

CPSC 583 Final Project Report

[30004202] | [April 11th, 2021]

1. Introduction

My project is about visualizing Pokémon data such as their main base stats like health, attack, defense, and speed along with their types. The goal I have in creating this interactive visualization is to create a unique and interesting visualization where people can find their favorite Pokémon's and see/ compare their stats to others. In this report we will go into the process it took to create an interactive visualization that demonstrates Pokémon's stats in a pleasant manner that is fun for all users, whether they know Pokémon's or not, they can still understand the data easily.

2. Data Description

2.1. Data Descriptions

Each row is a different Pokémon from the Pokémon game series. The columns represent the ID, name, primary type, secondary type, total stats, HP, Attack, Defense, SP Attack, SP defence, Speed of the Pokémon. First let's explain what the ID is, each Pokémon has a PokeDex index number that uniquely orders them. Every Pokémon also has their own name which is another way to identify them. Every Pokémon also has a primary type such as fire, water, grass, dragon, etc. Which determines its weakness/resistance to attacks. Some Pokémon's can have a secondary type which makes them dual typed Pokémon making them stronger to others but at the same time makes them weaker due to having more weakness. Total is just the sum of all stats which include HP, Attack, Defense, SP Attack, SP defence, Speed of the Pokémon. HP are known as hit points or in other words health. Attack is the base modifier for normal attacks. Defense is the base damage resistance against normal attacks. SP Attacks knowns as special attack, is the base modifier for special attacks such as water gun. SP Def is the base damage resistance against special attacks. And finally Speed which determines which Pokémon attacks first each round. The data was collected from <https://www.kaggle.com/abcsds/pokemon> and this individual used different Pokémon websites/data bases to create the csv file. I also used their description to describe each column. I think this data set is interesting to work with because Pokémon was my childhood. I loved the game series and always bought the new Pokémon game when they came out. I also feel that interesting visualizations can be made with this data in a unique and cool way.

2.2. Pros and cons of data sets

The pros of using this data set is that it contains more than one type of data. For example, the names of the Pokémon and whether they're legendary or not, would be nominal data. While the actual stats such as total stats, HP, Attack, Defense, SP Attack, SP defence, Speed of the Pokémon would be quantitative(ratio). Another pro is that the data set's size is not too small or too large making it perfect to work with. I would also consider this topic to be interesting, but it does have a con of only being portrayed from

the Pokémon mainline games side. As mentioned above this data doesn't represent the Pokémon card games or Pokémon Go and the data is focused up to gen 6 which doesn't contain every single Pokémon that exists.

2.3. Data set decision

While searching for a data set to pursue, I ended up picking Pokémon. Pokémon is one of the biggest IP in the world with millions of fans across the world, myself included. I found picking a data set that I'm familiar with and enjoy will help me make a great visualization compared to a data set that I don't truly find interesting. This data set is the perfect size which isn't too small or too large while having more than one type of data. For instance, it contains nominal and quantitative data. Overall, I believe this data can be used to make a unique and interesting visualization that hopefully can help other Pokémon players see, compare and gain knowledge of the Pokémon they capture in the game.

3. Design process

Some design goals I have is making a unique visualization where the Pokémon image and the base stats are the main focus. I want it to be simple yet visually appealing, where it's easy to understand the data but fun to interact and view with.

3.1. Sketch-able data subsets

Subset1:

Name	Type 1	Type 2	Total	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed
Bulbasaur	Grass	Poison	318	45	49	49	65	65	45
Ivysaur	Grass	Poison	405	60	62	63	80	80	60
Venusaur	Grass	Poison	525	80	82	83	100	100	80
VenusaurMe	Grass	Poison	625	80	100	123	122	120	80
Charmander	Fire		309	39	52	43	60	50	65

This was the first subset I picked which contained everything that is highlighted. The subset contained two Pokémon's along with their hp, attack, defense, and speed. The focus of this subset was more tailored to actual main stats. I tried to meet at the middle of having a data set that can be sketchable and unique in drawing while still trying to represent the overall data set.

Subset 2:

Name	Type 1	Type 2
Bulbasaur	Grass	Poison
Ivysaur	Grass	Poison
Venusaur	Grass	Poison
VenusaurMe	Grass	Poison
Charmander	Fire	

This is the second subset I picked which contains 2 Pokémon's and their primary and secondary types. The main focus for this subset was to have a way to visualize what type each Pokémon has and to demonstrate how it might look if a Pokémon only has one type.

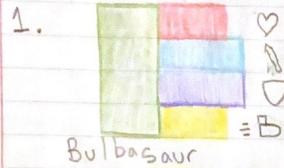
compared to one with two. In this case it was representing less number stats compared to the first subset.

3.2. Design process

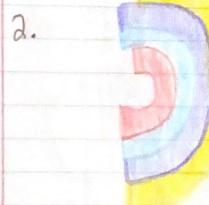
My design direction for the sketches were to have some simple graph ones while also having some that were more picture-ish and unique focused. So, I can see the difference where one area might shine compared to another. For some of the drawings I took inspiration from another drawing to try to see if it works. Which you can notice by looking at each sketch and noticing some similarities.

3.2.1. First sketches

Project hand in 2 : sketching
 Subset: 2 pokemons (Bulbasaur and Charmander) with their corresponding HP, Attack, Defense, and Speed.

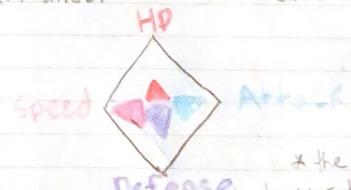


* Comparing stats
 the heart is HP,
 sword is Attack,
 shield is Defense, and
 boots is Speed.



