

## Data Analytics Fundamentals : Case Study



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# INTRODUCTION



- Our group will analyze two datasets for our stakeholder.
- Various analytical software's and techniques are applied.



**Our Goal :** To crunch data relentlessly, unlocking insights that help guide wiser decisions for our stakeholders.





# METHODOLOGY

Looked for proper datasets from reputable sources.

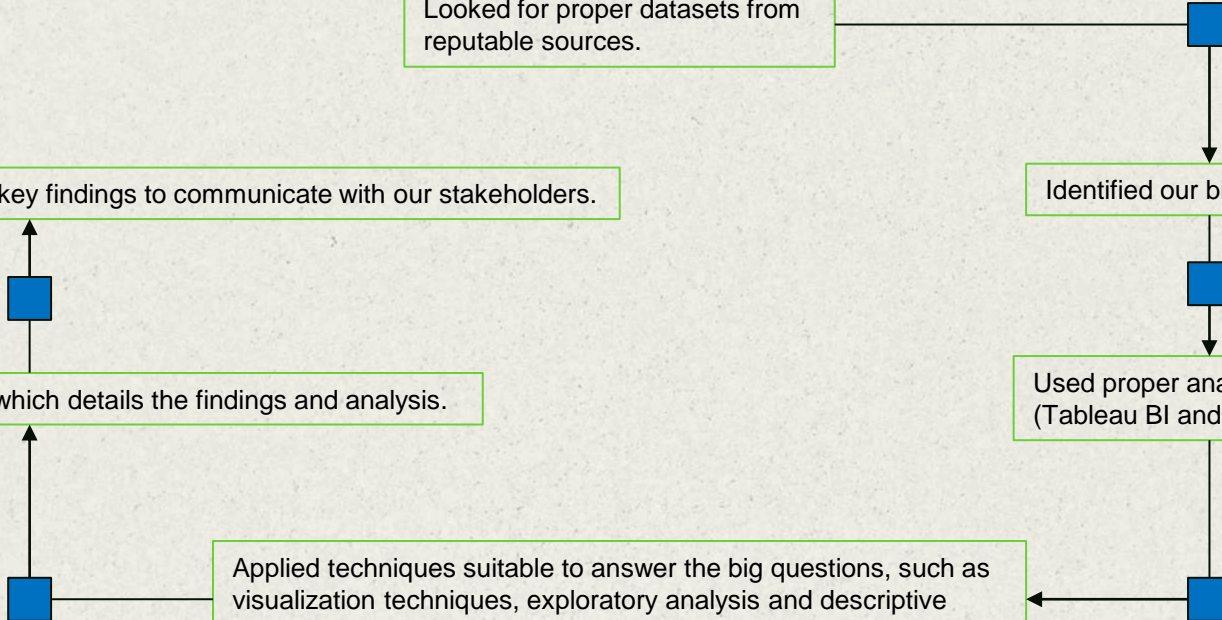
Identified our big questions.

Used proper analytical software's (Tableau BI and Power BI).

Applied techniques suitable to answer the big questions, such as visualization techniques, exploratory analysis and descriptive statistics.

Wrote a report which details the findings and analysis.

Summarized the key findings to communicate with our stakeholders.



# DATASETS

## Video Games Sales

Rank	Name	Platform	Year	Genre	Publisher	NA_Sales	EU_Sales	JP_Sales	Other_Sales	Global_Sales
1	Wii Sports	Wii	2006	Sports	Nintendo	41.49	29.02	3.77	8.46	82.74
2	Super Mario Bros.	NES	1985	Platform	Nintendo	29.08	3.58	6.81	0.77	40.24
3	Mario Kart Wii	Wii	2008	Racing	Nintendo	15.85	12.88	3.79	3.31	35.82
4	Wii Sports Resort	Wii	2009	Sports	Nintendo	15.75	11.01	3.28	2.96	33
5	Pokemon Red/Pokemon Blue	GB	1996	Role-Playing	Nintendo	11.27	8.89	10.22	1	31.37
6	Tetris	GB	1989	Puzzle	Nintendo	23.2	2.26	4.22	0.58	30.26
7	New Super Mario Bros.	DS	2006	Platform	Nintendo	11.38	9.23	6.5	2.9	30.01
8	Wii Play	Wii	2006	Misc	Nintendo	14.03	9.2	2.93	2.85	29.02
9	New Super Mario Bros. Wii	Wii	2009	Platform	Nintendo	14.59	7.06	4.7	2.26	28.62
10	Duck Hunt	NES	1984	Shooter	Nintendo	26.93	0.63	0.28	0.47	28.31
11	Nintendogs	DS	2005	Simulation	Nintendo	9.07	11	1.93	2.75	24.76
12	Mario Kart DS	DS	2005	Racing	Nintendo	9.81	7.57	4.13	1.92	23.42
13	Pokemon Gold/Pokemon Silver	GB	1999	Role-Playing	Nintendo	9	6.18	7.2	0.71	23.1
14	Wii Fit	Wii	2007	Sports	Nintendo	8.94	8.03	3.6	2.15	22.72
15	Wii Fit Plus	Wii	2009	Sports	Nintendo	9.09	8.59	2.53	1.79	22
16	Kinect Adventures!	X360	2010	Misc	Microsoft Game Studios	14.97	4.94	0.24	1.67	21.82
17	Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive	7.01	9.27	0.97	4.14	21.4
18	Grand Theft Auto: San Andreas	PS2	2004	Action	Take-Two Interactive	9.43	0.4	0.41	10.57	20.81
19	Super Mario World	SNES	1990	Platform	Nintendo	12.78	3.75	3.54	0.55	20.61
20	Brain Age: Train Your Brain in Minutes a Day	DS	2005	Misc	Nintendo	4.75	9.26	4.16	2.05	20.22

- Shows a list of video games with sales greater than 100,000 copies.
- Has 11 columns and 16,600 rows
- Dataset source : <https://zenodo.org/record/5898311>

## Electric Vehicle Population Data

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# DATA ANALYTICS AND RESULTS

## The Big Questions

### Video Games Sales

How has the sales of different genre's evolved over time?

