

Clash Royale Deck & Archetypes Analysis

Datathon 2025

Team: Pandas Powerhouse

Paolo Halog, Lily Heinonen, David Kaufman,
Bishista Paul, Michelle Reyes

Table of contents

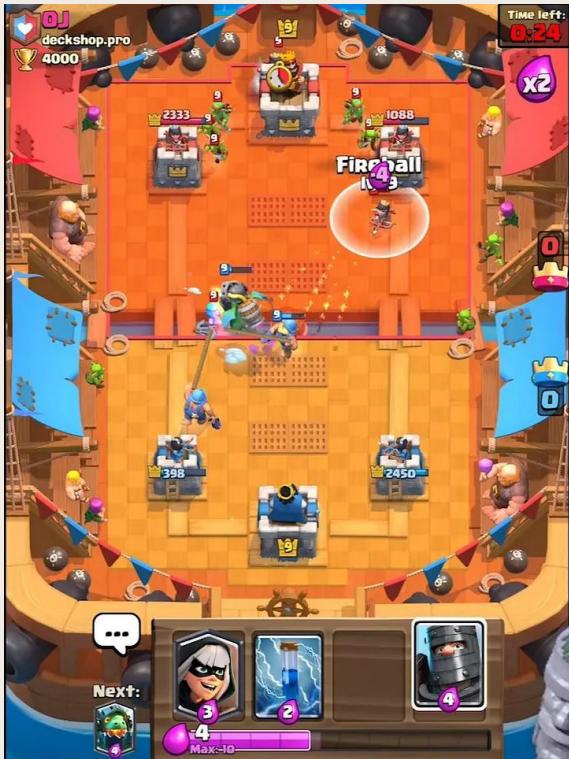
01 Initial Analysis

02 Archetype Analysis

03 Model Findings / Analysis

04 Summary & Takeaway

General Gameplay



Gameplay

- 3 minute strategy game where two players compete to destroy each other's towers
- Each player has a deck of 8 cards, consisting of troops, spells, elixir and towers (e.g. Mortar, X-Bow, and Inferno Tower)
- Each player's territory is connected by two bridges

01

Initial Analysis

What we Saw, Cleaned, and Questioned



Initial Analysis

Content



size/Shape



Content

Time

- December 2020:
7-11 AND 14-18
- Weekdays **ONLY**
- **24 Hour Periods**

Relevancy

- Season **18, LOGMAS**
- Winter Event
(Mother Witch)



Size/Shape

```
#Viewing head of data just for a glimpse of what we're working with
df.head()
```

		Unnamed: 0	battleTime	arena.id	gameMode.id	average.startingTrophies	winner.tag	winner.startingTrophies	winner.trophyChange	winner.crowns
0	0	2020-12-07 07:00:00+00:00	54000049.0	72000201.0		6590.0	#28RR8PJP0	6581.0	31.0	2.0
1	1	2020-12-07 07:00:00+00:00	54000049.0	72000201.0		5582.5	#YV9VQUVP	5592.0	28.0	3.0
2	2	2020-12-07 07:00:02+00:00	54000049.0	72000201.0		5684.0	#LPR2G0Q9L	5678.0	31.0	3.0
3	3	2020-12-07 07:00:03+00:00	54000049.0	72000201.0		6031.0	#2GL899VCJ	6035.0	29.0	2.0
4	4	2020-12-07 07:00:06+00:00	54000049.0	72000201.0		5140.0	#9Y2YJP GG2	5140.0	30.0	3.0

