

# PokePlot

## Gotta Graph 'Em All!

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# Background

- Began in the mid-1990s as an RPG for GameBoy
- Exploration, catching Pokemon, and fighting are primary game components
- Currently 8 generations (each belonging to a distinct region) with a total of 898 Pokemon
- Pokemon can be described by a number of numeric stats, including experience, hit points (HP), height, weight, and so on.
- Non-numeric stats include move sets and type.
- Some Pokemon can also evolve into stronger, more powerful forms but we will not consider these differences here.



# Questions

- 1) Does Pokemon type change across different generations and if so, how?
- 2) Are there generational difference in Pokemon base experience?
- 3) How are the different Pokemon attributes (for example, height, weight) related to one another and do they impact stats such as base experience, attack, and defense?
- 4) Does Pokemon type impact attributes (height, weight) and base statistics (hp, xp, attack, defense, etc)?
- 5) Do Pokemon that have 2 types have an advantage (in terms of base stats or height/weight) over Pokemon that only have one type?

## Questions for future research:

How do base stats differ for Pokemon compared to their highest evolution?

Are legendary and mythical Pokemon base statistics different than “regular” Pokemon?

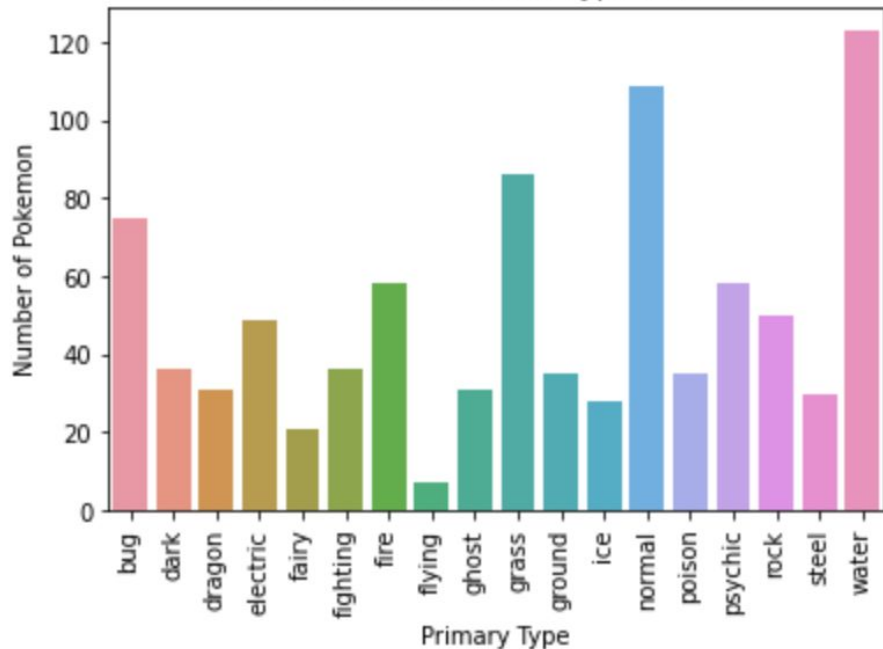


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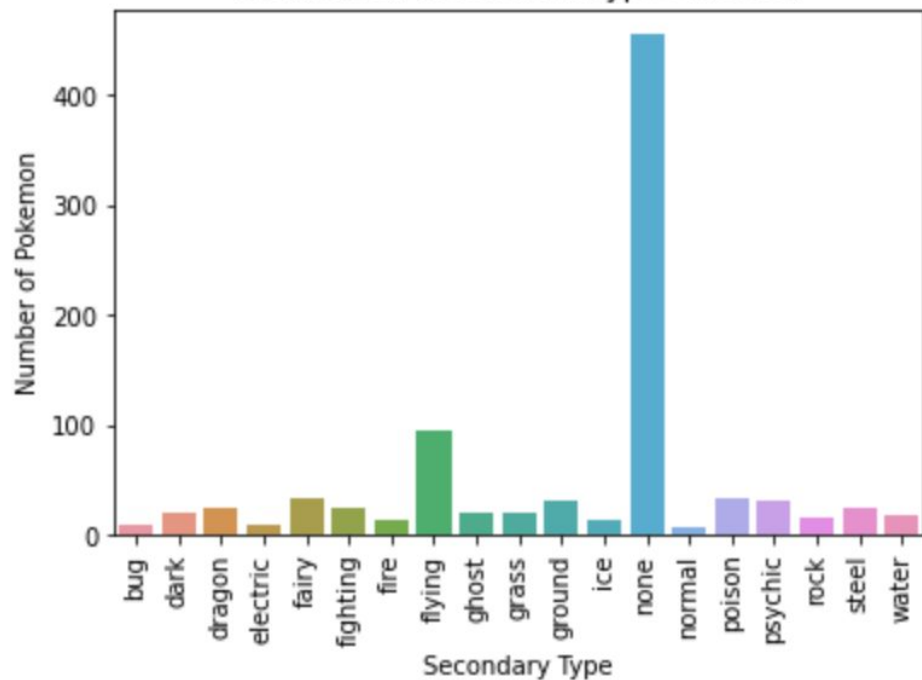
# Pokemon Types - All Generations



Distribution of Pokemon Types (all 898)

