



FEYNN LABS - **INTERNSHIP**

TASK 02: **Market Strategy on Electric** **Vehicle Market in India.**

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Problem Statement (EV Market)

You are a team working under an Electric Vehicle Startup. The Startup is still deciding in which vehicle/customer space it will be develop its EVs. You have to analyse the Electric Vehicle market in India using Segmentation analysis and come up with a feasible strategy to enter the market, targeting the segments most likely to use Electric vehicles. (CUSTOMER/VEHICLE/B2B)

SEGMENTS: Apart from Geographic, Demographic, Psychographic, Behavioral segments, teams can consider different CATEGORY of Segments for the Segmentation Tasks, based on AVAILABILITY OF DATA. Market Segmentation comes with wide scope of possibility and Segments created can change based on different datasets collected. DO NOTE that not every MARKET has Geographic, Demographic, Psychographic, Behavioral data available easily and there is going to be lot of research required in DATA Collection Tasks

INTRODUCTION:

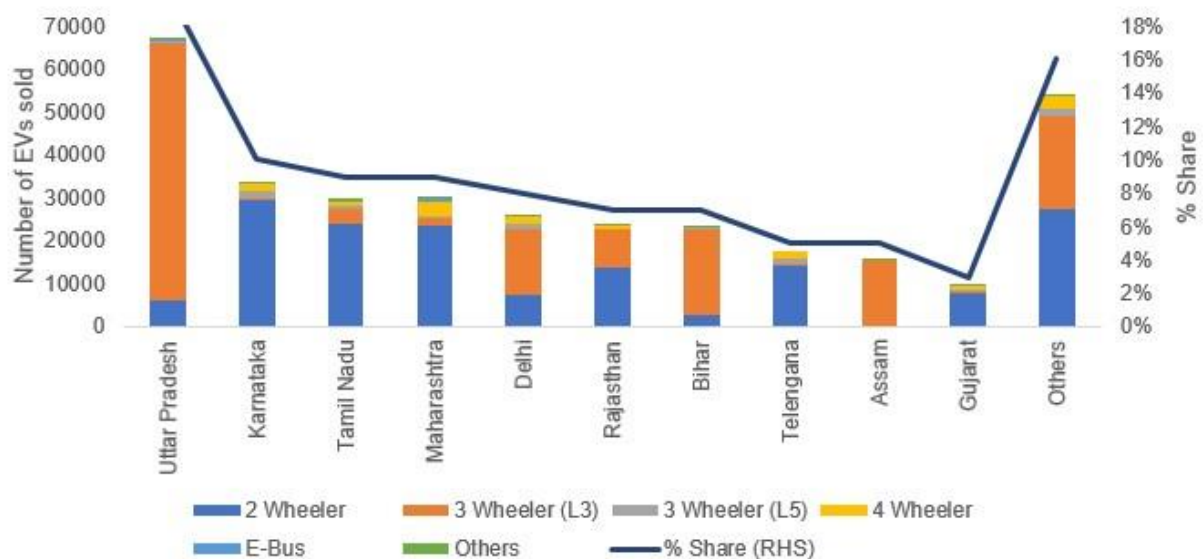
An electric vehicle (EV) is a vehicle that uses one or more electric motors as propulsion. It can be powered autonomously from a collector system that uses electricity from an external source or from a battery (charged by a solar panel or by converting fuel to electricity with a fuel cell or generator). There is also Electric vehicles include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft, and electric spacecraft. Electric cars function by plugging into a charge point and taking electricity from the grid. They store the electricity in rechargeable batteries that power an electric motor, which turns the wheels. Electric cars accelerate faster than vehicles with traditional fuel engines – so they feel lighter to drive. EVs have seen a resurgence due to technological developments, and an increased focus on renewable energy and the potential reduction of transportation's impact on climate change, air pollution, and other environmental issues. Project Drawdown describes electric vehicles as one of the 100 best contemporary solutions for addressing climate change.

Ev in India

India's automobile industry ranks fifth in the world and is expected to become the third largest by 2030. According to the Indian Energy Storage Alliance (IESA), the Indian automotive industry is expected to electric vehicles to grow at a compound annual growth rate of 36 percent. With a growing population and increasing demand for automobiles, relying on traditional energy sources is not a sustainable option as India imports almost 80% of its crude oil. NITI Aayog aims to achieve EV sales penetration of 70% of all commercial vehicles, 30% of passenger cars, 40% of buses and 80% of two and three wheelers by 2030 .This is in line with the goal of achieving net zero CO2 emissions by 2070. India registered 520,000 electric vehicles in the last three years, according to the Ministry of Heavy Industry. Electric vehicles will see strong growth in 2021, supported by supportive government policies and programs.

