POINT (-122.64681 47.73689)	PUGET SOUND ENERGY INC		5.303509e+10
1	1G1FX6S08K	Snohomish	Lake Stevens	WA	...		4735426	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC		5.306105e+10
2	WBY1Z2C58F	King	Seattle	WA	...		272697666	POINT (-122.41067 47.57894)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)		5.303301e+10
3	5YJ3E1EBXK	King	Seattle	WA	...		477309682	POINT (-122.23825 47.49461)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)		5.303301e+10
4	5YJ5A1V24F	Yakima	Selah	WA	...		258112970	POINT (-120.53145 46.65405)	PACIFICORP		5.307700e+10

[5 rows x 17 columns]

	VIN (1-10)	County	City	State	...	DOL	Vehicle ID	Vehicle Location	Electric Utility	2020	Census Tract
223990	7SAYGDEE4R	Pierce	Puyallup	WA	...		264662359	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.305307e+10
223991	WBY8P2C00M	Snohomish	Lake Stevens	WA	...		157728168	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC		5.306105e+10
223992	3M1AZ0CP3B	Pierce	University Place	WA	...		261733433	POINT (-122.53756 47.23165)	BONNEVILLE POWER ADMINISTRATION CITY OF TACOM...		5.305307e+10
223993	5YJ3E1EA2R	Pierce	Puyallup	WA	...		275283487	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.305307e+10
223994	WBY8P8C57K	King	Woodinville	WA	...		267288801	POINT (-122.15545 47.75448)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)		5.303303e+10

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

RangeIndex: 223995 entries, 0 to 223994

Data columns (total 17 columns):

#	Column	Non-Null Count	Dtype	VIN (1-10)	0
---	-----	-----	-----	County	3
0	VIN (1-10)	223995 non-null	object	City	3
1	County	223992 non-null	object	State	0
2	City	223992 non-null	object	Postal Code	3
3	State	223995 non-null	object	Model Year	0
4	Postal Code	223992 non-null	float64	Make	0
5	Model Year	223995 non-null	int64	Model	0
6	Make	223995 non-null	object	Electric Vehicle Type	0
7	Model	223995 non-null	object	Clean Alternative Fuel Vehicle (CAFV) Eligibility	0
8	Electric Vehicle Type	223995 non-null	object	Electric Range	18
9	Clean Alternative Fuel Vehicle (CAFV) Eligibility	223995 non-null	object	Base MSRP	18
10	Electric Range	223977 non-null	float64	Legislative District	474
11	Base MSRP	223977 non-null	float64	DOL Vehicle ID	0
12	Legislative District	223521 non-null	float64	Vehicle Location	10
13	DOL Vehicle ID	223995 non-null	int64	Electric Utility	3
14	Vehicle Location	223985 non-null	object	2020 Census Tract	3
15	Electric Utility	223992 non-null	object	dtype: int64	
16	2020 Census Tract	223992 non-null	float64	VIN (1-10)	0.000000

dtypes: float64(5), int64(2), object(10)

memory usage: 29.1+ MB

None

VIN (1-10)	13175	County	0.001339
County	207	City	0.001339
City	789	State	0.000000
State	48	Postal Code	0.001339
Postal Code	954	Model Year	0.000000
Model Year	21	Make	0.000000
Make	46	Model	0.000000
Model	164	Electric Vehicle Type	0.000000
Electric Vehicle Type	2	Clean Alternative Fuel Vehicle (CAFV) Eligibility	0.000000
Clean Alternative Fuel Vehicle (CAFV) Eligibility	3	Electric Range	0.008036
Electric Range	109	Base MSRP	0.008036
Base MSRP	31	Legislative District	0.211612
Legislative District	49	DOL Vehicle ID	0.000000
DOL Vehicle ID	223995	Vehicle Location	0.004464
Vehicle Location	952	Electric Utility	0.001339
Electric Utility	76	2020 Census Tract	0.001339
2020 Census Tract	2192	dtype: float64	

Removing City column from dataset:

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

RangeIndex: 223995 entries, 0 to 223994

Data columns (total 16 columns):