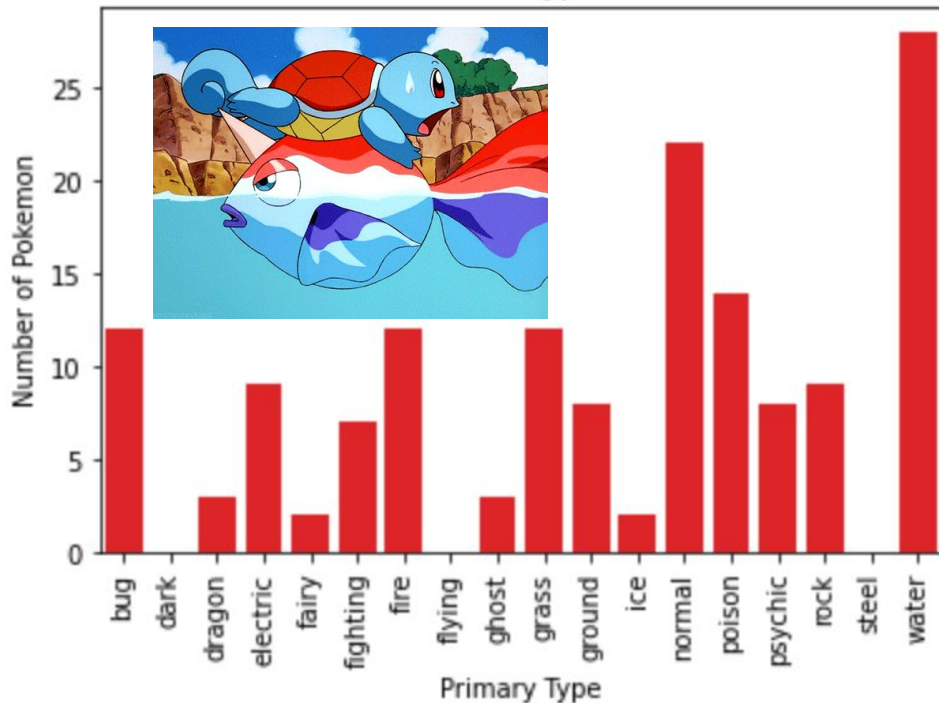


Distribution of Pokemon Types (all 898)

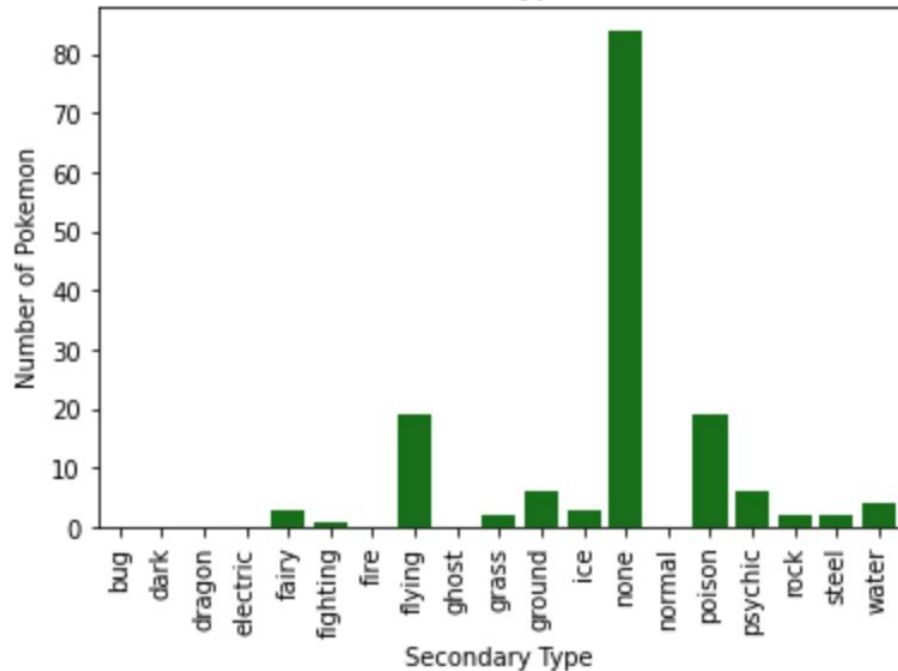


# Pokemon Types - 1st Generation (Kanto region)

Distribution of Pokemon Types (First Generation)



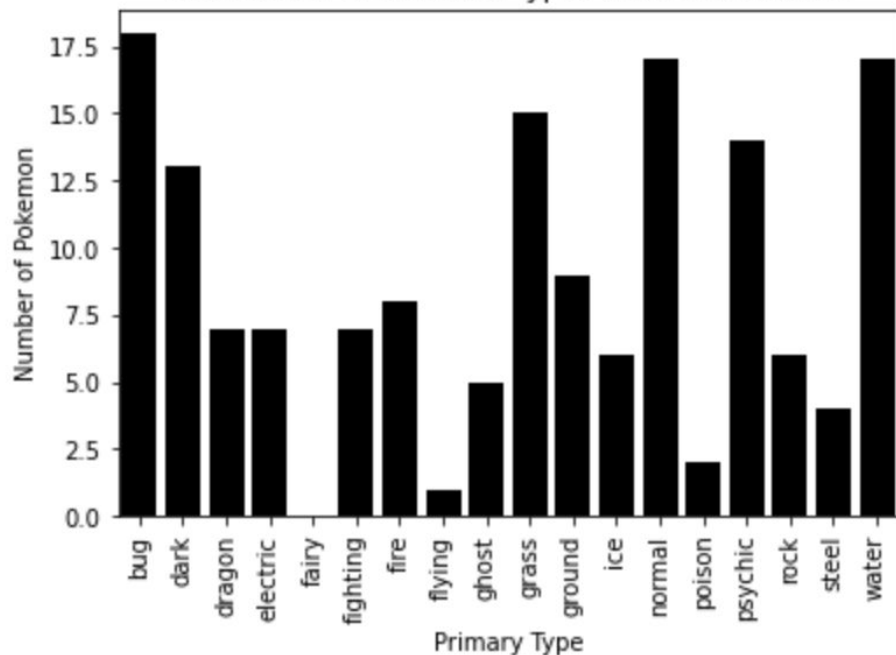
Distribution of Pokemon Types (First Generation)