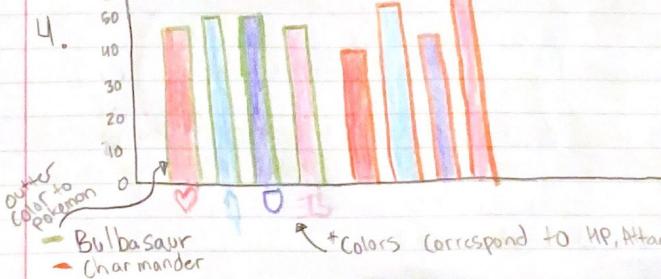
- HP
- Attack
- Defense
- Speed

* Showing stats
 half circle is 50



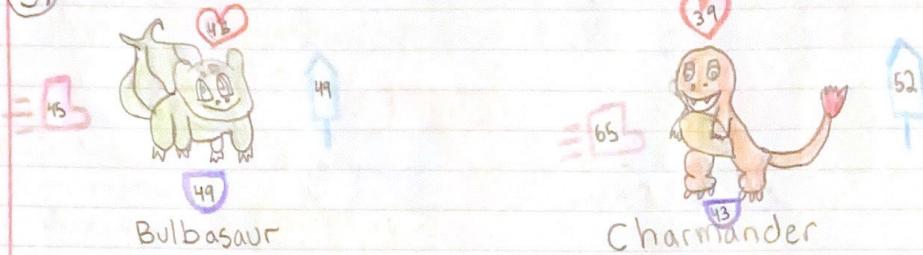
* the higher/bigger the triangle
 the higher the stat

* each side goes higher depending on stat value



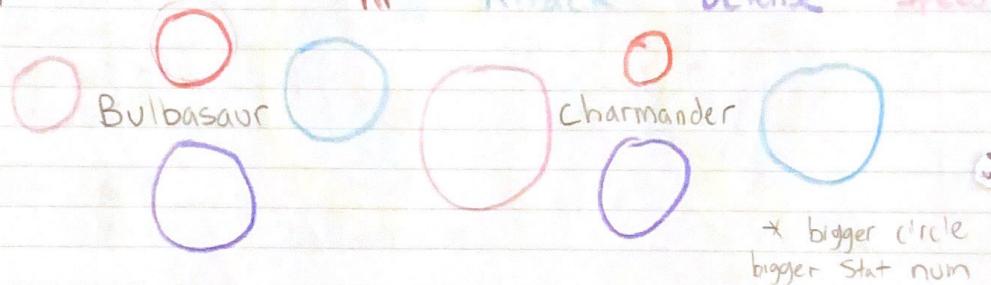
* Colors correspond to HP, Attack, Def, Speed

5.



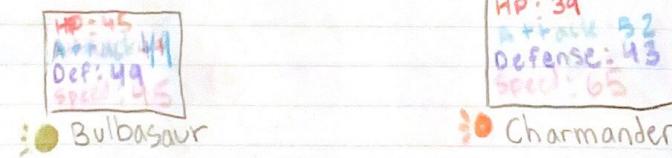
* Having the Pokemon in the middle then its stats around it.

6.



* bigger circle
bigger stat num

7.



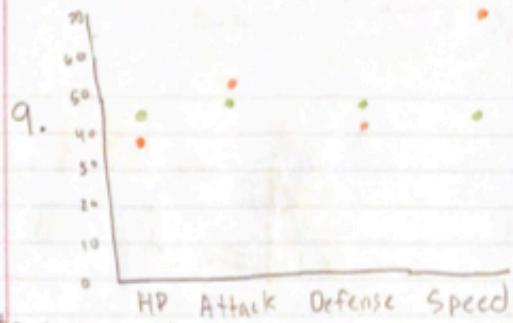
* Once mouse is over the circle it will show stats of the Pokemon

8.



-HP -Attack -Defense -Speed

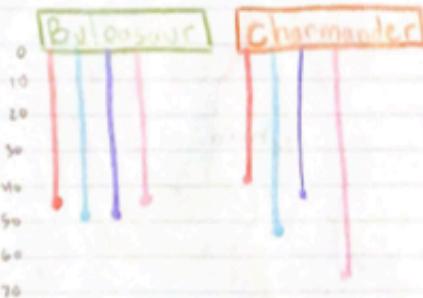
* more area colored higher stat



- *Bulbasaur*
- *Charmander*

- * Putting stats on a graph where different color = different pokémon

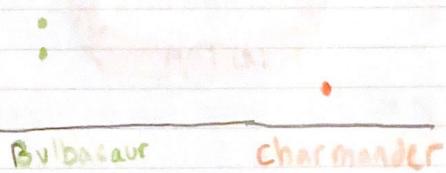
10.



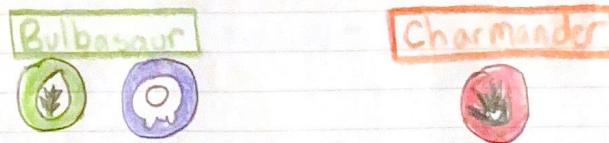
* the longer the line
the higher the stat
each stat is color
coded

Subset 2: 2 Pokemons (Bulbasaur and charmander) with their primary and secondary types.

1. Bug
poison
grass
fire



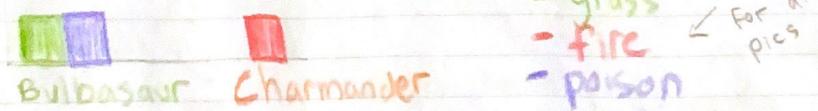
2.



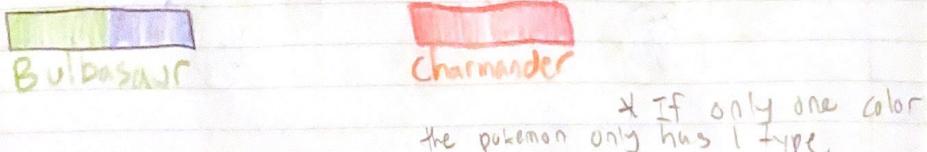
3.



4.



5.



6.



7.