- 1) Which game genres have the highest total global sales?
- 2) Are there any niche genres that have performed exceptionally well or poorly?
- 3) Can we identify trends in genre popularity over time?

What are the trends and patterns across different platforms?

- 1) Which gaming platforms have generated the most sales globally?
- 2) Have there been shifts in platform popularity over the years?
- 3) Are there any specific regions where certain platforms dominate?

What are the trends, patterns and preferences in different regions?

- 1) What is the top-selling video games in each region?
- 2) Can we identify any regional preferences for specific game genres or platforms?
- 3) How do different publishers perform in different regions?

### Electric Vehicle Population Data

What is the environmental impact of electric vehicles compared to traditional vehicles?

- 1) How does the electric range vary across different vehicle makers and models?
- 2) Are there any correlations between electric range and vehicle price?
- 3) How does the electric range correlate with CAFV eligibility?

How does the geographic location impact electric vehicle ownership and charging infrastructure?

- 1) Where are the clusters of electric vehicles located based on county and city?
- 2) Are there areas with limited electric vehicle charging infrastructure?
- 3) Which city and counties have most electric vehicles?

How is the electric vehicle market evolving over time?

- 1) Are there trends in the adoption of electric vehicles by model year?
  - 2) How has the electric vehicle market changed over the years in terms of maker and model preferences
  - 3) Is there a noticeable increase in electric vehicle adoption in recent years?
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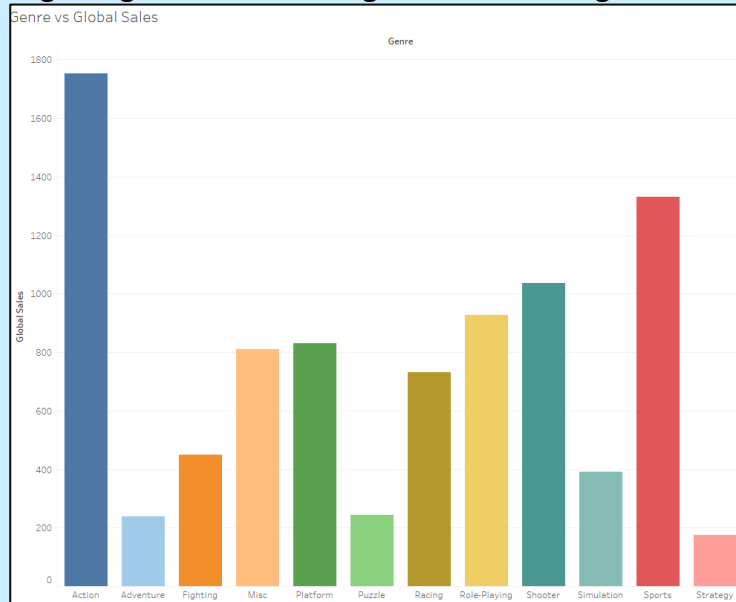
## **DATASET 1: VIDEO GAME SALES**

# DATA ANALYTICS AND RESULTS

## Video Games Sales

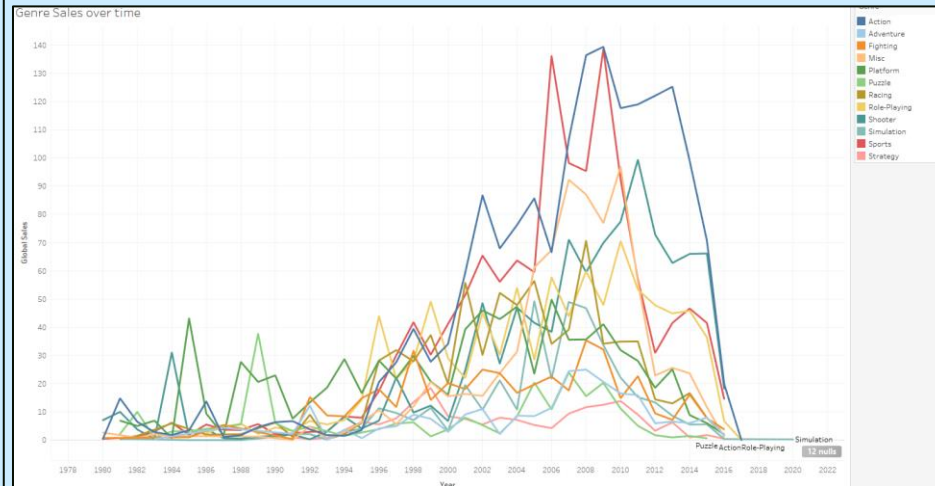
### How has the sales of different genre's evolved over time?

#### 1) Which game genres have the highest and lowest global sales?



- Highest Sales = Action (1,751 global sales, almost 20% of total global sales).
- Sports and Shooter genres are second and third best respectively.
- Lowest Sales = Strategy (175 global sales, less than 2% of total global sales.)
- Puzzle, adventure and simulation games are also very less in demand.