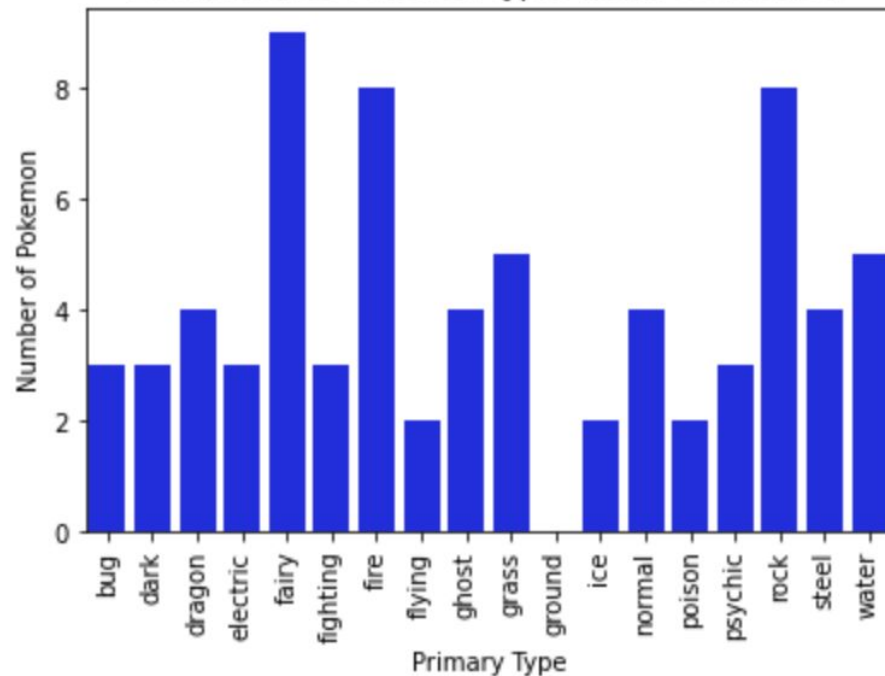
# Pokemon Types - 5th and 6th Generations (Unova and Kalos regions)



Distribution of Pokemon Types (Fifth Generation)



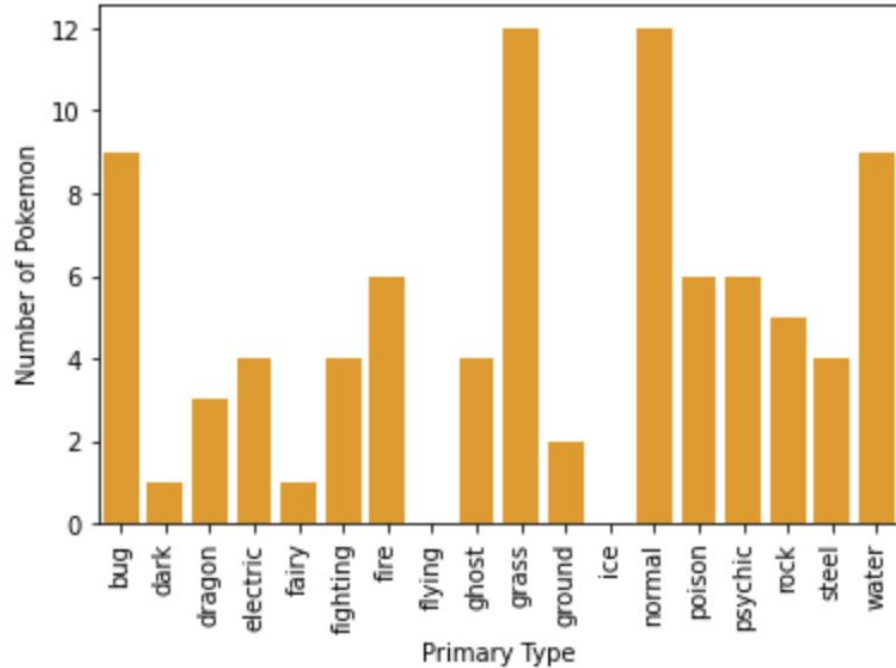
Distribution of Pokemon Types (Sixth Generation)