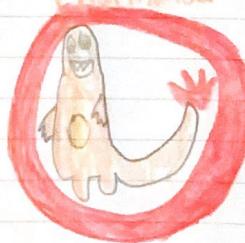


- Bulbasaur
- Charmander
- Poison - grass
- fire

8. Bulbasaur

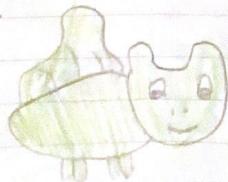


charmander



*Inner ring is primary type while outer is secondary type

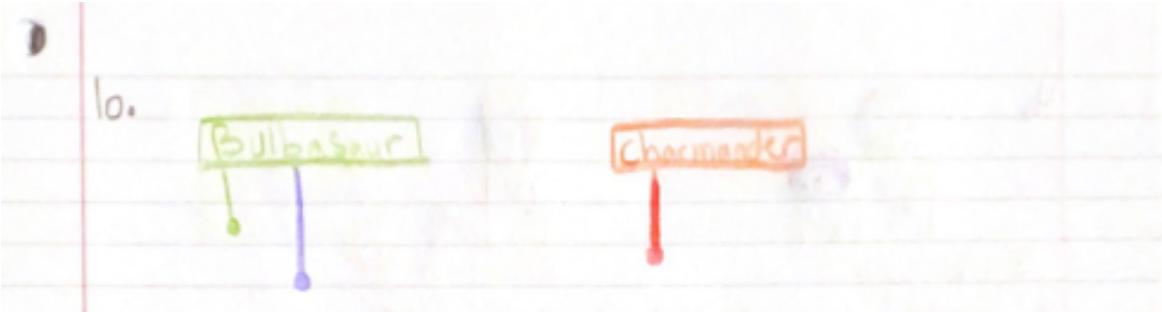
9.



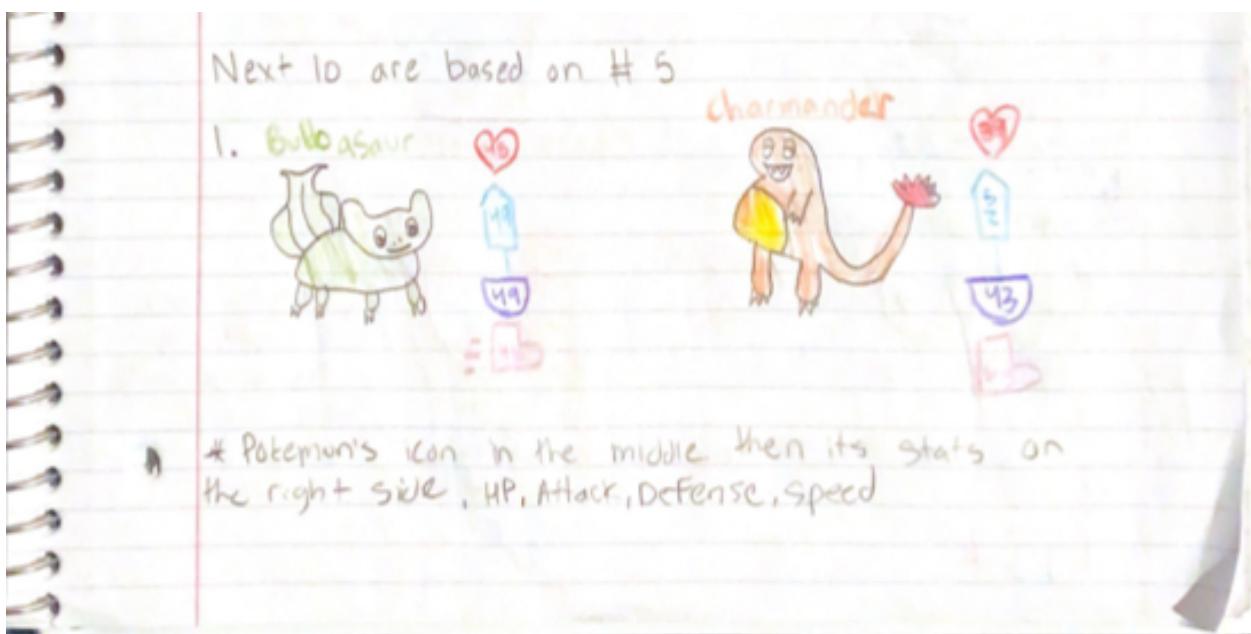
Primary: Grass
Secondary: Poison



Primary: Fire



3.2.2. Variations

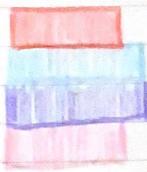


Color for drawing

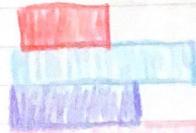
- HP
- Attack
- Defense
- Speed

* use this to know what the colors mean.

2.



Bulbasaur



charmander

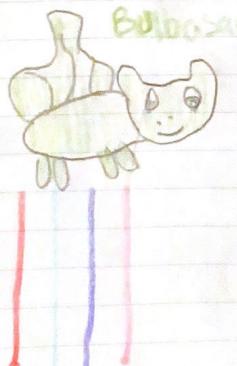
* Stats on the right of the pokémon
as bars



Bulbasaur

* Stats that goes around the pokémon full circle = 100

4.