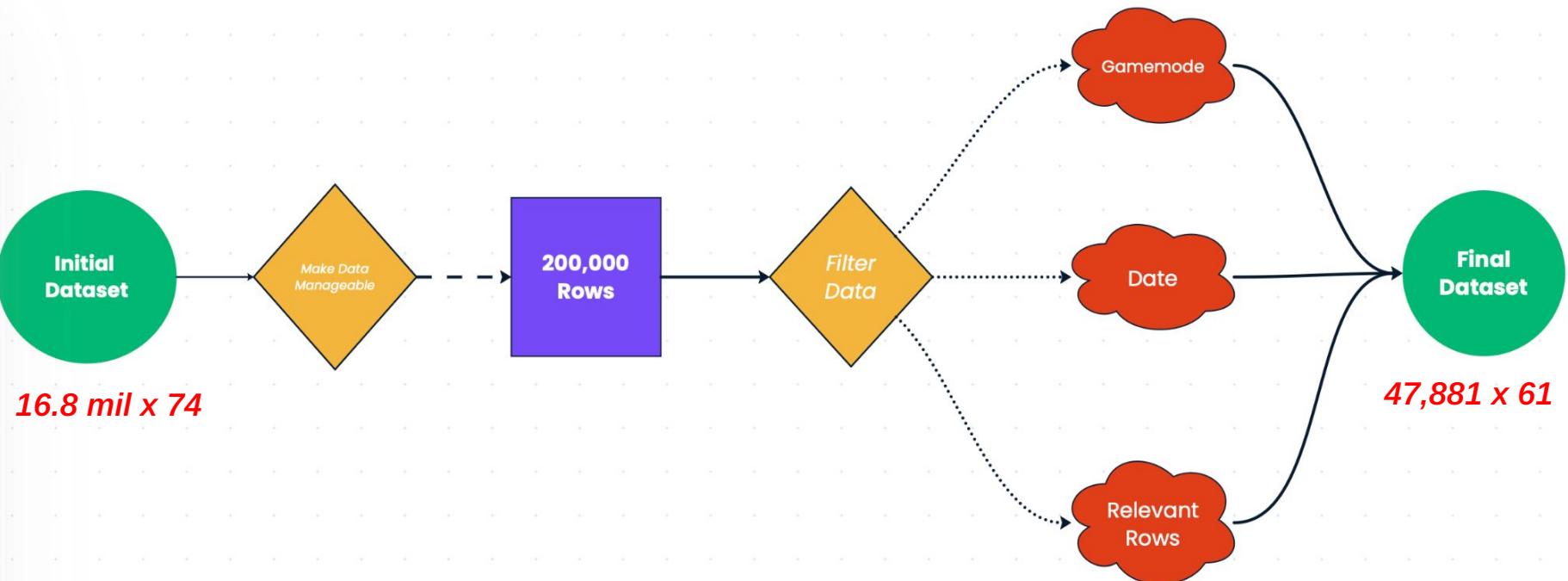
5 rows x 74 columns

Snippet of data
5 out of 16.8 MILLION Rows
&
74 Columns

Initial Question

*How do different card
combinations and cards selected
affect the outcome of a match?*