#	Column	Non-Null Count	Dtype
---	-----	-----	-----
0	VIN (1-10)	223995 non-null	object
1	County	223992 non-null	object
2	State	223995 non-null	object
3	Postal Code	223992 non-null	float64
4	Model Year	223995 non-null	int64
5	Make	223995 non-null	object
6	Model	223995 non-null	object
7	Electric Vehicle Type	223995 non-null	object
8	Clean Alternative Fuel Vehicle (CAFV) Eligibility	223995 non-null	object
9	Electric Range	223977 non-null	float64
10	Base MSRP	223977 non-null	float64
11	Legislative District	223521 non-null	float64
12	DOL Vehicle ID	223995 non-null	int64
13	Vehicle Location	223985 non-null	object
14	Electric Utility	223992 non-null	object
15	2020 Census Tract	223992 non-null	float64

dtypes: float64(5), int64(2), object(9)

Make Unique Data:

['WRANGLER' 'BOLT EV' 'I3' 'MODEL 3' 'MODEL S' '530E' 'MODEL X' 'LEAF'
 'RZ' 'EV6' 'PS2' 'SANTA FE' 'MODEL Y' '330E' 'PRIUS PRIME' 'R1T' 'XC60'
 'X5' '500' 'BOLT EUV' 'CX-90' 'NIRO' 'XC90' 'R1S' 'E-TRON' 'RX' 'IX'
 'PACIFICA' 'IONIQ' 'SOUL' 'F-150' 'Q5 E' 'VOLT' 'SORENTO'
 'GRAND CHEROKEE' 'RAV4 PRIME' 'GLC-CLASS' 'A3' 'CX-70' 'CLARITY' 'C-MAX'
 'OUTLANDER' 'PRIUS PLUG-IN' 'Q5' 'NX' 'SPORTAGE' 'ID.4' 'SOLTERRA'
 'ARIYA' 'E-GOLF' 'FUSION' 'IONIQ 5' 'SPARK' 'MUSTANG MACH-E' 'CAYENNE'
 'TRANSIT' 'BZ4X' 'EQS-CLASS SEDAN' '745E' 'KONA ELECTRIC' 'I-PACE' 'Q4'
 'EV9' 'TAYCAN' 'V60' 'SQ8' 'EQS-CLASS SUV' 'I4' 'XC40' 'EQB-CLASS'
 'TUCSON' 'EQUINOX EV' 'PROLOGUE' 'I5' 'HARDTOP' 'HUMMER EV PICKUP' 'AIR'
 'FOCUS' 'BLAZER EV' 'LYRIQ' 'I-MIEV' 'Q8' 'FORTWO ELECTRIC DRIVE'
 'AVIATOR' 'S90' 'ESCAPE' 'E-TRON GT' 'KONA' 'IONIQ 6' 'C-CLASS' 'X3' 'XM'
 'RANGE ROVER SPORT' 'C40' 'CYBERTRUCK' 'GV60' 'TONALE' 'OCEAN'
 'E-TRON SPORTBACK' 'GLE-CLASS' 'CROSSTREK' 'B-CLASS' 'COUNTRYMAN'
 'EQE-CLASS SUV' 'ACCORD' 'I7' 'HORNET' 'ROADSTER' 'GV70' 'S60' 'OPTIMA'
 'ZDX' 'POLESTAR 3' 'IONIQ 5 N' 'EQE-CLASS SEDAN' 'I8' 'CORSAIR'
 'EQ FORTWO' 'SOUL EV' 'RAV4' 'RS E-TRON GT' 'RANGE ROVER' 'PANAMERA'
 'MX-30' 'SILVERADO EV' 'SONATA' 'FORTWO' 'MACAN' 'HUMMER EV SUV' '500E'
 'ESPRINTER' 'ELR' 'S-CLASS' 'ONE' 'TX' 'CITY' 'VF 8' 'EDV' 'A7 E'
 'RANGER' 'G80' 'ID. BUZZ' '740E' 'ZEVO' 'KARMA' 'CT6'
 'TRANSIT CONNECT ELECTRIC' 'SPECTRE' 'CR-V' 'EX40' 'MIRAI' 'EX90'
 'G-CLASS' '918' 'WHEEGO' '750E' 'FLYING SPUR' 'SIERRA EV' 'BENTAYGA' 'Q6'
 'REVUELTO' 'A8 E' '745LE' 'PROMASTER 3500']