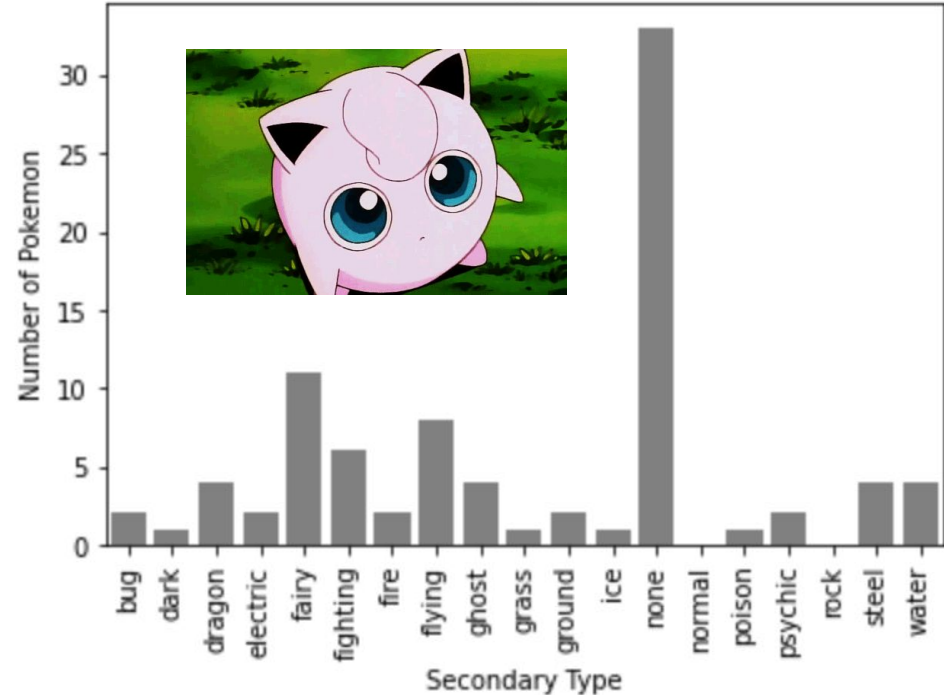


# Pokemon Types - 7th Generation (Alola region)

Distribution of Pokemon Types (Seventh Generation)

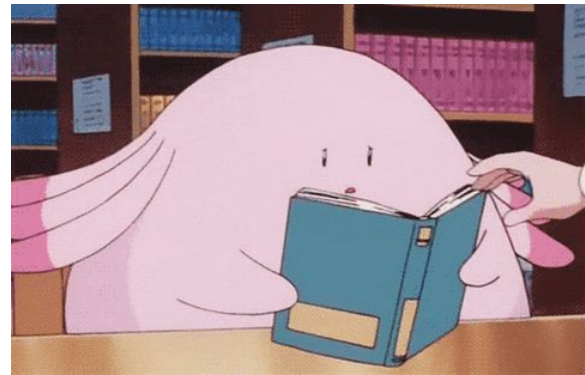


Distribution of Pokemon Types (Seventh Generation)



# What does the data show us?

- Overall, the most common type is water, followed by normal, then grass
- The least frequent types overall are flying and fairy
- The majority of Pokemon have only one type, **but** for those that have a two types, the most common secondary type overall is flying.
- The first few generations fall in line with these overall trends
- Generational typing trends start diverging from the overall trends with Gen 4
  - Most common Gen 4 type = normal, followed by water and grass
  - Most common Gen 5 type = bug, followed by water and normal
  - Most common Gen 6 type = fairy, followed by fire and rock
- ... And Generations 7 and 8 diverge even more
  - Most common primary Gen 7 types = grass and normal
  - Most common secondary Gen 7 type = fairy
  - Most common primary Gen 8 types = electric and water
  - Most common secondary Gen 8 type = dragon





# Generational Differences: Base Experience

```
pokemon_df['base_experience'].describe()
```

```
count      898.000000
mean       146.384187
std         75.838240
min         36.000000
25%         66.000000
50%        154.000000
75%        180.000000
max        608.000000
Name: base_experience, dtype: float64
```

```
pokemongen3df['base_experience'].describe()
```

```
count      135.000000
mean       137.340741
std         70.795708
min         38.000000
25%         62.000000
50%        147.000000
75%        169.000000
max        306.000000
Name: base_experience, dtype: float64
```

```
pokemongen7df['base_experience'].describe()
```

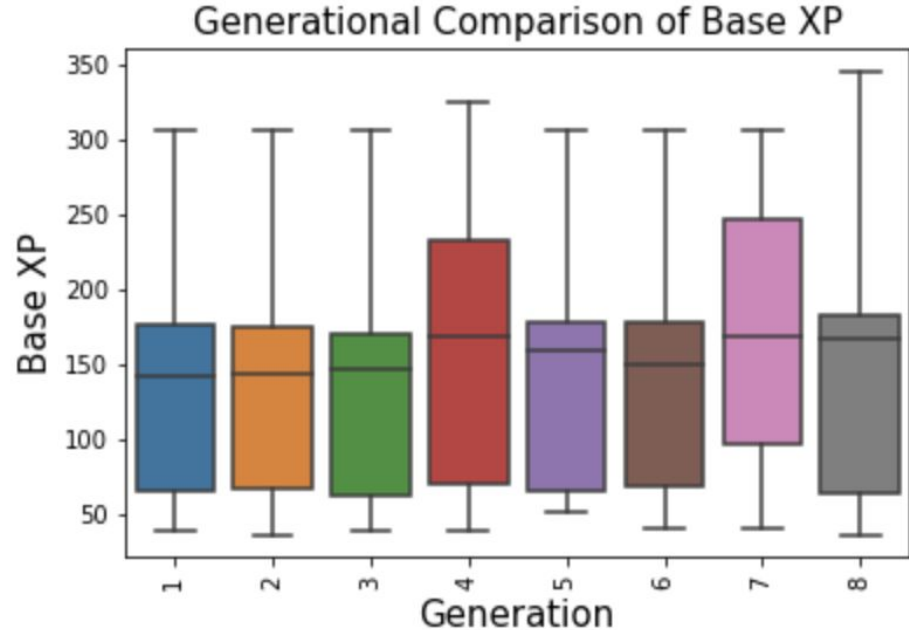
```
count      88.000000
mean       165.738636
std         77.683930
min         40.000000
25%         95.750000
50%        168.000000
75%        246.500000
max        306.000000
Name: base_experience, dtype: float64
```



- 3rd Gen = Hoenn region
  - Wide variety of habitats (mountains, deserts, etc.)
- 7th Gen = Alola region
  - Based on Hawaiian islands
  - Certain developed regional adaptations to the climate (ex. Alolan Exeggutor is super tall and skinny)