Cleaning the Dataset

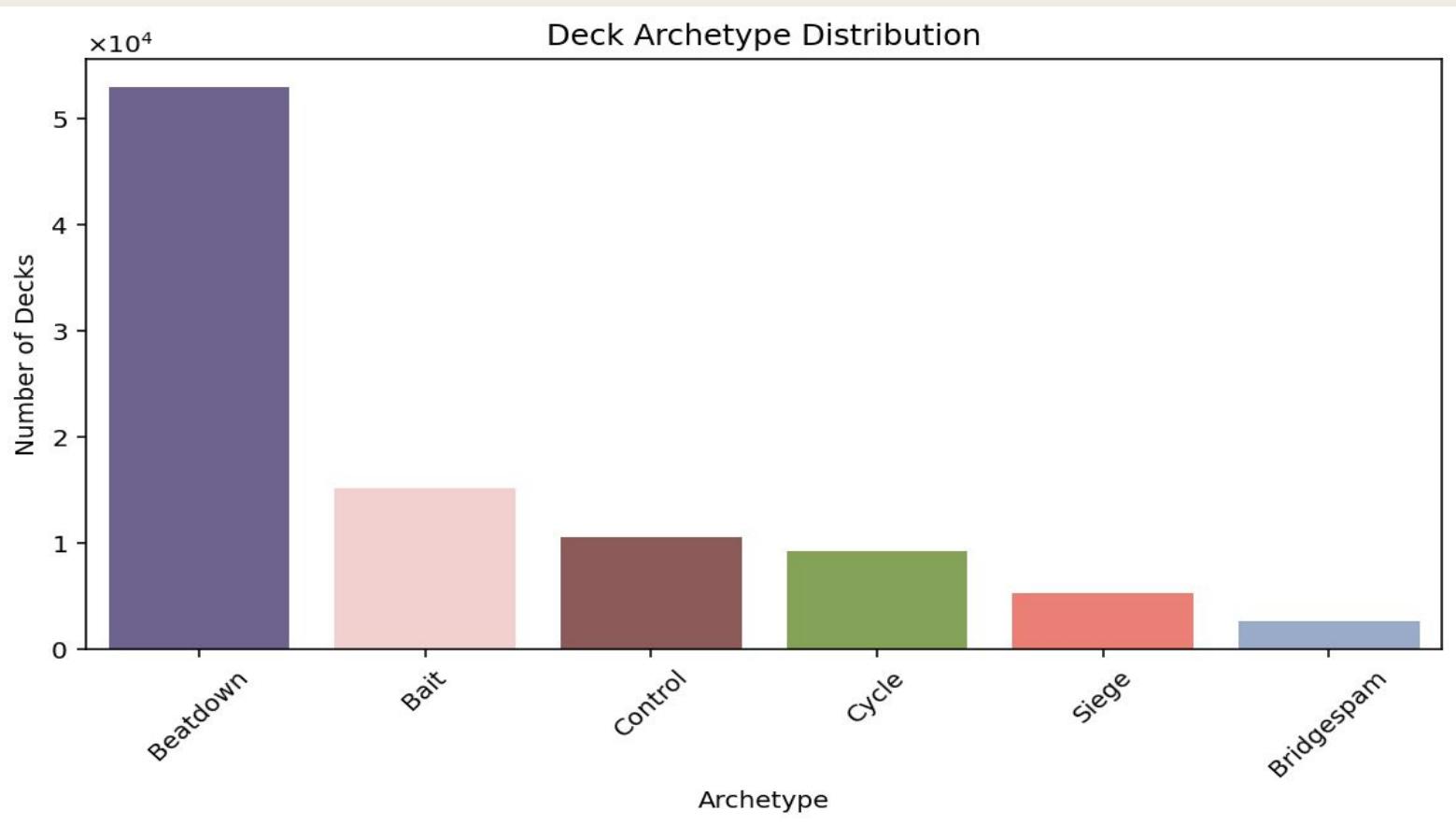


02