Bulbasaur



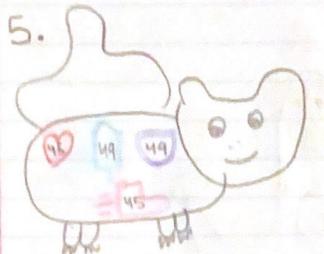
charmander



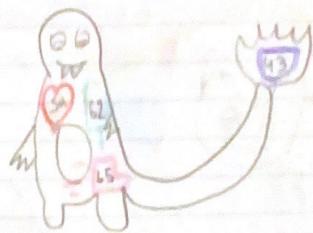
charmander

* the lines shows stats the longer lines have higher value

* Having icon stats on the Pokemon



Bulbasaur



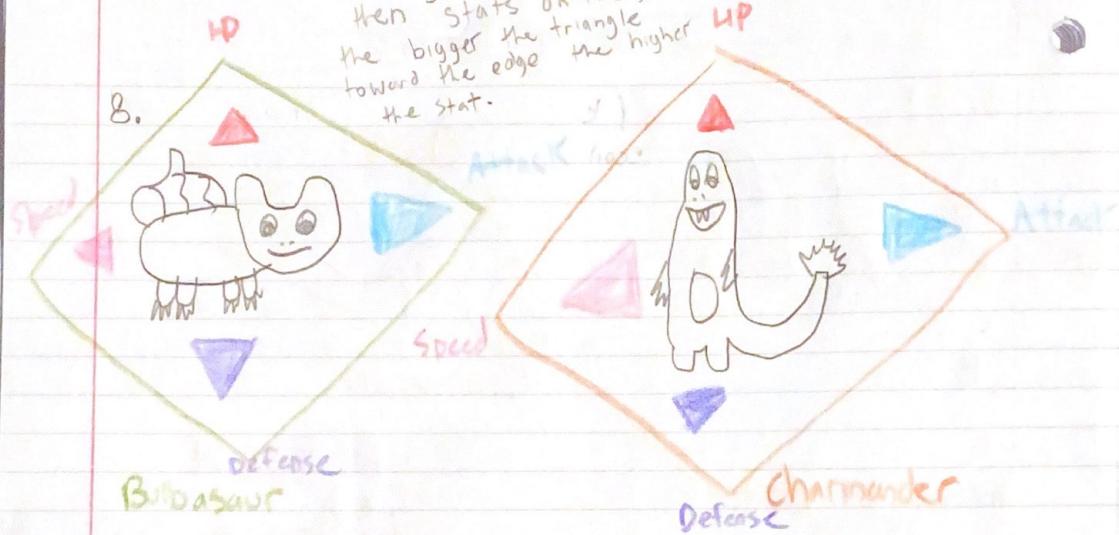
Charmander



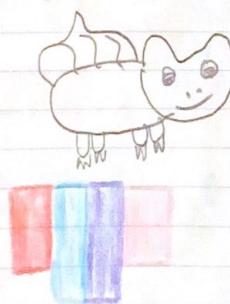
* bars + number used
to show stats longer bars =
bigger #

* Stats show as the real number but using
color to describe which one it is

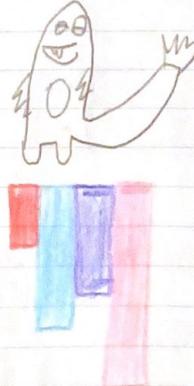
* having the Pokemon in the middle
then stats on the sides
the bigger the triangle the higher
toward the edge the higher
the stat.



9. Bulbasaur



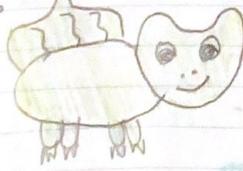
Charmander



* Showing
stats as a bar
under the pokemon
bigger bar = higher
stat value.

* Having the stats with the symbols
under the pokemon

10.



Bulbasaur

HP 45
49

ATT 49
45



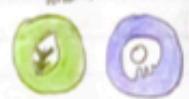
Charmander

HP 39
43

ATT 52
65

The next 10 are based on #2 from subset 2

1. Bulbasaur



Charmander



2.



Bulbasaur



Charmander

3.



Primary
type

Secondary
type

4.



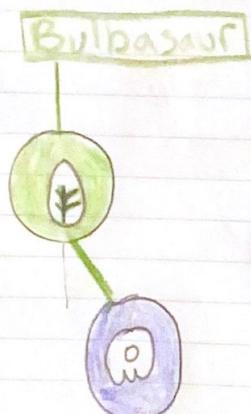
Bulbasaur



Charmander

* looking at primary and secondary types

5.



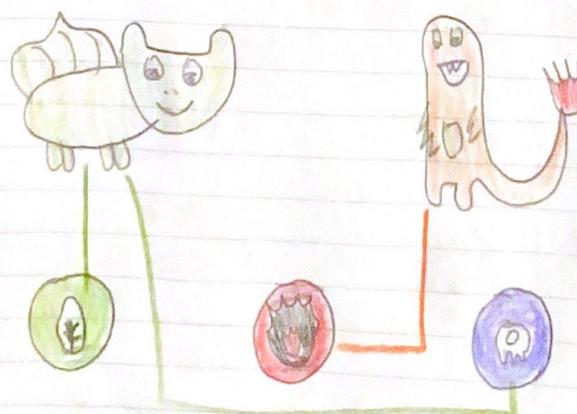
Bulbasaur



Charmander

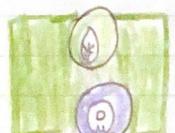
* showing types each pokemon has

6.



* showing the types each pokemon has

7.



Bulbasaur



charmander

8.

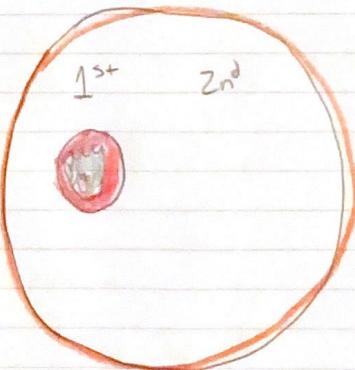
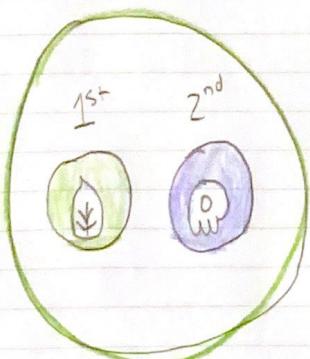
secondary
primary

Bulbasaur

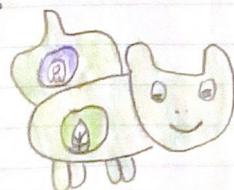


charmander

9.



10.