GEOGRAPHIC ANALYSIS

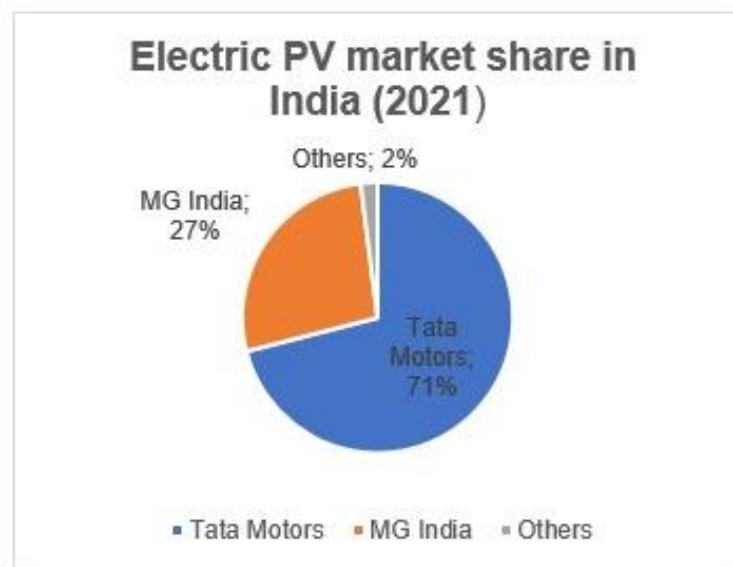
In India, Uttar Pradesh will have the largest share of EV sales in 2021 with 66,704 sales across all sectors, followed by Karnataka with 33,302 and Tamil Nadu with 30,036. Uttar Pradesh dominates the tricycle segment, while Karnataka and Maharashtra dominate the two-wheeler and four-wheeler category, respectively.



From the above data we can see that UP leads the way in the total number of EV sales.

DEMOGRAPHIC ANALYSIS:

In the passenger car segment, Tata Motors leads the electric vehicle segment with a market share of 71%, with two flagship models, the Nexon and the Tigor EV, leading the pack. MG Motors India came in second, offering the longest lineup of electric vehicles (the MG EZS offers a range of 39 km on a single charge). Other Indian manufacturers have already announced their models and are expected to launch in the future.



Situational Analysis

Before developing a strategic marketing plan, you need to analyze the situation. The use of electric vehicles is growing rapidly in all market segments. With government incentives and benefits such as subsidies and lower fuel costs, customers of all demographics are eager to use electric vehicles as their primary means of transportation.

1. Customer use: The customer's use of the electric vehicle depends on their daily habits, ie. The greater the average distance you travel each day and the greater your average daily commute, the greater the long-term savings.
2. Mileage: Mileage will also play an important role, especially in the Indian market, where most customers are looking for higher mileage and lower taxes, which affects speed.

3. Safety: The manufacturing quality of electric vehicles should be similar to that of gasoline vehicles, as there are many reports of battery fires. Addressing this issue is critical, especially given the hot weather in many parts of India for most of the year.
4. Quality: comfort, quality construction materials used, additional features will help attract new customers
5. Energy, fuel and charging infrastructure companies:

Laying the foundations for support, innovative business models (eg battery leasing, infrastructure exchanges and fast charger deployment), the economics of operating (fast) charging infrastructure, providing a stable energy supply and grid stability, enables easy charging and fast and paid adoption of electric vehicles.

Data analysis

In order to enter an industry , we need to analyse the customer needs and competitor companies in order to be successful

Data sources:

I have used 3 datasets in order to gain deep insights of the field

Dataset 1:EVSTATS

Description: This data source has the information about each states in India and sales about the Electric vehicles line two wheelers and three wheelers. It gives total sales in each state

	A	B	C	D	E	F	G	H	I	J	K
1	Sl. No	State	Two Wheel	Two Wheel	Two Wheel	Three Wheel	Three Wheel	Passenger	Buses	Total in state	
2	1	Meghalaya	0	0	0	0	0	6	0	6	
3	2	Nagaland	0	20	3	0	0	1	0	24	
4	3	Manipur	16	8	11	0	5	12	0	52	
5	4	Tripura	28	9	36	0	0	8	0	81	
6	5	Andaman & Nicobar	0	0	0	0	0	82	0	82	
7	6	Himachal Pradesh	0	0	0	0	0	98	0	98	
8	7	Jammu & Kashmir	2	76	152	0	0	208	0	438	
9	8	Goa	0	0	0	0	0	513	1	514	
10	9	Dadra and Nagar Haveli	4	0	9	0	0	803	0	816	
11	10	Jharkhand	75	228	736	9	7	655	0	1710	
12	11	Assam	463	138	1006	0	117	151	0	1875	
13	12	Chandigarh	612	18	896	0	0	974	0	2500	
14	13	Bihar	252	430	2148	6	64	271	0	3171	
15	14	Odisha	377	824	2031	0	37	594	0	3863	