Archetype Analysis

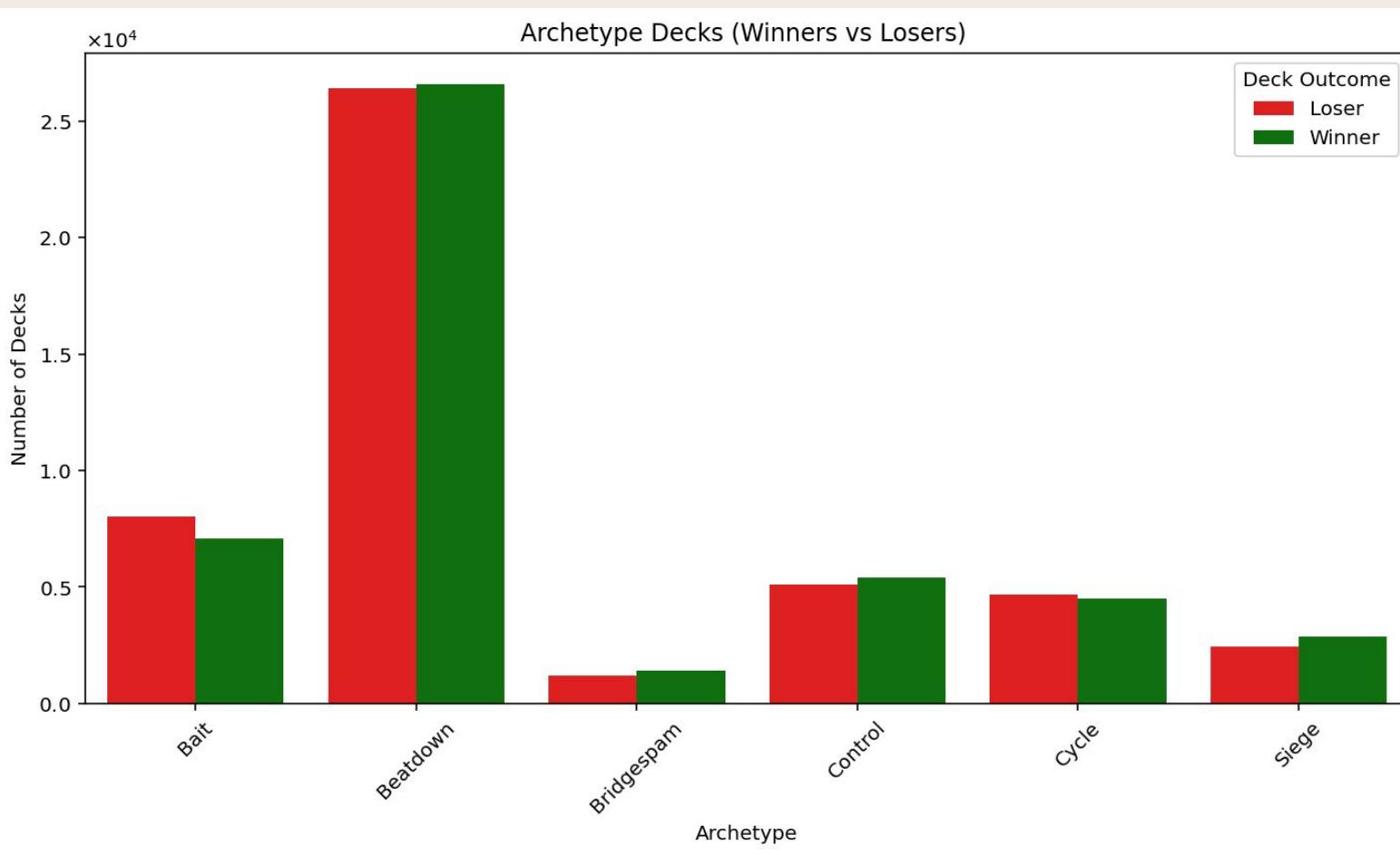
What is an archetype?