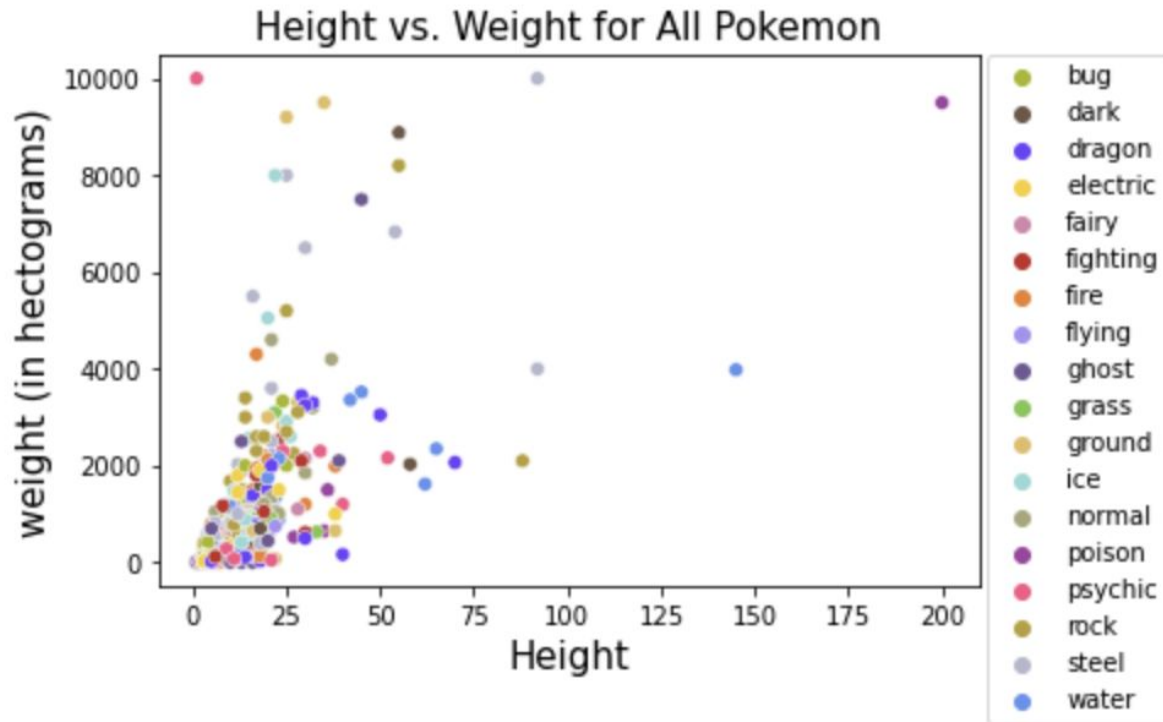
# A visual representation of how base XP varies with generation

- Gen. 4 & 8 stand out
- Possible Gen. 5, 6, 8 are different but maybe not statistically so
- Future work could include more detailed statistical analysis and pulling additional data to relate variations to in game factors such as habitat variability by region



# Investigating the relationships between various Pokemon attributes & stats:

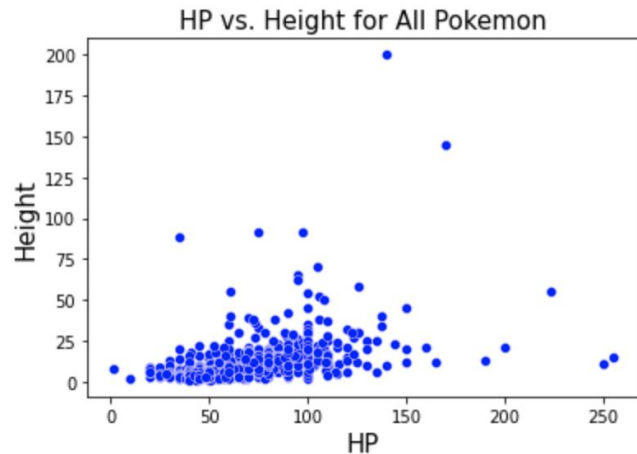
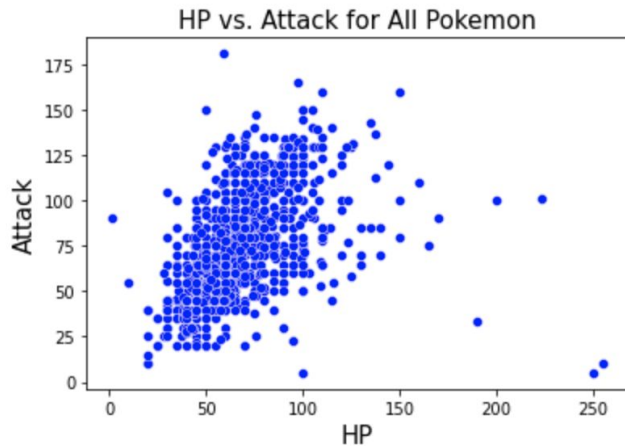
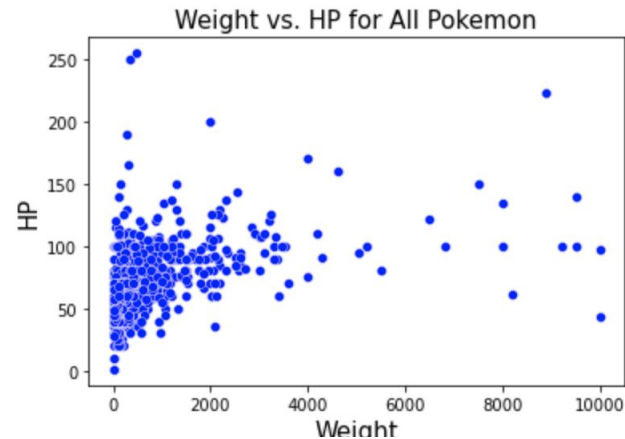
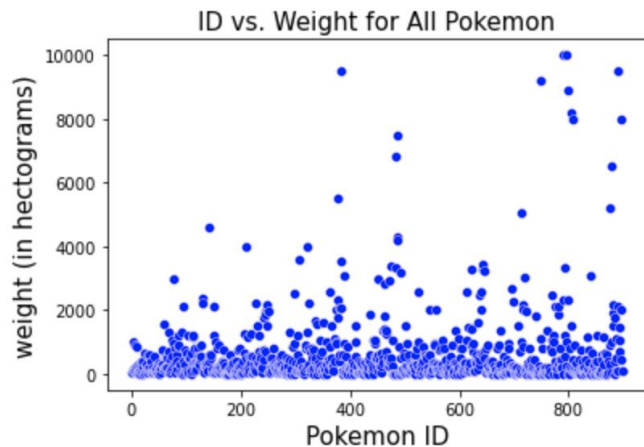
## Height vs. Weight