#### 2) Can we identify trends in genre popularity over time?



- Late 2000's was the peak of sales. Action, Shooter and Sports genre dominated then.
- Action, Shooter and Sports genres have consistently been well sold globally.
- Mode = Action genre in 2009 (139.4 sales)



# DATA ANALYTICS AND RESULTS

## Video Games Sales

### How has the sales of different genre's evolved over time?

Genre	Median
Action	0.2500
Sports	0.2800
Shooter	0.2400
Role Playing	0.2000
Platform	0.3700
Misc	0.1800
Racing	0.2100
Fighting	0.2400
Simulation	0.1925
Puzzle	0.1550
Adventure	0.1200
Strategy	0.0950

Genre	Mean (Overall Sales)
Action	0.5281
Sports	0.5673
Shooter	0.7919
Role Playing	0.6232
Platform	0.9383
Misc	0.4658
Racing	0.5861
Fighting	0.5294
Simulation	0.4524
Puzzle	0.4209
Adventure	0.1859
Strategy	0.2572

Genre	Mean (2009 Sales)
Action	0.51
Sports	0.75
Shooter	0.77
Role Playing	0.47
Platform	1.42
Misc	0.37
Racing	0.41
Fighting	0.61
Simulation	0.27
Puzzle	0.26
Adventure	0.15
Strategy	0.19

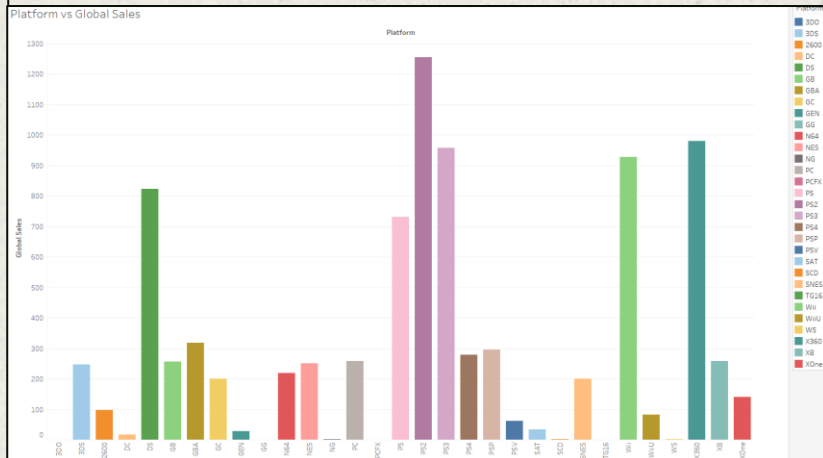
- Platform genres have the highest Medians and Means, despite not being the best sold genres.
- Due to outliers. The Super Mario's franchise (*a platform genre*) is among the most sold games worldwide.
- Sports and Shooter games follow closely behind. Signalling high and competitive sales.
- Despite the Action genre being the most sold game, Sports and Shooter genres have high outliers.
- This shows that these genres have been well sold throughout the decades as well.



## Video Games Sales

## What are the trends and patterns across different platforms?

1) Which gaming platforms have generated the most and least sales globally



- PS2 most sold platform (120 million sales), at the time the data was collected
- Followed by the Wii (90 million) and PS3 (80 million).
- Sega CD was the lowest selling at 2 million sales.
- Platforms sold before 2000's weren't well sold.

Platform	Mean	Global Sales
PS2	0.58105	1,255.64
X360	0.77467	979.96
PS3	0.72072	957.84
Wii	0.6994	926.71
DS	0.38025	822.49
PS	0.61092	730.66
GBA	0.38747	318.5
PSP	0.24425	296.28
PS4	0.82768	278.1
PC	0.2696	258.82
XB	0.31342	258.26
GB	2.60663	255.45
NES	2.56194	251.07
3DS	0.48617	247.46

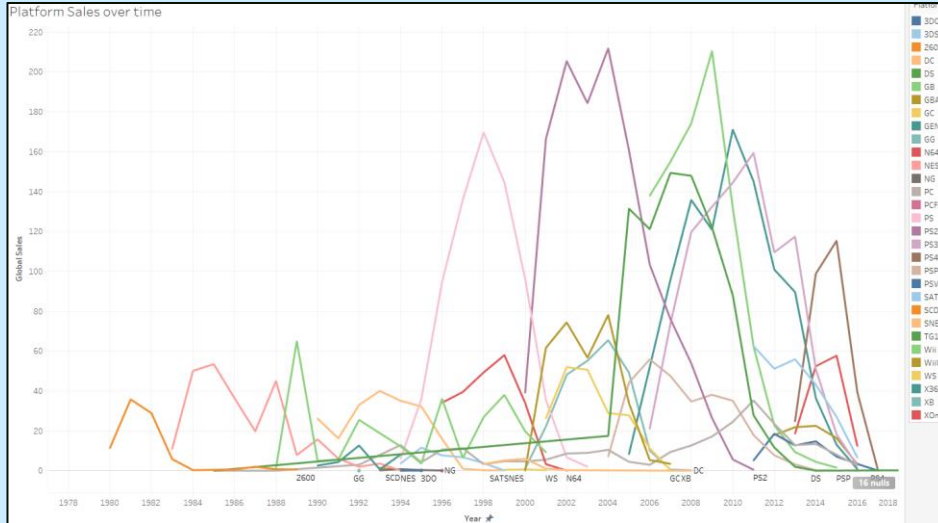
- Despite PS2 being the most sold, the GB, NES and PS4 have the highest mean.
- Higher mean ratio means more games were sold per console.
- This shows that those platforms had the most sold video games.
- Game Boy (GB) and Nintendo ES (NES) released in the 80's when competition among other platforms was less, so more games for them.
- If a console has smaller game library, each game has a more significant impact on the mean.