- A strategy for building a deck that aims to win a match
- In Clash Royale, there are multiple deck building style or strategy with a distinct playstyle
- The deck types are:
 - 1) Beatdown (Heavy elixir decks with powerful cards; e.g. tank)
 - 2) Bait (Low-elixir decks designed to provoke opponent's counter cards)
 - 3) Control (Balanced defense decks)
 - 4) Cycle (Fast recycling low-elixir decks)
 - 5) Siege (Long-range damage decks)
 - 6) Bridgespam (Aggressive deck pressure at the bridge)

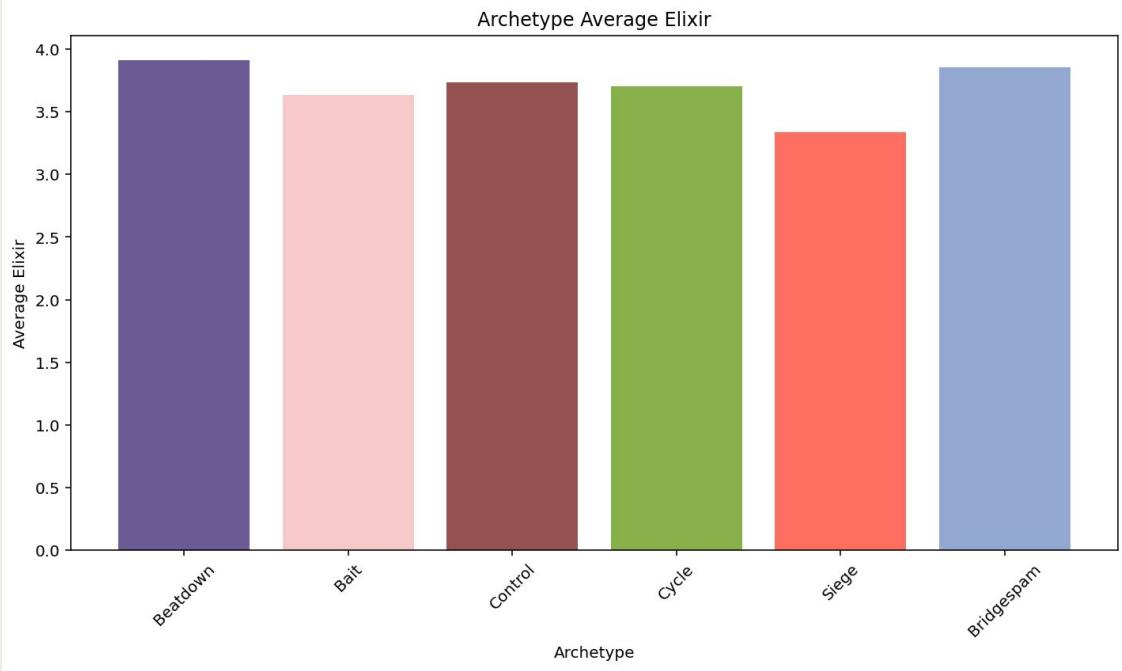


Archetype Distribution

Archetype	Total Decks	Percentages
Beatdown	53,017	55.36 %
Bait	15,131	15.80 %
Control	10,518	10.98 %
Cycle	9,183	9.59 %
Siege	5,305	5.54 %
Bridgespam	2,608	2.72 %



Archetype Elixir Usage



Archetype	Average Elixir
Beatdown	3.91
Bait	3.64
Control	3.74
Cycle	3.71
Siege	3.34
Bridgespam	3.86

Archetype Elixir Summary Statistics

Archetype	Count	Mean	STD	Min	1Q	Median	3Q	Max
Bait	15,131	3.64	0.45	2.13	3.25	3.63	4.00	5.25
Beatdown	53,017	3.91	0.51	1.50	3.63	3.88	4.25	7.50
Bridgespam	2,608	3.56	0.45	2.38	3.50	3.88	4.13	5.50
Control	10,518	3.74	0.56	1.50	3.34	3.75	4.13	6.13
Cycle	9,183	3.71	0.46	1.84	3.34	3.75	4.00	6.00
Siege	5,305	3.34	0.45	2.50	3.00	3.13	3.50	6.63

03

Model Findings / Analysis

IQ: How do different card combinations and cards selected affect the outcome of a match?

Our goal is to identify the key factors that contribute to a player's success in Clash Royale.

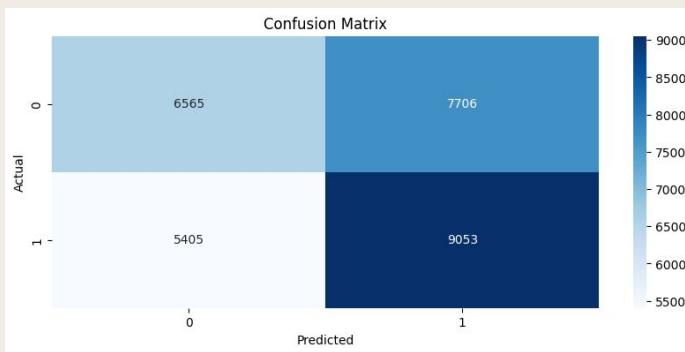
We hypothesize:

- 1) the number of cards within each category (troops, spells, and buildings) + the average elixir cost of the deck
- 2) composition of the deck + and the player's starting trophy count.

We developed two XGBoost models to evaluate our hypotheses, aiming to predict a player's likelihood of winning based on the combinations or structure of the deck.

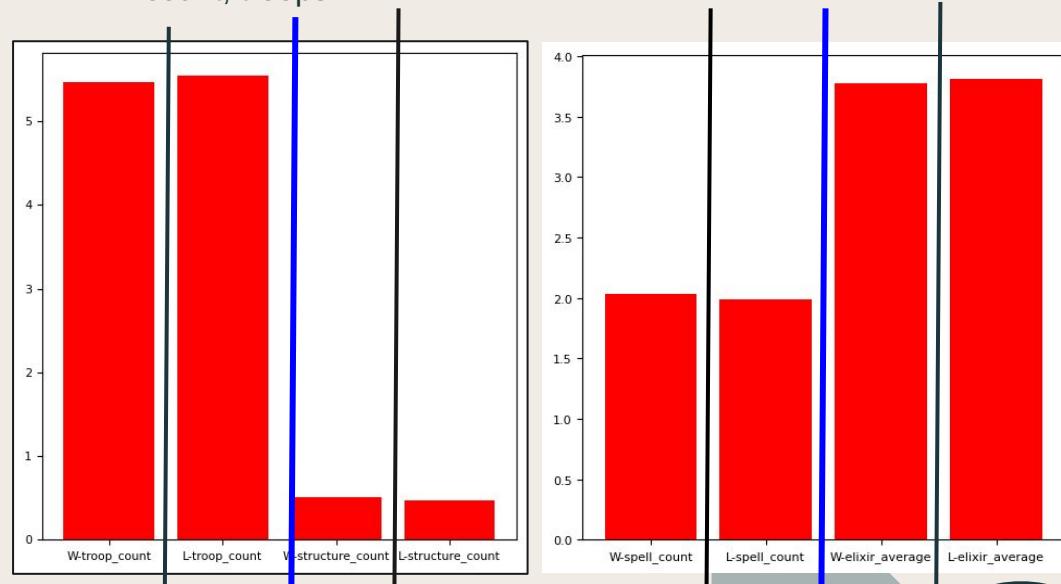
In the **first xgboost model**, the accuracy of this model is 54.232%. Essentially, it is like a coin-toss.