Bulbasaur



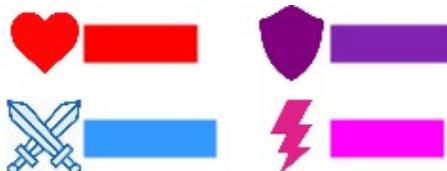
charmander

3.3. Process

The process of drawing the sketches were tough because it's hard to always think of a unique idea to draw. This caused me to have some sketches which look similar to

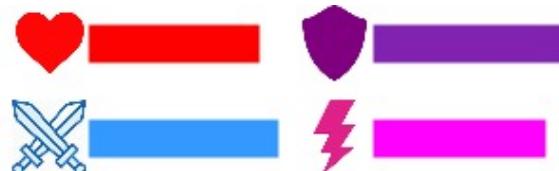
another drawn in a different approach. For the first subset it was difficult to draw the stats because I wanted to find a way to show the stat without just saying a number or find a way to show the number in a unique way. For the second subset it was even harder for me to think of ways to show what type the Pokémon is. So, I tried writing it out next to the name, putting it on a graph, drawing the actual symbol of the type. I made both subsets capture different elements of the data because I needed a way to visualize two different parts so I can later think about how to visualize the full data set. The results were interesting since I got an idea of how I may want my visualization to turn out, but I would love to get feedback on whether having the Pokémon's picture be too much if each Pokémon was displayed that way. Overall, I think I found a cool way to display the types for the Pokémon and how I might express the stats which make it visually appealing. I like the idea of having the Pokémon in the center and its stats around it while having the types displayed under it. I do see limitations with this because it might be too much at once to look at and it may become overwhelming to do for each Pokémon.

3.4. General design direction



Bulbasaur

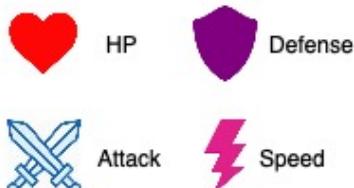
Grass Poison



Ivysaur

Grass Poison

Legend



I created this based on my 10+10 drawings using draw.io. This is my main design inspiration on how I would like to implement and visualize my data using d3. The design direction I'm going for is having the pictures of each Pokémon in my visualization because I feel like people that know Pokémon can instantly tell which Pokémon it is, based on just looks. The reason I picked a heart icon for HP is because many people see a heart and a bar next to it and instantly know its hp, so I think it works very well when trying to show health data. I even plan on using a sword to demonstrate attack, shield to show defense and lightning to show speed. My main design philosophy was to make it look special and fun to view while still maintaining the critical information I would like to show in a unique manner. With these cute and fun icons and the way I intend to represent and implement them I feel like I hit the nail with how I want my design direct to go. Based on my data I don't want to create a graph or try to mess every Pokémon into dots or anything like that because I feel like it defeats the purpose of demonstrating Pokémon stats. That's why I plan on having multiple rows with Pokémon and their stats on top of them so you can easily see the difference in hp, attack, defense, speed by just viewing it. Some of my old drawings I showed the number of the stats, but I realized I don't want my design to go down that path since its just extra stuff that's not needed and just makes the visualization feel bloated. Another general design direction I wanted was if someone didn't know how the Pokémon looked the name is displayed under them so they can understand the data too without having previous knowledge. I also want to include the primary and secondary types of Pokémon in a cool way so I made tiles under the names that tell you which type it is and the tiles color would be the same for all fire types, yet different color for let's say comparing fire to water. The fire tile would be orange while the water one is blue. Just the colors aren't enough so I would like to include the name of the types. Overall this is my general design direction I wish to implement in d3.

3.5. Prototyping variations

3.5.1 Variation A

*** All the variation descriptions are here I didn't add them on the HTML to avoid bloating***

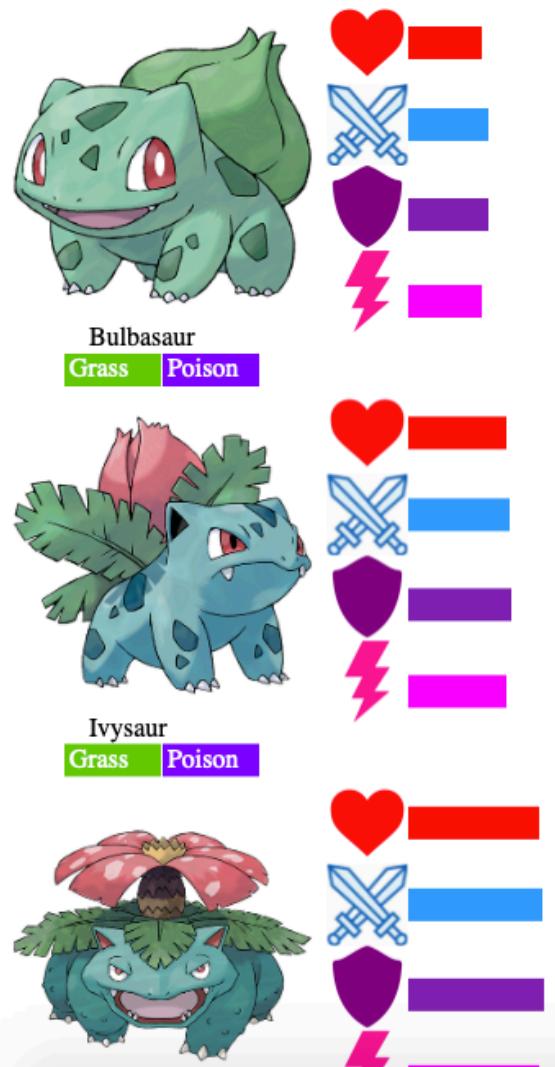
Variation 1: Here's a snapshot of variation 1



Link to website to view full variation 1:
<https://navjeethundal.github.io/NavjeetHundalDataVisualization/>

This variation explores being able to draw and show all 151 Pokémons from my data set. This variation mostly just explores how it looks with having all the Pokémons' pictures along with their stats on the right side of them. The hearts icon demonstrates Health/HP, the two swords demonstrate Attack, the shield demonstrates Defense, while the lightning bolt demonstrates speed. The corresponding bars stand for their respected icons they're beside. I added color to both the symbols and bars to make it easier to understand what symbol goes along with what stat. So, in this case red = hp(health), blue = attack, purple = defense, pink = speed.