Dataset 2: Indian automobile buying behaviour study 1.0.csv

Description: This dataset Indian Consumers Automobiles (Cars) buying behaviour. By observing different brands and their sales pattern, we can predict customer demand and bring up new products that would reach customer satisfaction.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Brand	Model	AccelSec	TopSpeed	Range_Km	Efficiency	FastCharge	RapidChar	PowerTrai	PlugType	BodyStyle	Segment	Seats	PriceEuro	
2	Tesla	Model 3 L	4.6	233	450	161	940	Yes	AWD	Type 2 CC	Sedan	D	5	55480	
3	Volkswage	ID.3 Pure	10	160	270	167	250	Yes	RWD	Type 2 CC	Hatchback	C	5	30000	
4	Polestar	2	4.7	210	400	181	620	Yes	AWD	Type 2 CC	Liftback	D	5	56440	
5	BMW	iX3	6.8	180	360	206	560	Yes	RWD	Type 2 CC	SUV	D	5	68040	
6	Honda	e	9.5	145	170	168	190	Yes	RWD	Type 2 CC	Hatchback	B	4	32997	
7	Lucid	Air	2.8	250	610	180	620	Yes	AWD	Type 2 CC	Sedan	F	5	105000	
8	Volkswage	e-Golf	9.6	150	190	168	220	Yes	FWD	Type 2 CC	Hatchback	C	5	31900	
9	Peugeot	e-208	8.1	150	275	164	420	Yes	FWD	Type 2 CC	Hatchback	B	5	29682	
10	Tesla	Model 3 St	5.6	225	310	153	650	Yes	RWD	Type 2 CC	Sedan	D	5	46380	
11	Audi	Q4 e-tron	6.3	180	400	193	540	Yes	AWD	Type 2 CC	SUV	D	5	55000	
12	Mercedes	EQC 400 4	5.1	180	370	216	440	Yes	AWD	Type 2 CC	SUV	D	5	69484	
13	Nissan	Leaf	7.9	144	220	164	230	Yes	FWD	Type 2 CH	Hatchback	C	5	29234	
14	Hyundai	Kona Elect	7.9	167	400	160	380	Yes	FWD	Type 2 CC	SUV	B	5	40795	
15	BMW	i4	4	200	450	178	650	Yes	RWD	Type 2 CC	Sedan	D	5	65000	
16	Hyundai	IONIQ Elec	9.7	165	250	153	210	Yes	FWD	Type 2 CC	Liftback	C	5	34459	

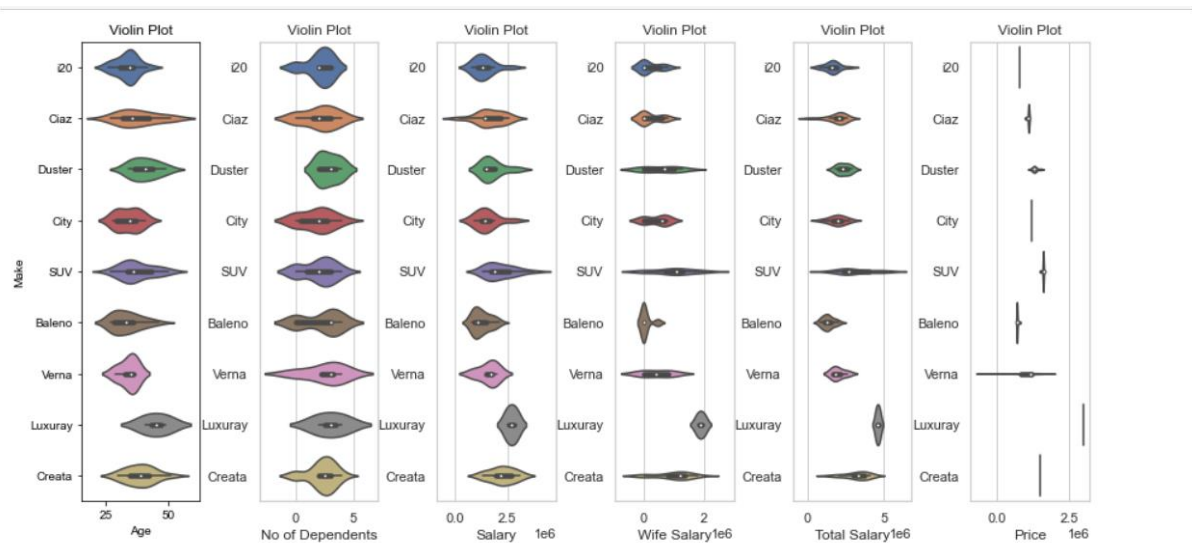
Dataset 3: ElectricCarData_Clean.csv

Description: This dataset has a detailed information on buying behaviour of Indians and factors that affects their probability of buying an electric vehicle