# DATA ANALYTICS AND RESULTS

## Video Games Sales

### What are the trends and patterns across different platforms?

#### 2) What are the shifts in platform popularity over the years?



Platform	Mean
NES	0.11
NG	0.2
3DO	0.02
SAT	0.192
PS	0.354
GB	4.057
SNES	0.662

Mean of 1994

Platform	Mean
PSP	0.475
PC	0.337
DS	0.759
GC	0.348
XB	0.37
GBA	0.446
PS2	0.818

Mean of 2004

Platform	Mean
DS	0.02
PSP	0.024
Wii	0.74
OC	0.304
PSV	0.145
WiiU	0.726
X360	0.56
3DS	0.546
PS3	0.472
PS4	1.317

Mean of 2014



- PS1 peaked in popularity during the late 90's, particularly in 1998 (100 million)
- PS3 and the Xbox 360 had similar competitive sales from the late 2000's to the early 2010's. Both platforms peaked around 2011.
- Many platforms have sharp declines, usually just after release of newer platform or discontinuation
- Towards the late 2010's, the PS4 had sharp and steady increment, signaling its future domination

- GB (Game Boy) stood out in 1994, meaning sales of GB games were very popular.
- PS2 and DS dominated 2004.
- PS4 stands out, with Wii and Wii U close behind.
- By visualizing and taking the mean of video game platform sales over the decades, this shows how game platforms sales vary over the years and decades.



# DATA ANALYTICS AND RESULTS

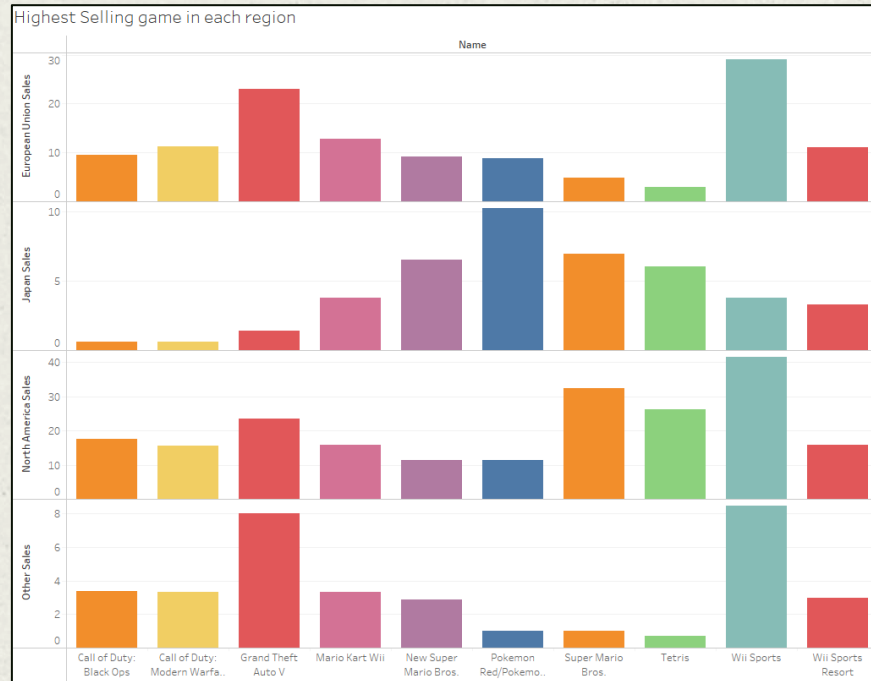
## Video Games Sales

### What are the trends, patterns and preferences in different regions?

#### 1) What are the top-selling video games in each region?

Name	Mean (EU)	Mean (Japan)	Mean (North America)	Mean (Others)	Mean (Global)
Call of Duty: Black Ops	1.9	0.118	3.518	0.672	6.206
Call of Duty: Modern Warfare 3	2.8225	0.155	3.895	0.8375	7.7075
Grand Theft Auto V	4.608	0.278	4.692	1.606	11.184
Tetris	1.475	3.015	13.085	0.345	17.92
Super Mario Bros.	2.44	3.48	16.24	0.495	22.655
New Super Mario Bros.	9.23	6.5	11.38	2.9	30.01
Pokemon Red/Pokemon Blue	8.89	10.22	11.27	1	31.37
Wii Sports Resort	11.01	3.28	15.75	2.96	33
Mario Kart Wii	12.88	3.79	15.85	3.31	35.82
Wii Sports	29.02	3.77	41.49	8.46	82.74

- EU, North America and 'other regions' have Wii Sports as their highest selling video game.
- The highest selling video game in Japan is Pokémon Red, which wasn't sold well in other regions.
- There are variations in different nations, such as Wii Sports being well sold in North America but not other regions, or Super Mario Bros and Tetris being well sold in Japan alone.
- A nation's culture, influence and possible loyalty to one's national products influence these sales.
- Some games that did well globally did not do well in specific regions. Such as Wii Sports, Call of Duty and GTA V, which did well in other nations but not Japan.

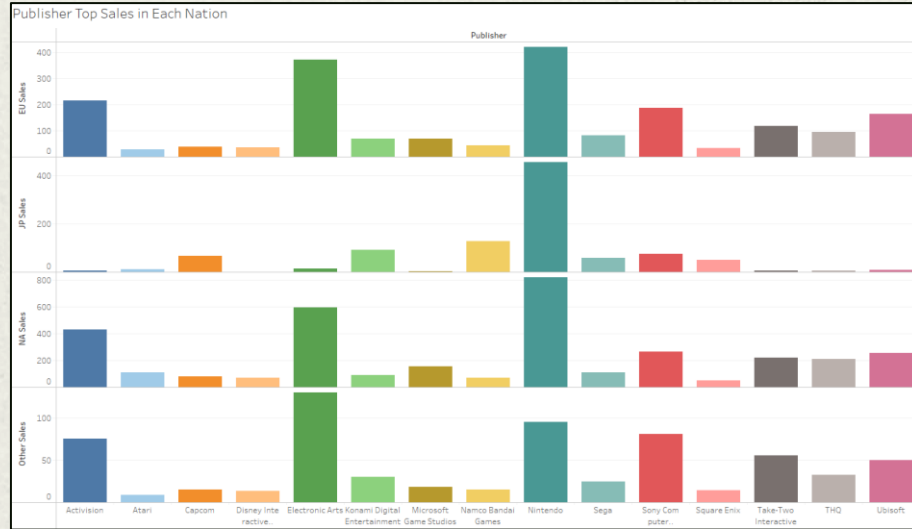


# DATA ANALYTICS AND RESULTS

## Video Games Sales

What are the trends, patterns and preferences in different regions?