3.5.2. Variation B

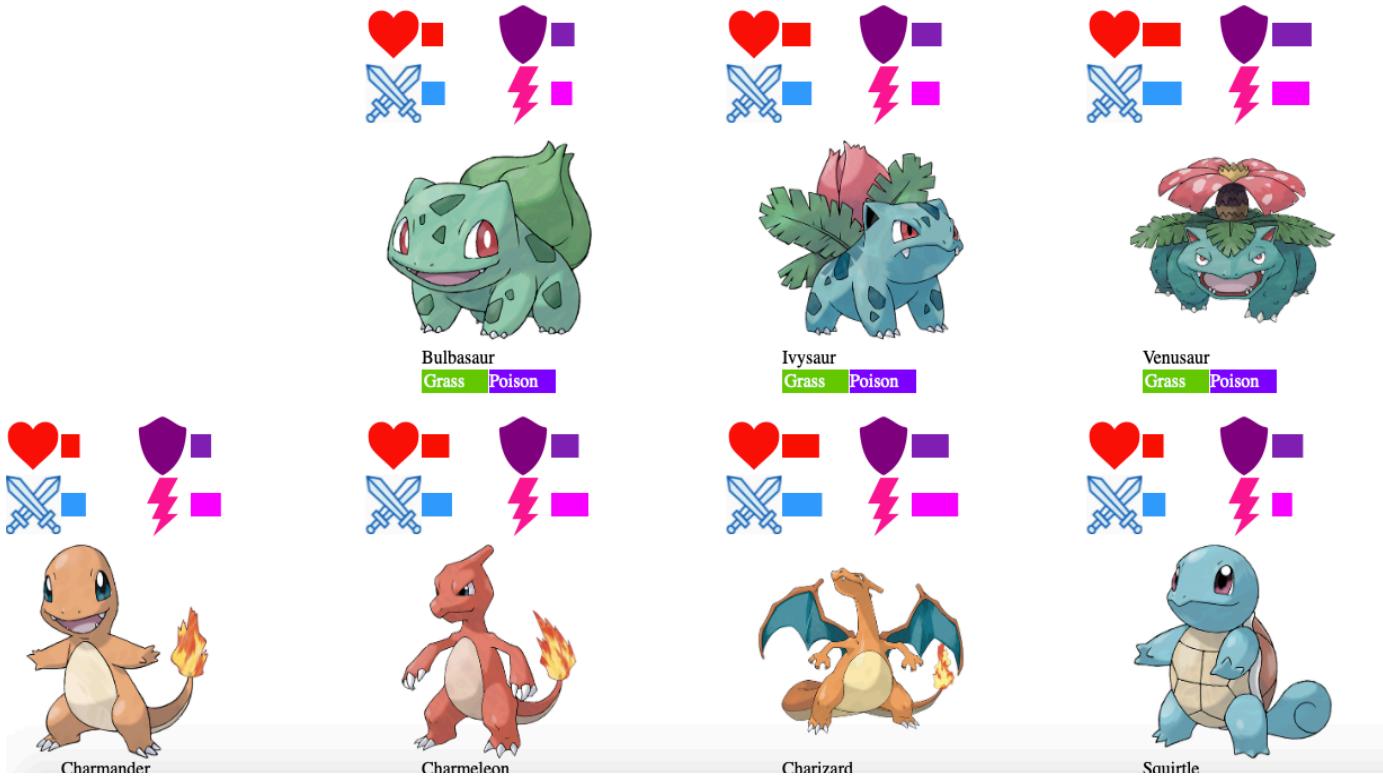


Link to website to view full variation 2:

<https://navjeethundal.github.io/NavjeetHundalDataVisualization2/>

This variation explores how it would feel / look like if I added the Pokémon's name along with their types. The general design concept I wanted to try for this variation was trying to figure out how to add the names and types along with the types bars all together to get a sense how they will look as one unit with using d3. Each Pokémon has their names displayed under them and their primary and secondary types. In this variation I was able to see how it would look like if a Pokémon had 2 types compared to Pokémon's that had 1 type. I also explored how it would look if a made different types have different colored bars to represent them. when you see light green and it says grass on the tile you now know all light green are grass. This variation helped me explore those ideas. It also helped me see that if a Pokémon has one type you will only see one tile instead of two.

3.5.3. Variation C



Link to website to view full variation 3:

<https://navjeethundal.github.io/NavjeetHundalDataVisualization3/>

This variation explores my final design and how I actually think the visualization should look like. I mainly focused on how I can get 3-4 Pokémon's per row using d3 and how it would look like if the stats were on top of the Pokémon opposed to being on the sides and adding scaling to the stats.

3.6. Implementation process

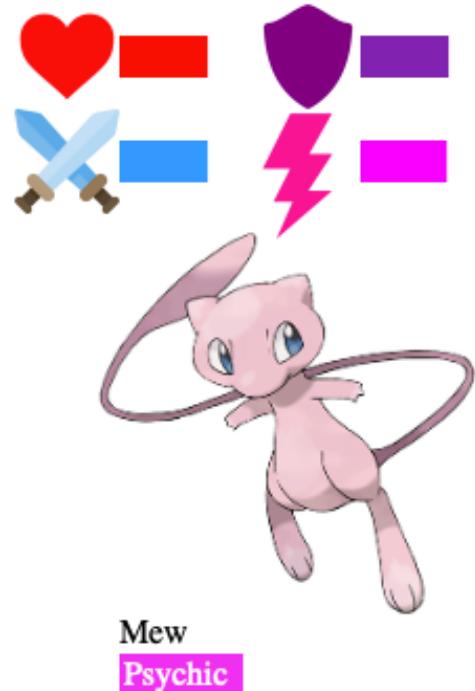
The process with coding the alternatives were very tough to begin with since I'm not that good at coding especially using d3, html, js. At first, I started off with just being able to display Pokémon. Then I quickly realized it would be so hard if I don't add links to the Pokémon images in my csv file that I can easily retrieve. Once I figured out how to add the pictures I couldn't figure out how to make it go from one row to the next so I just made it print all in a line, that's why in variation 1 and 2 all the Pokémon are in a vertical line. When I finally got it showing all the Pokémon and the stats on the sides I realized if I show all stats from my csv it wouldn't look that nice, which made me decide I only want to show the main stats such as hp, attack, defence, and speed along with their pictures, name, and type 1 and 2. When designing each variation I tried putting the main stats on the side and I noticed I liked my original idea better that it should go on top of the Pokémon. Making each new variation helped me learn how to implement my ideas in d3. Overall, I'm very happy with my current results and I feel like

I'm going to keep variation 3 as my final variation and just add interaction for my final submission.