	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	Age	Profession	Marrital St	Education	No of Dep	Personal Ic	House Loa	Wife Work	Salary	Wife Salar	Total Salar	Make	Price	
2	27	Salaried	Single	Post Gradu	0	Yes	No	No	800000	0	800000	i20	800000	
3	35	Salaried	Married	Post Gradu	2	Yes	Yes	Yes	1400000	600000	2000000	Ciaz	1000000	
4	45	Business	Married	Graduate	4	Yes	Yes	No	1800000	0	1800000	Duster	1200000	
5	41	Business	Married	Post Gradu	3	No	No	Yes	1600000	600000	2200000	City	1200000	
6	31	Salaried	Married	Post Gradu	2	Yes	No	Yes	1800000	800000	2600000	SUV	1600000	
7	28	Salaried	Married	Graduate	3	Yes	Yes	No	900000	0	900000	Baleno	700000	
8	31	Salaried	Married	Graduate	4	No	No	Yes	1200000	600000	1800000	City	1200000	
9	33	Business	Married	Post Gradu	4	No	No	No	1400000	0	1400000	Baleno	700000	
10	34	Business	Married	Post Gradu	4	No	No	No	2000000	0	2000000	Verna	1100000	
11	34	Salaried	Married	Graduate	3	Yes	Yes	Yes	1200000	700000	1900000	i20	800000	
12	35	Salaried	Married	Post Gradu	4	No	No	Yes	1300000	700000	2000000	SUV	1600000	
13	35	Salaried	Married	Graduate	4	Yes	Yes	m	1400000	0	1400000	Baleno	700000	
14	29	Salaried	Married	Post Gradu	0	No	No	Yes	900000	800000	1700000	Verna	110000	
15	30	Business	Single	Post Gradu	2	Yes	No	No	1400000	0	1400000	i20	800000	
16	31	Business	Married	Graduate	3	Yes	Yes	Yes	900000	400000	1300000	Baleno	700000	

From dataset 3

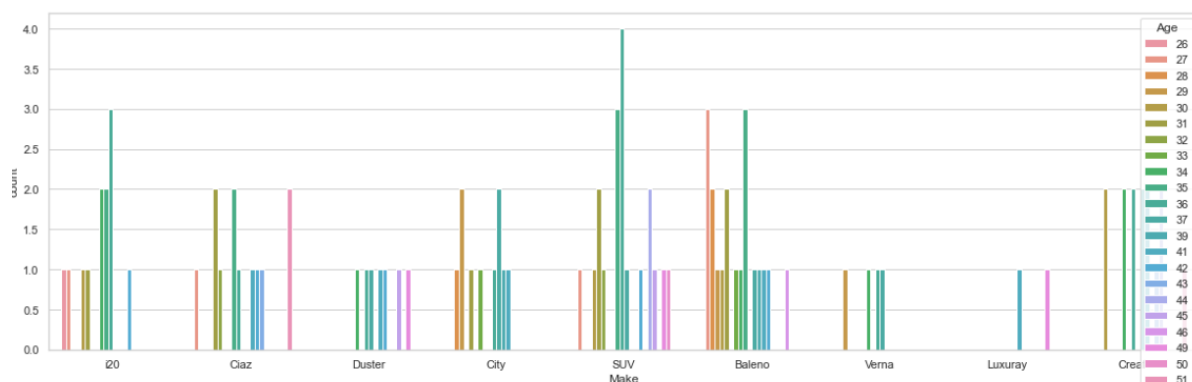
We will visualize the dataset to gain knowledge on customer preferences



Observations:

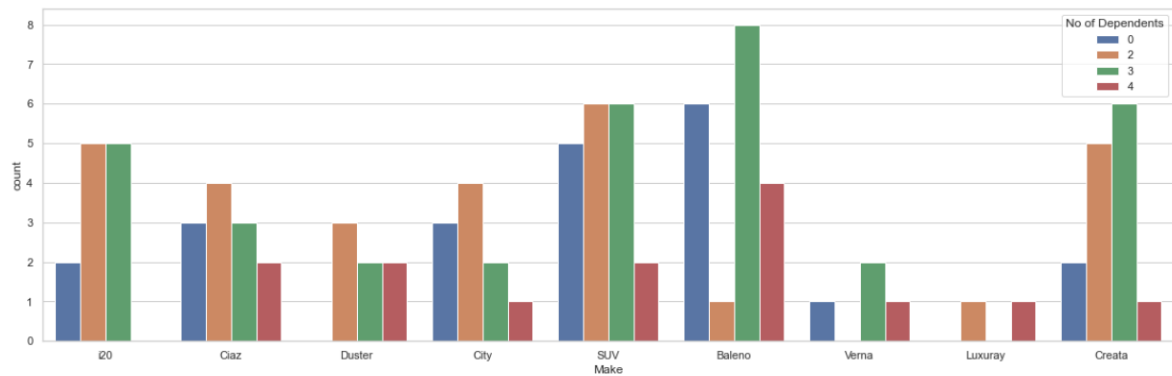
- Age: Younger consumers buy cheaper cars.
- Number of dependents: More dependents make consumers buy cars with more seats, so they prefer SUVs.
- Salary: If you fit the normal salary chart with the price chart, you'll notice that the average violin salary chart corresponds to the price of the car, which is a very direct relationship