- Weak positive correlation between Pokemon height and weight ( $r = 0.64$ )
- One of the strongest correlations of the parameters we investigated

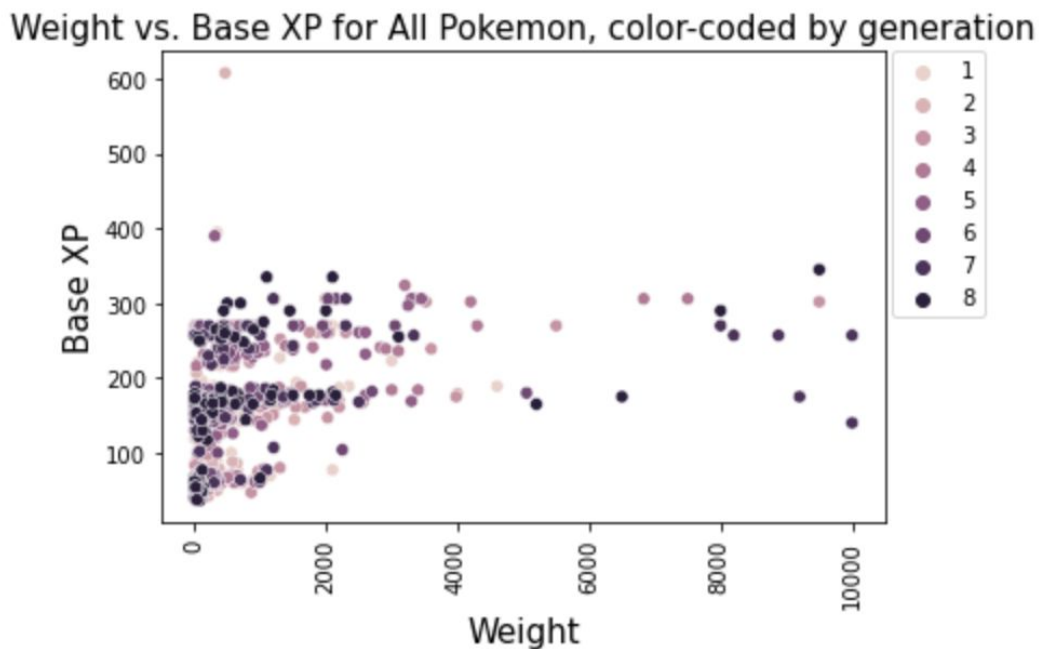
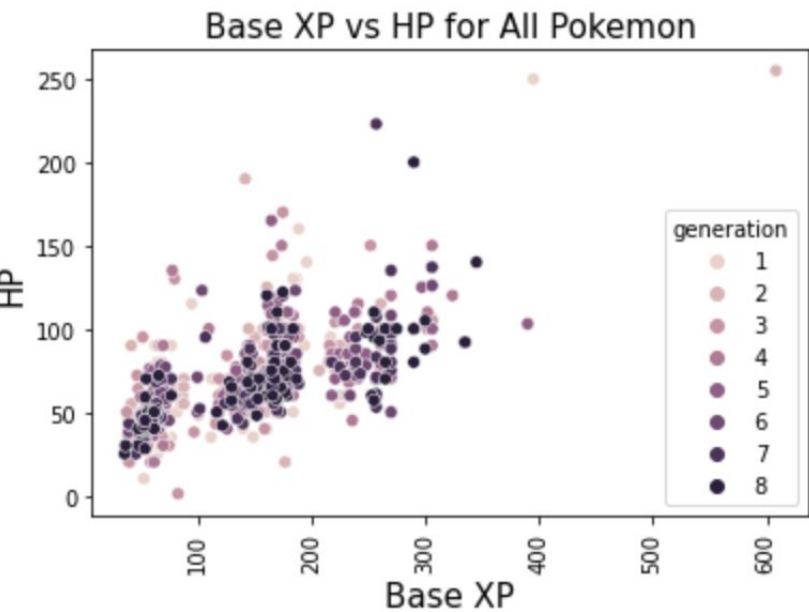
# Investigating the relationships between various Pokemon attributes & stats:

## A few representative examples



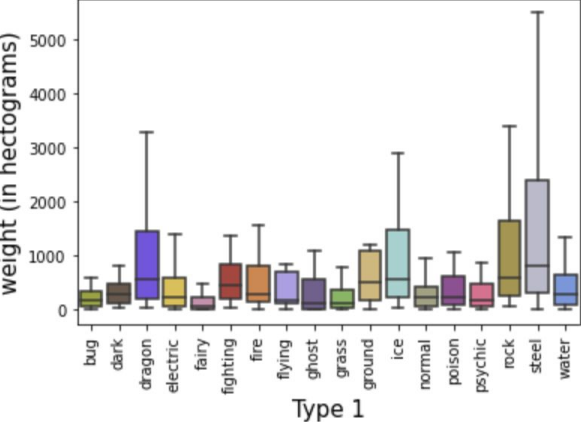
# Investigating the relationships between various Pokemon attributes & stats:

## Interesting patterns in Base XP

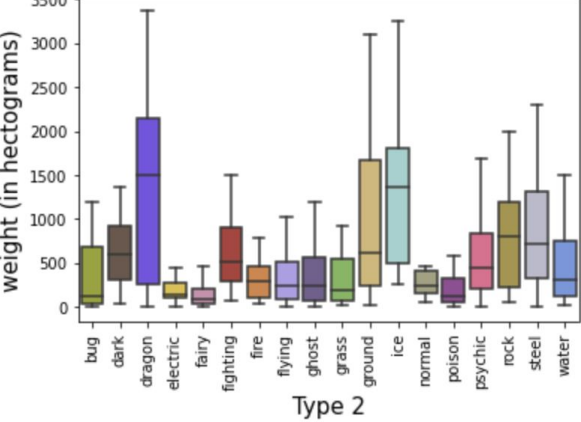


# Does Pokemon type impact attributes (height, weight) and base statistics (hp, xp, attack, defense, etc)?

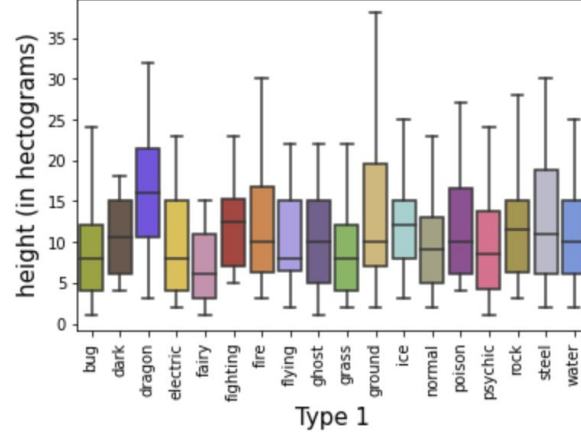
Weight Comparisons for different Pokemon Types (type 1)



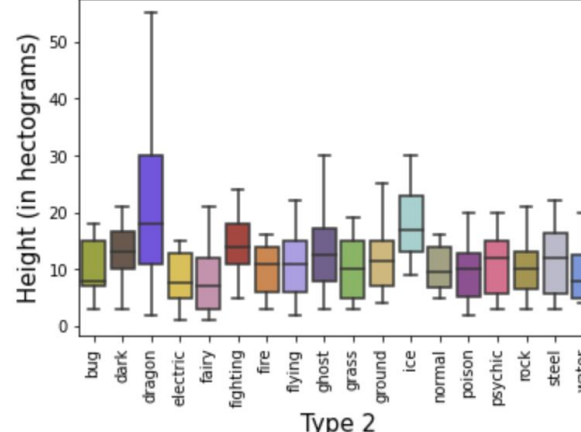
Weight Comparisons for different Pokemon Types (type 2)



Height Comparisons for different Pokemon Types (type 1)



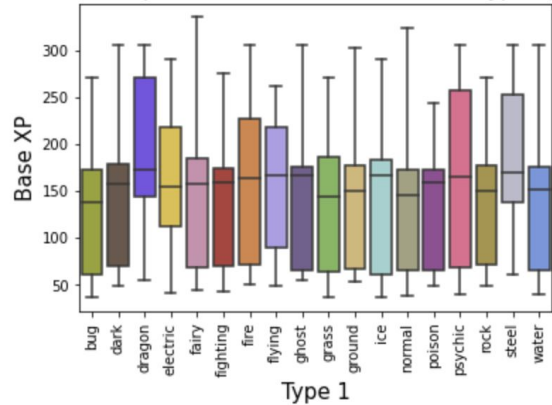
Height Comparisons for different Pokemon Types (type 2)



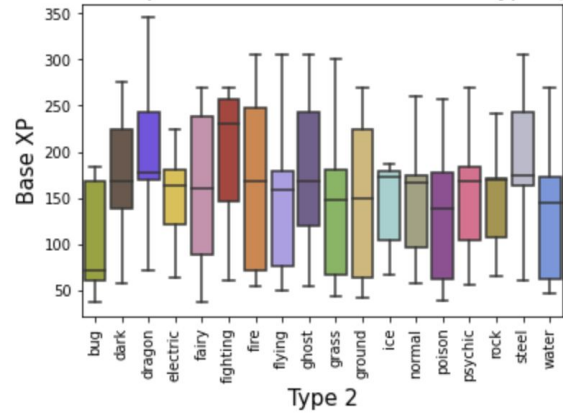


Does Pokemon type impact attributes (height, weight) and base statistics (hp, xp, attack, defense, etc)?