3.7. Final static design

Based on my three variations that I created, I have decided to go with variation c as my final design choice. Because I feel like it's the most visually appealing, with great use of space while maintaining all the data in an easily understandable manner. The interactions I would like to implement is being able to click the icons such as the heart, sword, shield, and lightning bolt to show the actually stat number inside the icon which the user can turn on and off by clicking them. A potential alternative could be when you click on the bars it shows the stats within the bar. I think having a zoom function would be incompatible because it would make it way too hard to see the bars and zooming in wouldn't make sense with the way I intend to create my visualization since there is no detail that can be gained by zooming in. The secondary information I plan to include to the visualization is having a legend, so the users understand what the 4 symbols mean. I would also like to add a small description under the legend to explain to the user what the interaction is and how to use it.

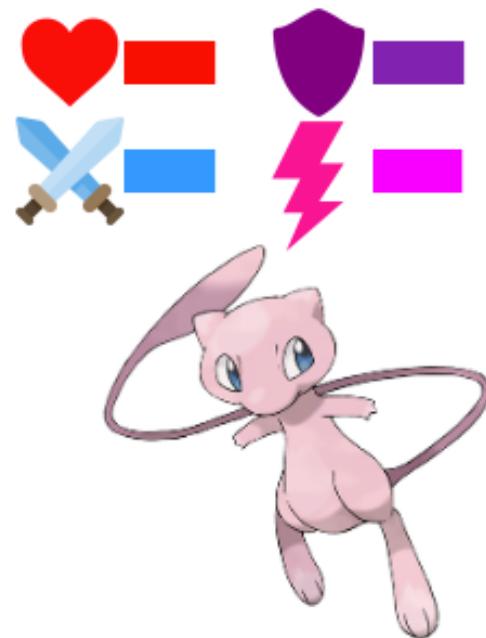
3.8. Prototyping interactions



This is how part of the visualization looks like before the user uses any interaction.



Mewtwo
Psychic



Mew
Psychic

The user clicks the center of the heart icon, they can see the actual stat number. In this case the user clicks the heart icon which then reveals the HP that the Pokémon has.



Mewtwo
Psychic



Mew
Psychic

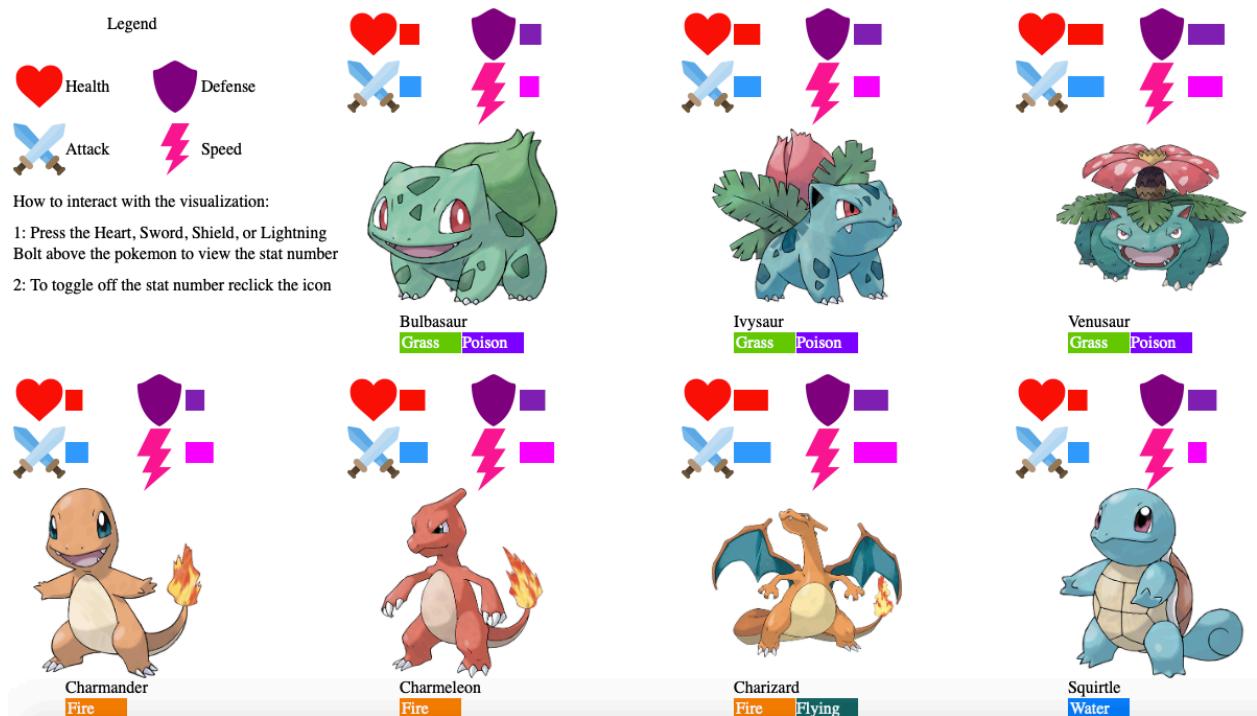
The user then pressed all the non-selected icons for mewtwo and mew to reveal the stat number for HP, Attack, Defense, and Speed.