2) How do different publishers perform in different regions?



Publisher	Mean (EU)	Mean (Japan)	Mean (North America)	Mean (Others)	Mean (Global)
Nintendo	0.595647	0.647824	1.16198	0.135605	2.54134
Microsoft Game Studios	0.363016	0.017249	0.82196	0.098201	1.30048
Take-Two Interactive	0.286053	0.014116	0.53387	0.133753	0.96741
Sony Computer Entertainment	0.274846	0.108492	0.38832	0.117789	0.88946
Electronic Arts	0.274811	0.010392	0.44047	0.096055	0.82185
Activision	0.221056	0.006708	0.44072	0.077272	0.74611
Warner Bros. Interactive Entertainment	0.228966	0.004483	0.34991	0.08	0.66332
Square Enix	0.140858	0.214077	0.2088	0.059614	0.62309
Disney Interactive Studios	0.158899	0.002569	0.32725	0.060459	0.55028
Capcom	0.10294	0.178688	0.20627	0.03895	0.52727
Ubisoft	0.177329	0.008143	0.27517	0.054571	0.51544
THQ	0.13249	0.007007	0.29199	0.044951	0.4766
Atari	0.074711	0.029504	0.30314	0.024821	0.43311
Sega	0.128326	0.089249	0.17121	0.038372	0.42721
Konami Digital Entertainment	0.083762	0.109736	0.11077	0.03643	0.34091
Namco Bandai Games	0.04574	0.136341	0.07459	0.015762	0.27263

- Nintendo, Activision. And Electronic Arts have the most sales in all regions.
- Nintendo has the highest mean global sales figure.
- Homegrown publishers play a role, such as for Nintendo's popularity in Japan
- Specialized markets are also influential, like for EA, which specializes in sports , particularly football, where 'other regions' have big fanbases of the sport.
- Publishers such as Activision and Sony also have good global sales.
- High sales in a nation indicates a strong presence in that nations market.

Region	Median
EU	Sony Computer Entertainment (1009.65)
Japan	Namco Bandai Games (488.69)
North America	Activision (1802.89)
Others	Activision (338.045)



## DATASET 2: ELECTRIC VEHICLE POPULATION DATA

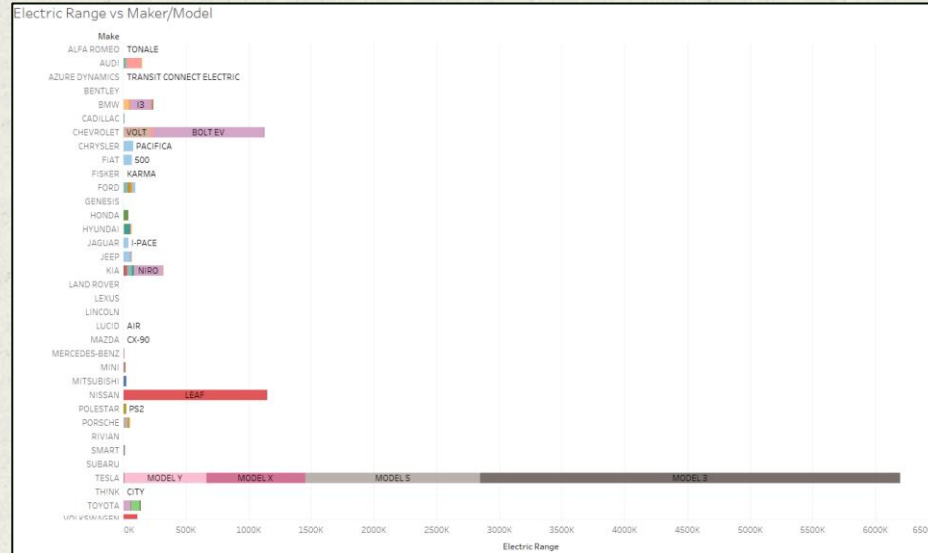


# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

### What is the environmental impact of electric vehicles compared to traditional vehicles?

#### 1) How does the electric range vary across different vehicle makers and models?



- Electric range is the distance a car can go before it needs to be recharged.
- Measured in Miles.
- Tesla Model 3 has the highest electric range.
- Other Tesla models follow closely behind, such as Models S,Y and X.

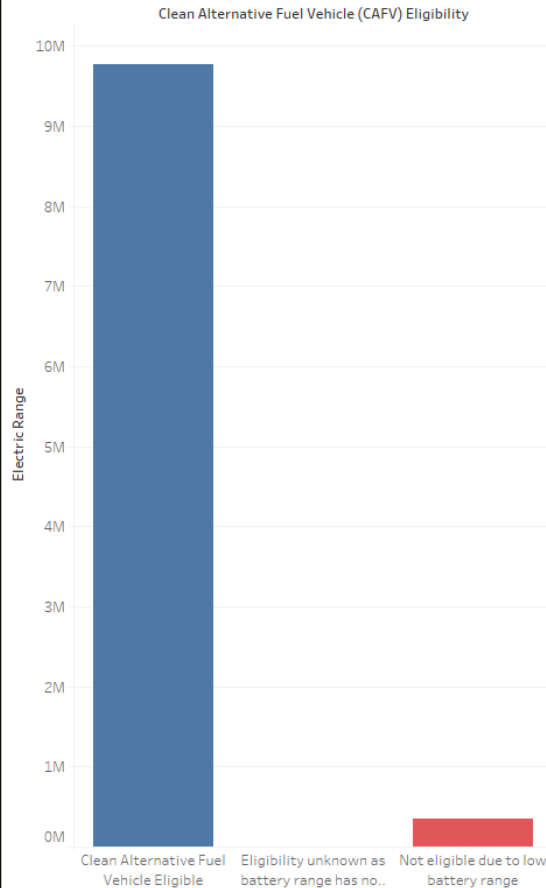
- Shows Tesla's dominance in having good electric ranges.
- Luxury manufacturers, such as Mercedes, Mini, Porsche, all have low electric ranges.
- Signals that there is no correlation between luxury cars with good electric ranges



# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

Electric Range vs CAFV Eligibility



**What is the environmental impact of electric vehicles compared to traditional vehicles?**

**2) How does the electric range correlate with CAFV eligibility**

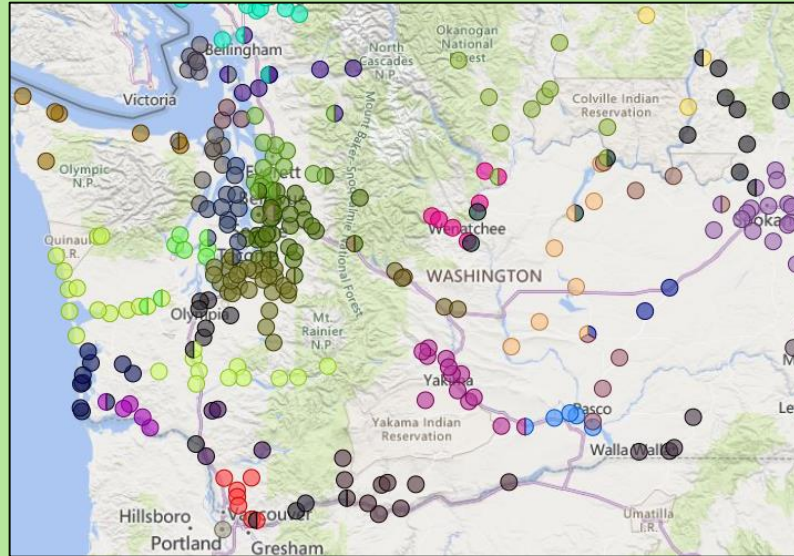
- CAFV stands for Clean Alternative Fuel Vehicle.
- They use alternative fuels and have lower emissions than conventional vehicles.
- Not all electric vehicles are CAFV.
- Vehicles that do have CAFV have higher electric ranges.
- All of them have electric ranges less than 345,000 kWh.
- CAFV helps reduce greenhouse gas emissions.
- The more electric vehicles with CAFV, the better for the environment.

# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

**How does the geographic location impact electric vehicle ownership and charging infrastructure?**

**1) Where are the clusters of electric vehicles located based on city and county?**



- Seattle has the highest cluster of electric vehicles in Washington.
- Seattle has the most charging stations in Washington.
- Seattle also has high gasoline prices .
- Various policies aimed at reducing carbon emissions and promoting clean energy.