- the number of cards within each category (troops, spells, and buildings) + the average elixir cost of the deck



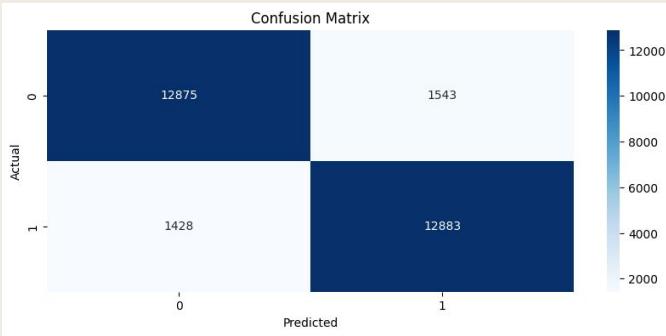
Analysis

- Both winner and non-winner have the similar statistics in the counts between categories: spell, count, troops.



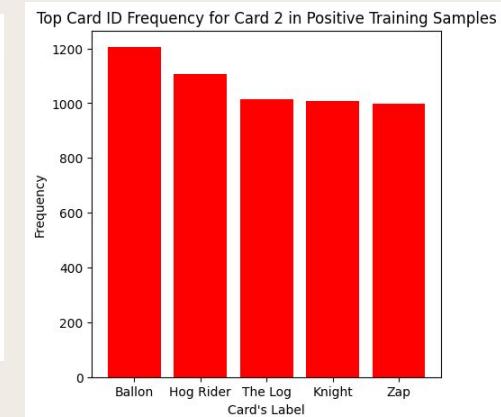
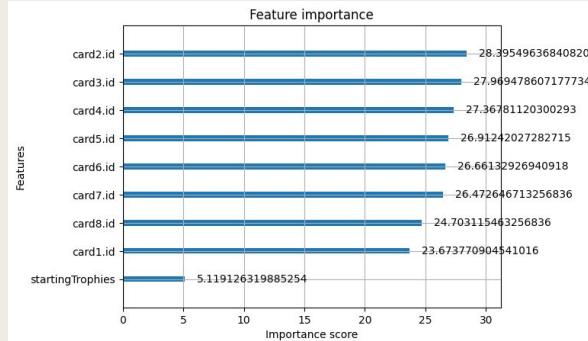
In the **second xgboost model**, the accuracy of this model is 89.227%

- Based on the deck + starting trophies.