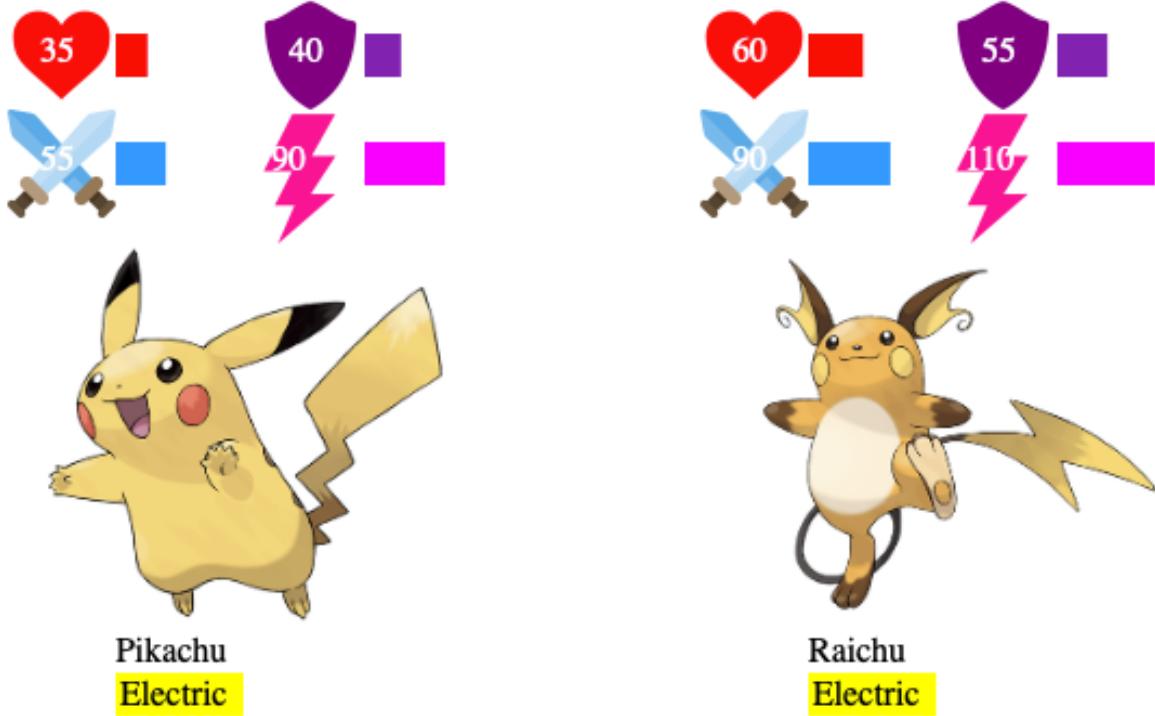


The user then decides to turn off the Attack, and speed stats from showing so they click on the center of the Attack, and speed icon to turn it off.

4. Final Implemented visualization

Here is a snapshot of the final visualization:





Here we can see how it looks like when the user clicks all the icons above Pikachu and Raichu.

Here's the link to view the final visualization:

<https://navjeethundal.github.io/NavjeetHundalFinalDataVisualization/>

My final visualization has a legend on the top left corner and a small description on how to use the interactive parts, as shown in the above pictures. The visualization shows all 151 gen 1 Pokémons along with their HP, Attack, Defense, speed, name, picture, and their primary and secondary types. The final implemented visualization offers a way to view Pokémons' base stats in fun and interesting way all in one place. No background info is needed and its very simple for the user to understand and use. The insights the user will gain from using the visualization may be to get a better understanding of how certain Pokémons compare to others, or just use it to quickly view their favorite Pokémons' stats when needed.

4.1. Process reflections

The process of implementing the final visualization was both fun and at times difficult. When I decided to pick the variation c as my main design most of the work was already done other than fine tuning and adding interactions. The first thing I decided on adding was a legend in case users didn't know what the symbols above the Pokémons represented. Once I got that I started to implement the interaction that I decided on and noticed it was hard to see the number on the sword when toggled, which made me change the Attack(sword) symbol. At first, I wanted to add the stat number on the bars but noticed that it won't work well since some Pokémons have very

low stats where the number won't fit on the bar and will hang off of it. So, I thought it would be cool if you click the icons that represent HP, Attack, Defense, and Speed, toggle the corresponding stat value inside those icons. After that was working, I noticed using black font inside those symbols were hard to see and didn't look visually appealing, so I changed them to white which made them stand out more.

5. Discussion

At first, I looked for a data set that interested me to use for my project. When I found a Pokémon, data set I knew that I had to pick it since it reminds me of my childhood when I would play Pokémon games on my Gameboy. After that I started to create some rough sketches to see how I could visualize the data in a fun and unique way. This was tough for me at the start because I kept wondering how I show this data without just having it in a graph. This gave me the idea of what if I actually have the Pokémon's picture and somehow show the starts near them. When I started to code it, I noticed how hard it actually is to create but I really wanted to do it my way, so I kept trying and I'm proud of the final visualization I have created. If I had more time and resources, I think I would've included a way to filter Pokémon by type and include more ways to interact. The advantages to my visualization are its very user friendly and easy to understand. I would also say it's also very visually appealing which makes it just fun to view and interact with. The disadvantages is that you can't view all the Pokémon's at once and it doesn't include all the stats the Pokémon's could have only the main ones. While doing this project I learned how much you can do with d3 and how making visualization aren't that easy to make. They take a lot of effort and a lot of sketches to finally get to your final design. I would love to learn more so I can add more unique way to interact with my visualization.

6. Conclusion

My main achievements while doing and completing this visualization was being able to make the interactive visualization I wanted to make. Each step was a milestone starting with finding a data set that interested me on a person level and being able to sketch many pictures to start getting a sense of what I wanted to create. Whether something worked or not. When I was able to finally get multiple Pokémon's on each row was a huge achievement for me because it took so much time for me to figure out how to do that. Adding the interaction was another main achievement because at first if I clicked one symbol to toggle it on, I would have to double click if I wanted to turn another one on since the Boolean switch was connected to the first one, I clicked. Overall, I would say my biggest achievement was being able to create an interactive visualization from scratch for the first time using a language I never knew existed. I learned a lot creating this visualization and can't wait to see what I can create in the future.