Plot for Relationship between consumers age and the vehicles they purchase



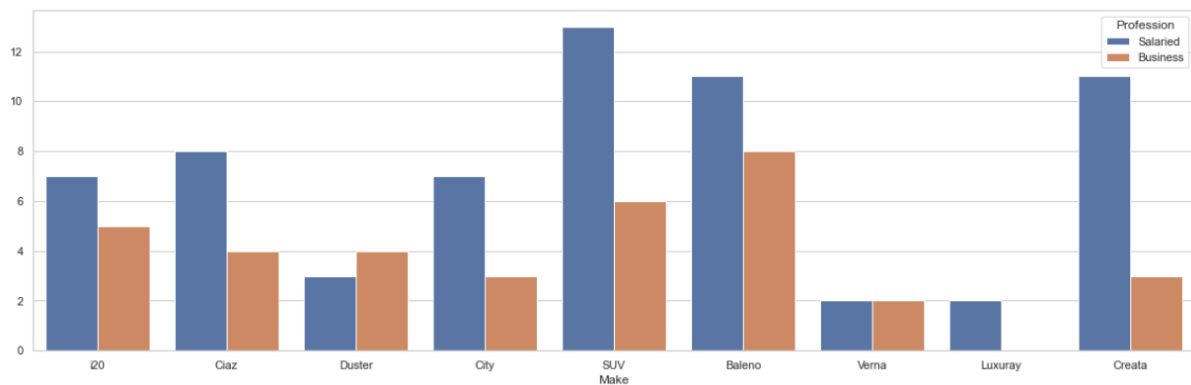
Observation: People in their 30s including early 40s and late 20s tend to buy electric vehicle comparatively than others

Plot for Relation between number of dependents on a consumer and the vehicles they purchase



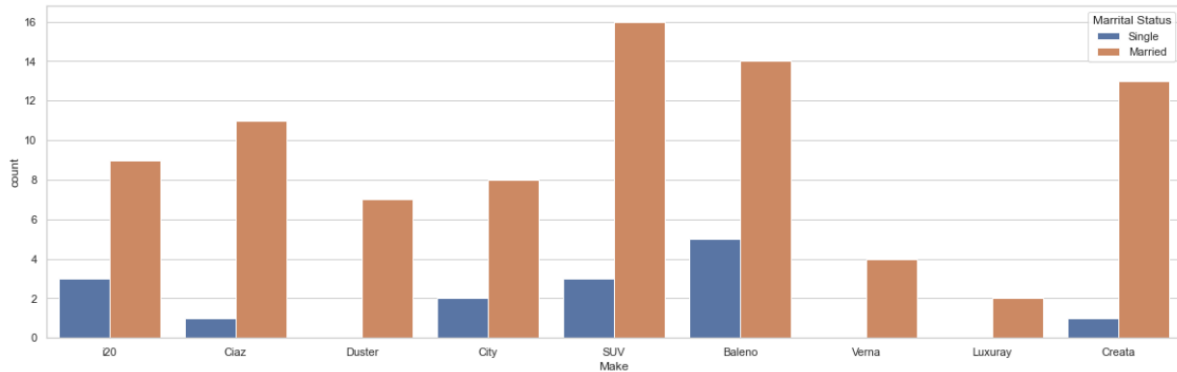
Observation: More dependents make consumers buy cars with more seats.