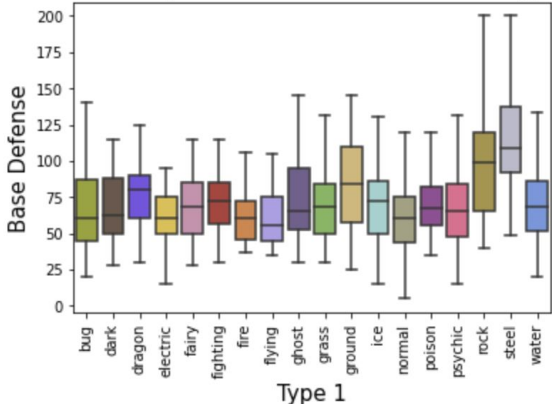
Base XP Comparisons for different Pokemon Types (type 1)



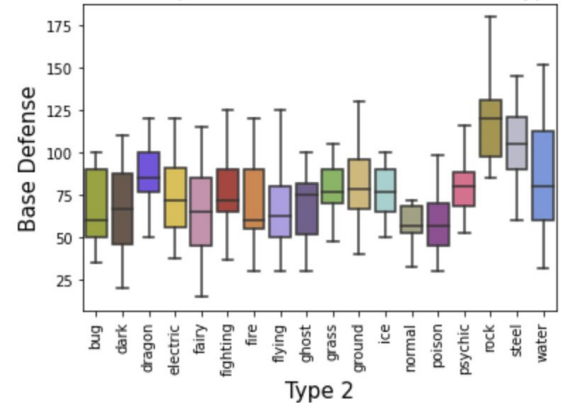
Base XP Comparisons for different Pokemon Types (type 2)



Base Defense Comparisons for Different Pokemon Types (type 1)



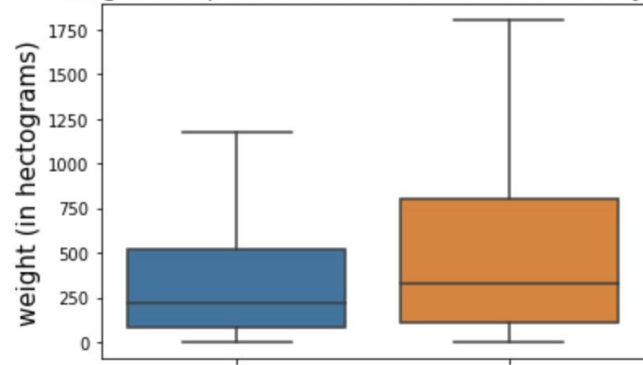
Base Defense Comparisons for different Pokemon Types (type 2)



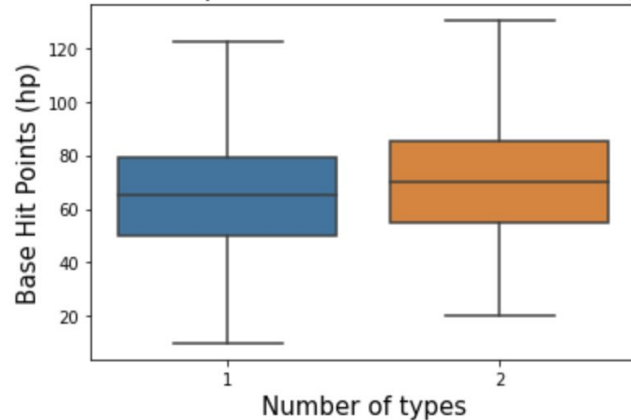
# Does a Pokemon having 2 types have a base advantage over a Pokemon having only 1 type?

## Yes...and maybe no

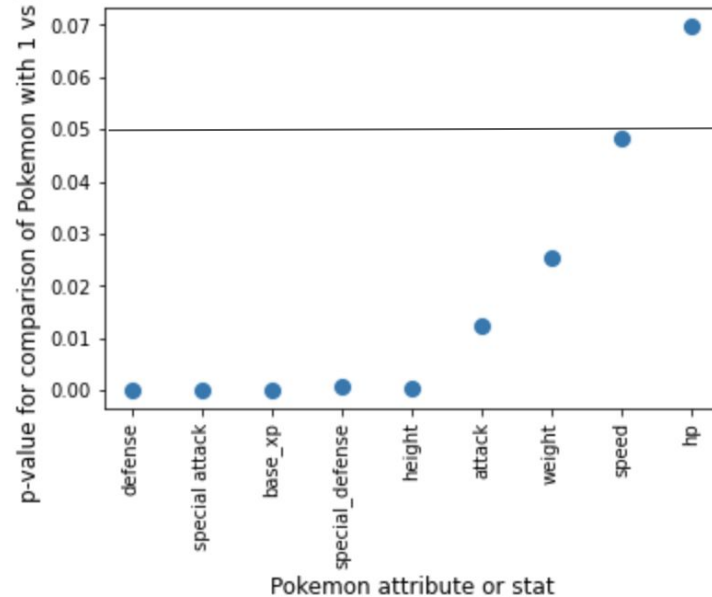
Weight Comparisons for Pokemon with 1 vs 2 Types



Base HP Comparisons for Pokemon with 1 vs 2 Types



Summary of P-values for Pokemon with 1 vs 2 types



# Summary, Conclusions and Hypothetical Next Steps

- Type distributions vary by generation-artifact of environment?
- There are also generational differences in base experience. Region/habitats?
- There are some (fairly weak) positive correlations between Pokemon attributes.
- Pokemon type impacts attributes and base stats. There are significant differences for some categories and for certain types (for example, rock and steel tend to diverge more from average Pokemon weight than other types) but not all types and parameters.
- Pokemon with 2 types tend to be heavier, taller, have higher: base hp, xp, attack and defense. However, type advantage matters! Having 2 types may infer both advantages and disadvantages!
- Some important factors not included (think evolutions, legendary and mythicals)-future research!