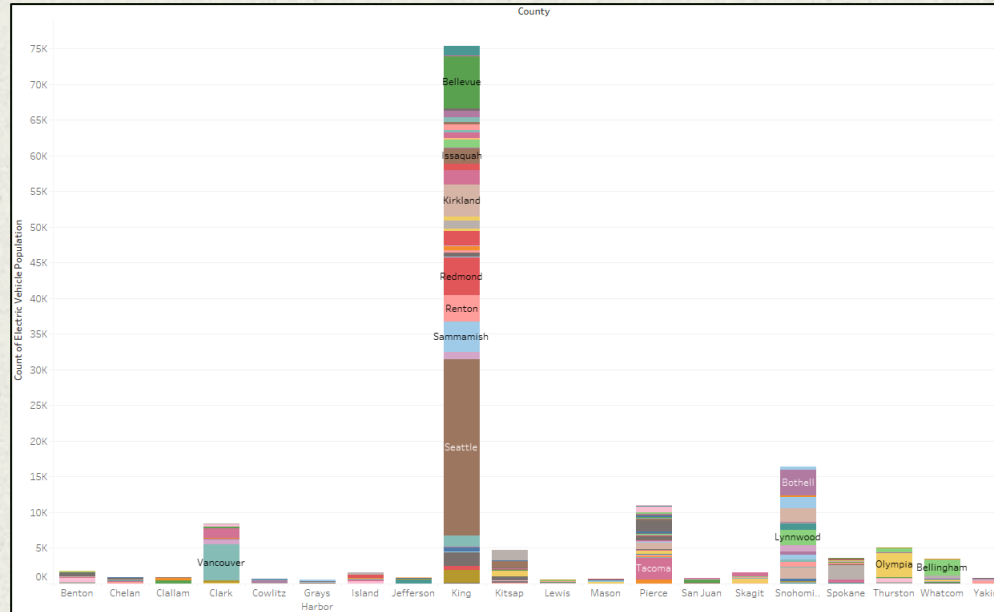


# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

**How does the geographic location impact electric vehicle ownership and charging infrastructure?**

**Which counties and cities have the most and least electric vehicles sales?**



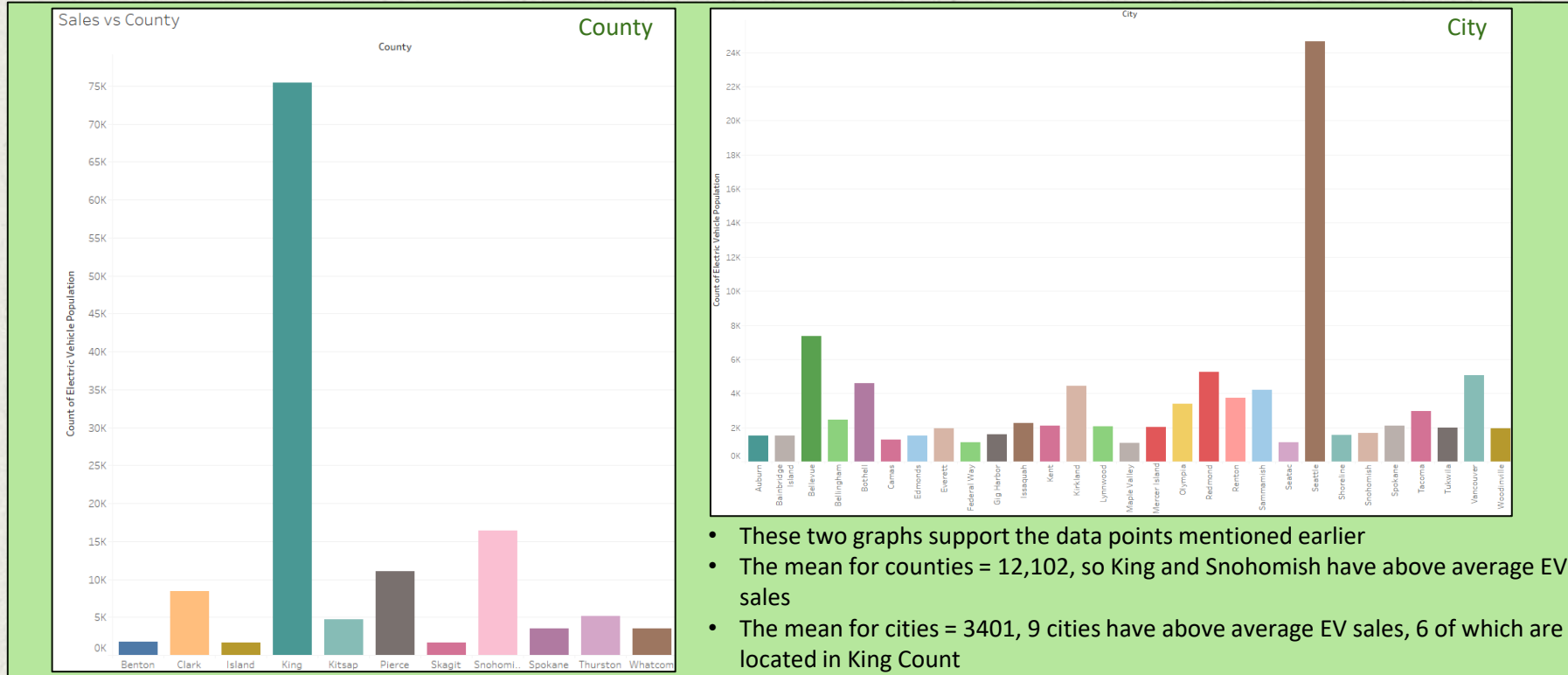
- King county has the highest number of EV sales, more than half of the total EV sales in Washington
- Followed by Pierce County and Snohomish County
- These three counties account for more than 70% of the total EV population in the state.
- Has more incentives, infrastructure, and awareness for EV adoption than other counties.
- Garfield County has the lowest EV adoption.
- Due to it being the smallest county in the state, with less access to less access to EV charging stations, dealerships, and services and its rural nature.

# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

**How does the geographic location impact electric vehicle ownership and charging infrastructure?**

**Which counties and cities have the most and least electric vehicles sales?**

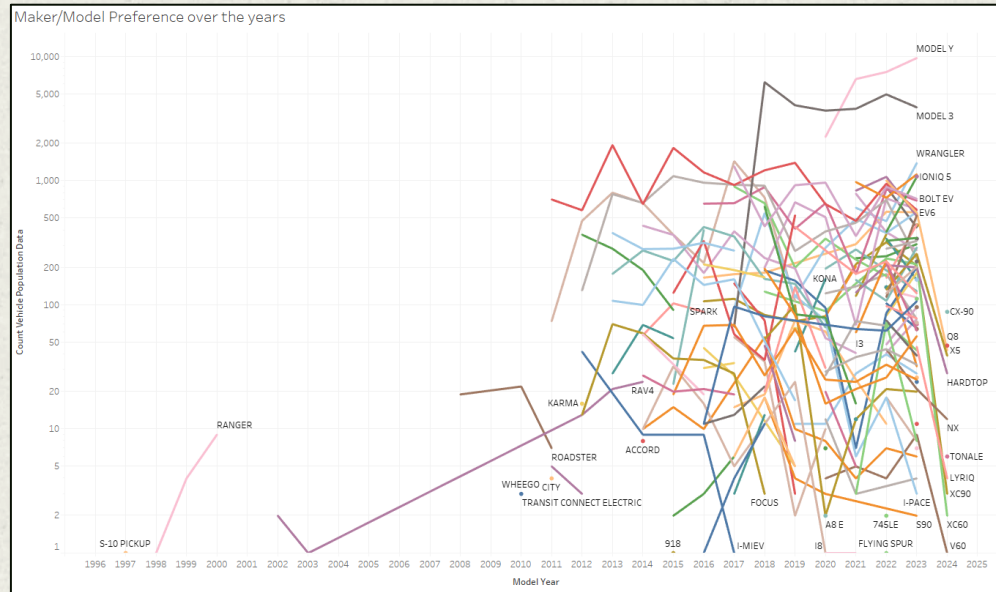


# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

### How is the electric vehicle market evolving over time?

#### 1) Are there trends in the adoption of electric vehicles by model year?



- The demands for Tesla Model X was the highest which rose from less than 100 units sold in 2015 to over 1500 sold in 2021.
- Model X, Model Y and Model 3 have the highest growth rates, suggesting Tesla cars have the highest demand.
- Over the years, it can be seen that adoption of electric vehicle has increased over the years
- More manufacturers are also increasing production of electric vehicles, signaling an increase in demand