Plot for Relation between consumers profession and the vehicles they tend to purchase



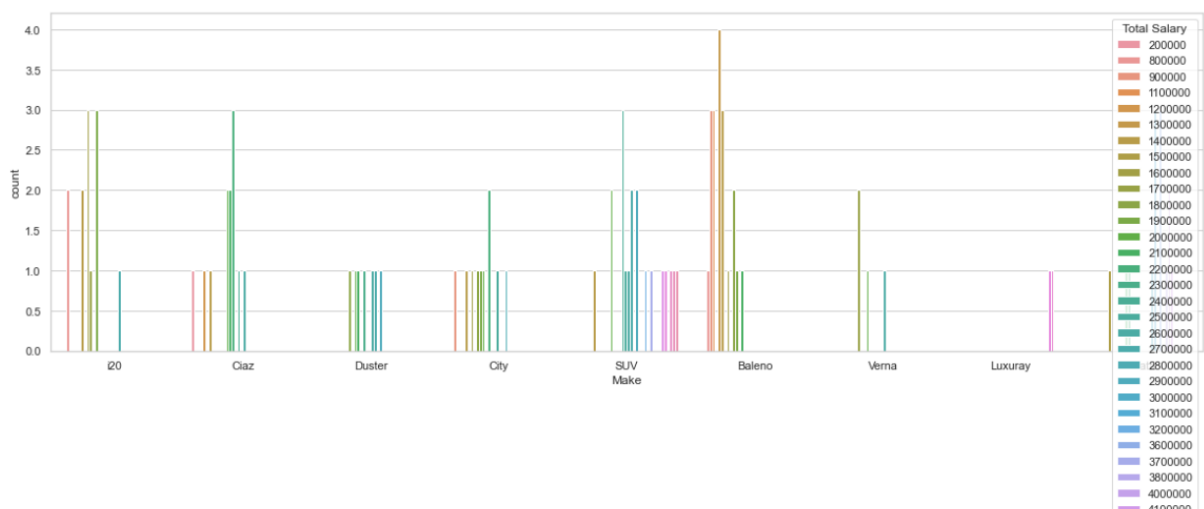
Observation: Salaried persons shows more interests in buying an electric vehicle when compared to a Business owners

Plot for Relation between consumers' marital status and the vehicles they purchase



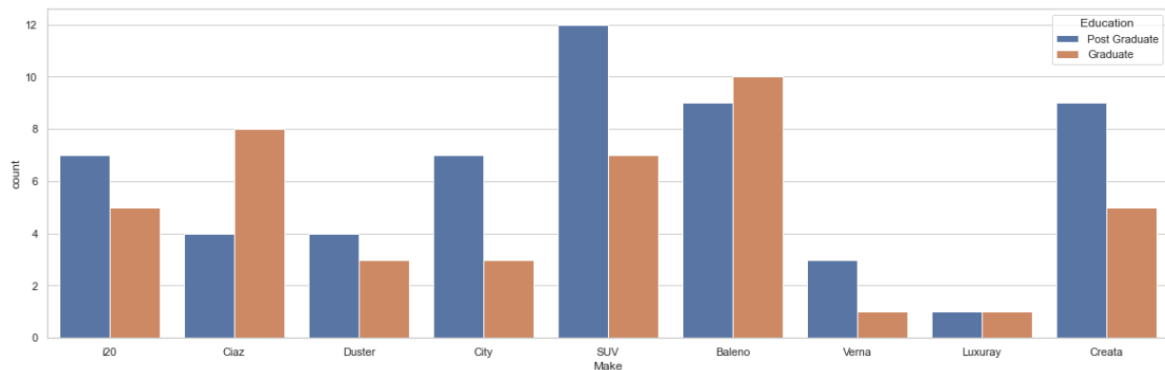
Observation: From the above plot it is clearly notable that married persons are more likely to purchase an electric vehicle when compared to a single person.

Plot for Relation between consumers total salary and the vehicles they purchase



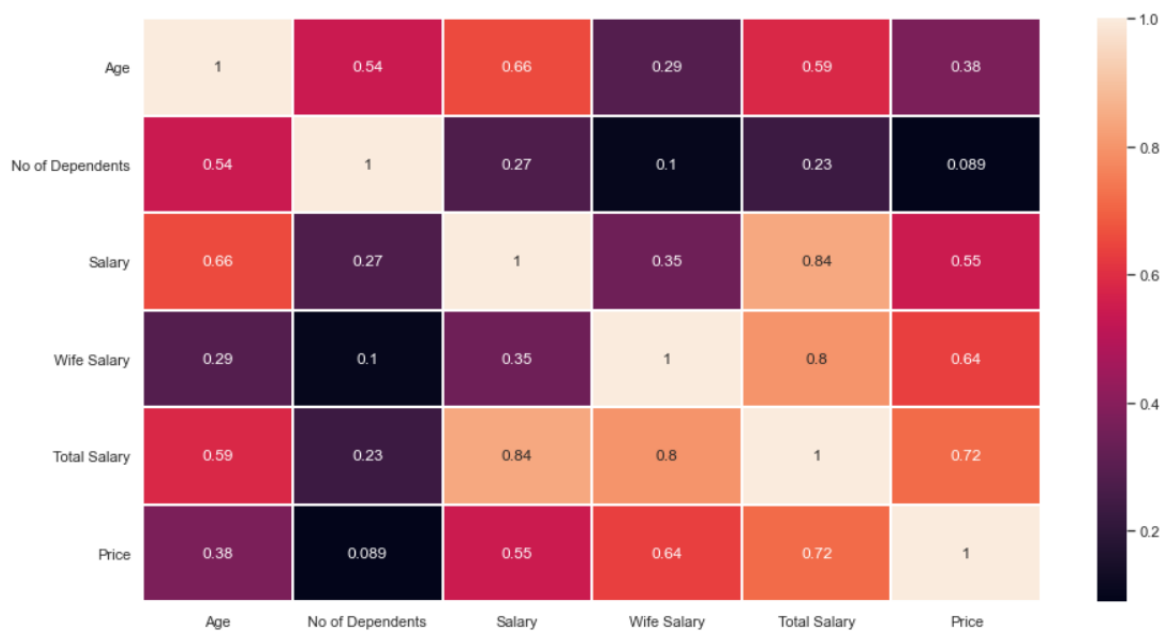
Observation : from the above plot we can analyse that salary is directly proportional to type of Electric vehicle a person tends to buy.