164										
	count	mean	std	min	25%	50%	75%	max		
Code	223992.0	9.817649e+04	2.544241e+03	1.731000e+03	9.805200e+04	9.812600e+04	9.837400e+04	9.957700e+04		
Year	223995.0	2.021264e+03	2.989676e+00	1.999000e+03	2.020000e+03	2.022000e+03	2.023000e+03	2.025000e+03		
ic Range	223977.0	4.773619e+01	8.498714e+01	0.000000e+00	0.000000e+00	0.000000e+00	3.900000e+01	3.370000e+02		
SRP	223977.0	8.298944e+02	7.372509e+03	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	8.450000e+05		
ative District	223521.0	2.887636e+01	1.491102e+01	1.000000e+00	1.700000e+01	3.200000e+01	4.200000e+01	4.900000e+01		
icle ID	223995.0	2.329328e+08	6.884329e+07	4.385000e+03	2.008002e+08	2.482992e+08	2.673973e+08	4.792548e+08		
ensus Tract	223992.0	5.297997e+10	1.531491e+09	1.001020e+09	5.303301e+10	5.303303e+10	5.305307e+10	5.602100e+10		
e	223995.0	3.735592e+00	2.989676e+00	0.000000e+00	2.000000e+00	3.000000e+00	5.000000e+00	2.600000e+01		
(-10)			count	unique			top	...		
			223995	13175			75AYGDEE7P	...		
			223992	207			King	...		
			223995	48			WA	...		
Code			223992.0	NaN			NaN	...		
Year			223995.0	NaN			NaN	...		
			223995	46			TESLA	...		
			223995	164			MODEL Y	...		
ic Vehicle Type			223995	2			Battery Electric Vehicle (BEV)	...		
Alternative Fuel Vehicle (AFV) Eligibility			223995	3			Eligibility unknown as battery range has not b...	...		
ic Range			223977.0	NaN			NaN	...		
SRP			223977.0	NaN			NaN	...		
ative District			223521.0	NaN			NaN	...		
icle ID			223995.0	NaN			NaN	...		24
e Location			223985	952			POINT (-122.13158 47.67858)	...		
ic Utility			223992	76			PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	...		
ensus Tract			223992.0	NaN			NaN	...	5303	
e			223995.0	NaN			NaN	...		

[17 rows x 11 columns]

Categorical Variables:

Index(['VIN (1-10)', 'County', 'State', 'Make', 'Model',
 'Electric Vehicle Type',
 'Clean Alternative Fuel Vehicle (CAFV) Eligibility', 'Vehicle Location',
 'Electric Utility'],
 dtype='object')

Numerical Variables:

['Postal Code', 'Model Year', 'Electric Range', 'Base MSRP', 'Legislative District', 'DOL Vehicle ID', '2020 Census Tract', 'car_age']
car_age
Skew : 1.27

Search for specific model names:

	VIN (1-10)	County	State	Postal Code	...	DOL Vehicle ID	Vehicle Location	Electric Utility	2020 Census Tract	car_age
ge										
7	5YJXCBE45H	King	WA	98031.0	2017	...	141889702 POINT (-122.17743 47.41185)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.303303e+10	
8										
22	5YJXCBE29G	King	WA	98074.0	2016	...	6097171 POINT (-122.02054 47.60326)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.303303e+10	
9										
46	5YJXCDE25H	King	WA	98075.0	2017	...	5470846 POINT (-122.03539 47.61344)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.303303e+10	
8										
47	5YJXCDE46K	Kitsap	WA	98370.0	2019	...	142025740 POINT (-122.64681 47.73689)	PUGET SOUND ENERGY INC	5.303509e+10	
6										
61	5YJXCBE27L	King	WA	98122.0	2020	...	172153082 POINT (-122.31009 47.60803)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)	5.303301e+10	
5										

[5 rows x 17 columns]

Replace the model name:

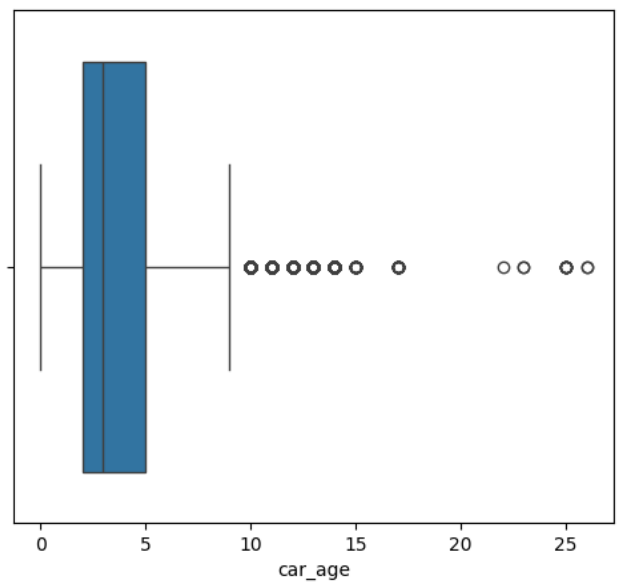
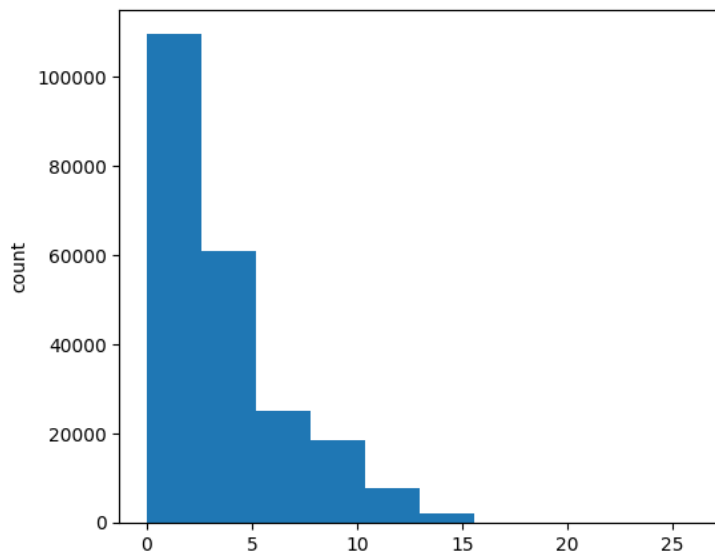
	VIN (1-10)	County	State	Postal Code	...	Vehicle Location	Electric Utility	2020 Census Tract	car_age
0	1C4JJXP66P	Kitsap	WA	98370.0	...	POINT (-122.64681 47.73689)	PUGET SOUND ENERGY INC	5.303509e+10	2
1	1G1FX6S08K	Snohomish	WA	98258.0	...	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC	5.306105e+10	6
2	WBY1Z2C58F	King	WA	98116.0	...	POINT (-122.41067 47.57894)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)	5.303301e+10	10
3	5YJ3E1EBXK	King	WA	98178.0	...	POINT (-122.23825 47.49461)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)	5.303301e+10	6
4	5YJSA1V24F	Yakima	WA	98942.0	...	POINT (-120.53145 46.65405)	PACIFICORP	5.307700e+10	10
...									
223990	75AYGDEE4R	Pierce	WA	98374.0	...	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.305307e+10	1
223991	WBY8P2C00M	Snohomish	WA	98258.0	...	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC	5.306105e+10	4
223992	JN1A20CP3B	Pierce	WA	98466.0	...	POINT (-122.53756 47.23165)	BONNEVILLE POWER ADMINISTRATION CITY OF TACOM...	5.305307e+10	14
223993	5YJ3E1EA2R	Pierce	WA	98374.0	...	POINT (-122.27575 47.13959)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.305307e+10	1
223994	WBY8P8C57K	King	WA	98072.0	...	POINT (-122.15545 47.75448)	PUGET SOUND ENERGY INC CITY OF TACOMA - (WA)	5.303303e+10	6

memory usage: 27.3+ MB

None

Create New Column:

	VIN (1-10)	County	State	Postal Code	...	Vehicle Location	Electric Utility	2020 Census Tract	car_age
0	1C4JJXP66P	Kitsap	WA	98370.0	...	POINT (-122.64681 47.73689)	PUGET SOUND ENERGY INC	5.303509e+10	2
1	1G1FX6S08K	Snohomish	WA	98258.0	...	POINT (-122.06402 48.01497)	PUGET SOUND ENERGY INC	5.306105e+10	6
2	WBY1Z2C58F	King	WA	98116.0	...	POINT (-122.41067 47.57894)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)	5.303301e+10	10
3	5YJ3E1EBXK	King	WA	98178.0	...	POINT (-122.23825 47.49461)	CITY OF SEATTLE - (WA) CITY OF TACOMA - (WA)	5.303301e+10	6
4	5YJSA1V24F	Yakima	WA	98942.0	...	POINT (-120.53145 46.65405)	PACIFICORP	5.307700e+10	10



Plot Bar for Categorical Variables in the dataset