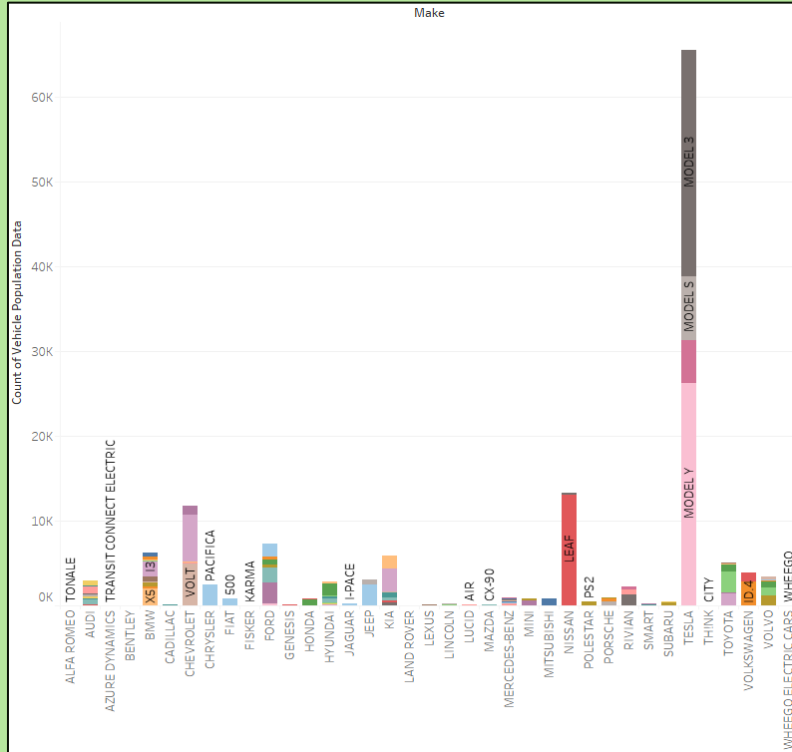


# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

### How is the electric vehicle market evolving over time?

#### 2) How is the electric vehicle market in terms of maker and model preferences?



- Tesla Model Y and Model 3 are the best sold car models
- Closely behind Tesla is the Nissan Leaf.
- Manufacturers such as Audi, Mercedes and Ford have produced a high count of electric cars, but have very low sales.

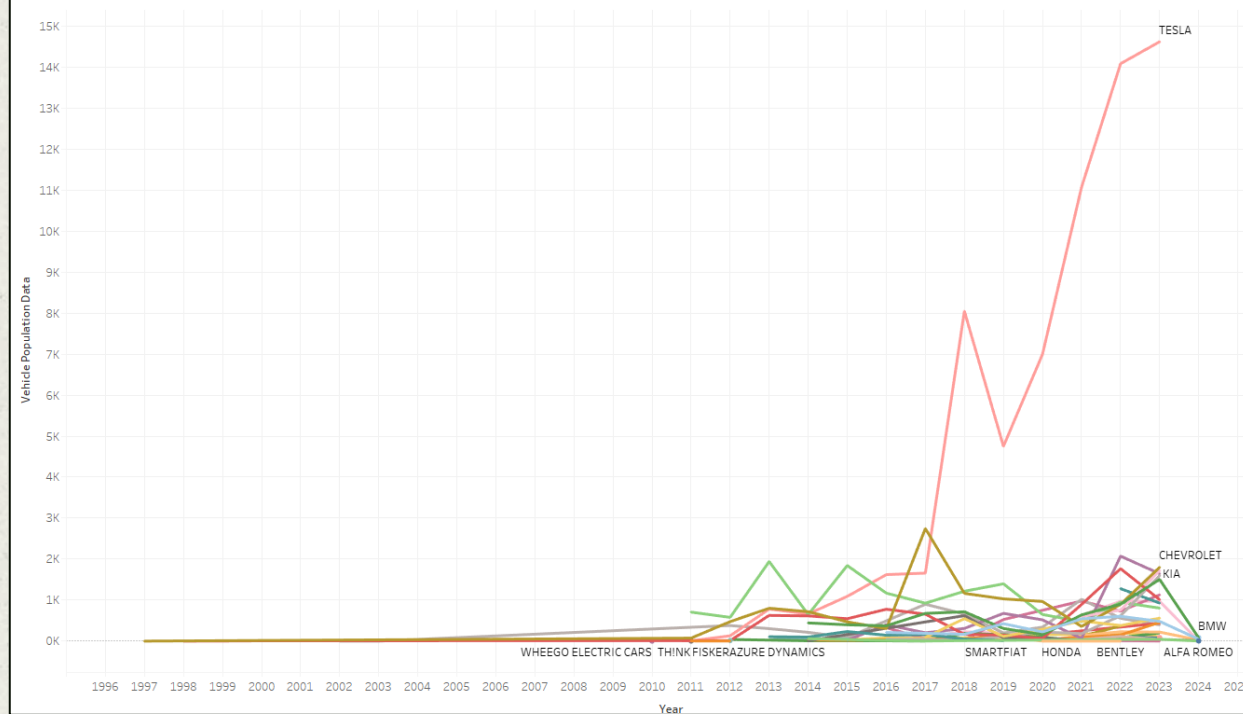
# DATA ANALYTICS AND RESULTS

## Electric Vehicle Population Data

### How is the electric vehicle market evolving over time?

#### 2) How is the electric vehicle market in terms of maker and model preferences?

Year vs Manufacturer



Maker	Mean
Tesla	4370
Kia	658
Ford	487
Chevrolet	844
Hyundai	357
BMW	564
Volvo	379
Audi	322
Nissan	1024
Volkswagen	564

- To make it clearer, this is the graph and mean of the manufacturers global sales.
- It shows that Nissan and Chevrolet have the highest mean car sales.
- Despite Tesla cars having most global sales, outliers, such as the popular Nissan leaf, affects the mean values.
- Nissan for example, only produced two cars but has high global sales.

**THANK YOU**