Plot for Relation between consumers education and the vehicles they purchase.



Observation: In this plot both graduate and undergraduate have equal probability of buying an e vehicle

CORRELATION PLOT:



This correlation plot can clearly convey the attributes that affect the buying preference of any person

Final observation:

So from all above visualisation we can find our target customer. The characteristics that define our target customers are.

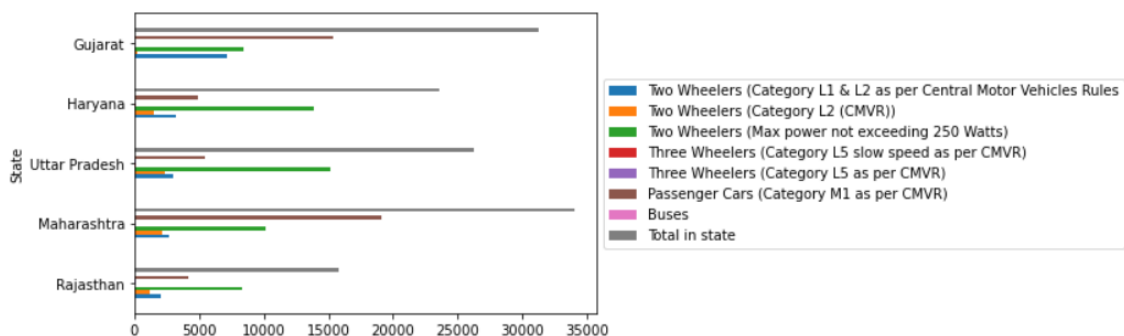
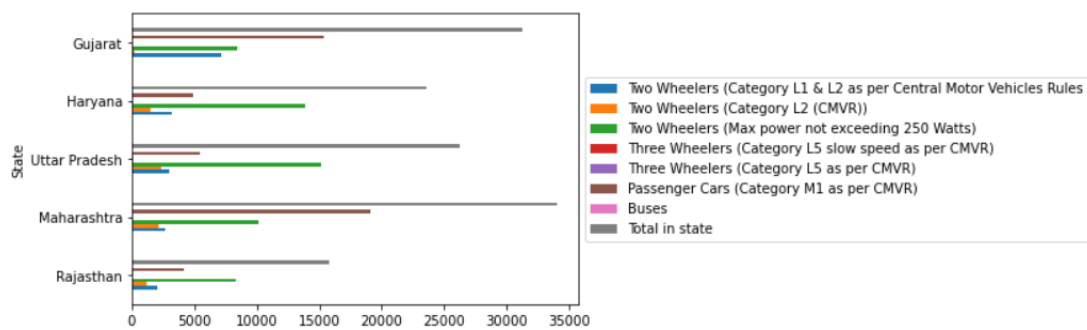
- Age
- No of dependents

- Salary
- Total salary
- Price
- Marital status

And most of the target customers are people with

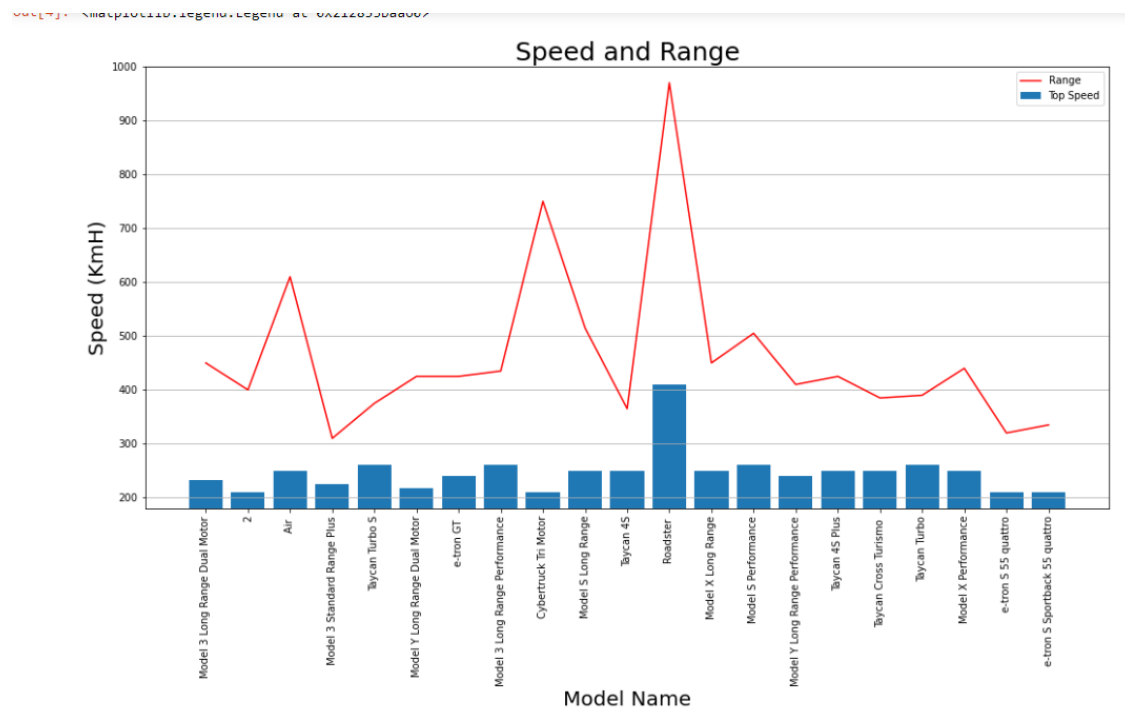
- Age 25 to 45
- More than 2 dependents
- Salaried
- Married

Geographic analysis on dataset 1



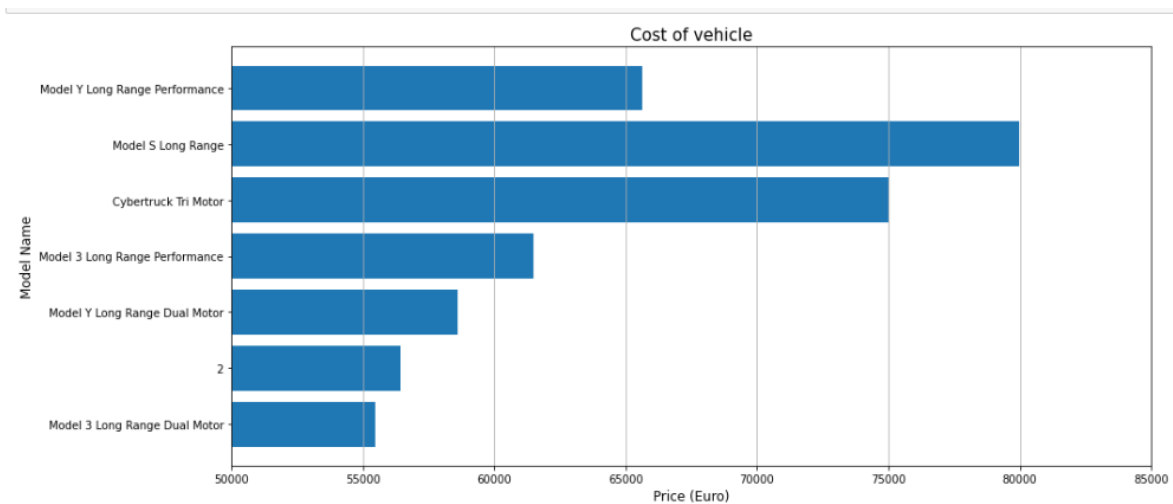
Observation : we can see that sales rate in Uttar Pradesh and Maharashtra are comparatively high than other states.

Analysis dataset on 2:



Observation

There are much of models speed above 200kmH and subsequently with the range



Observation:

This shows the top speed of around more than 400KmH is the Roadster which is from tesla and other models that are quiet good in top speed

This is the list of vehicle with specifications that satisfies the condition of

eg. A person wanted to buy a vehicle which must be an EV with the top speed more than 200 KmH and range more than 400 Km. They are 4 person family and working so budget is around 50000 euros to 80000 euros (this is the budget more than 60% people look for)

Final analysis :

So The User mainly prefer tesla due to its range and cost according to its performance .So a new startup should also focus on the range and affordability of the e-vehicle

Machine learning model used: kmeans clustering

GITHUB LINK:

<https://github.com/deepika-prabakaran/feynn-lab-EV-segmentation>

References:

<https://www.kaggle.com>

<https://data.world>

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