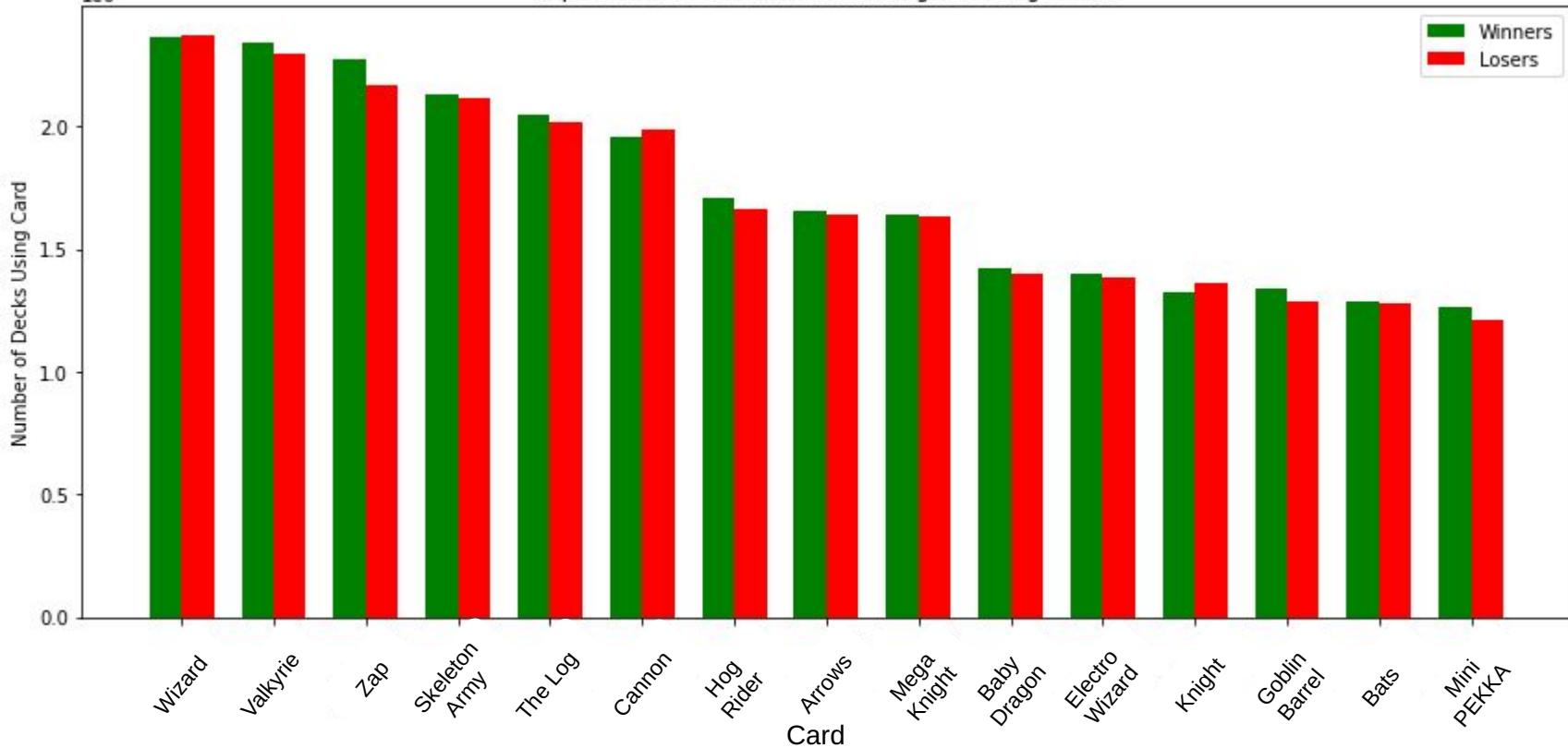


Analysis:

- All 8 cards are chosen by the player, often selected based on experience of the game beforehand.
 - This model suggests that the most defining card to the game is the second card.
- However, the remaining selection of the cards afterwards still matter to a player's winner.
- Strategy + Experience → predictive of success than the deck alone.



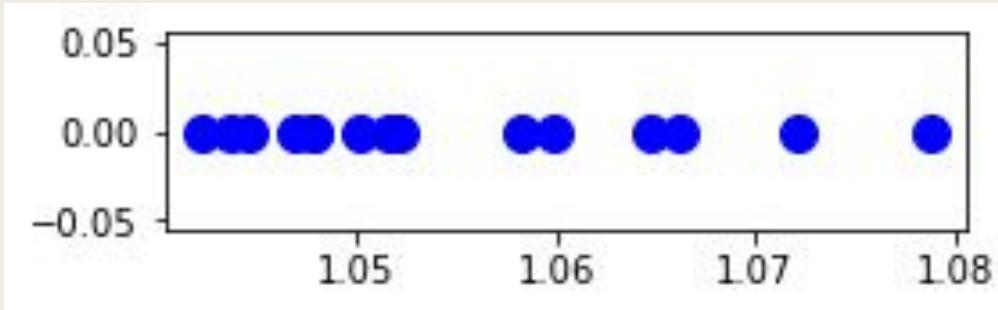
Top 15 Most Used Cards in Winning vs Losing Decks



Odds Ratio

	With Card	Without Card
Winner	Winner With Card	Winner Without Card
Loser	Loser With Card	Loser Without Card

How does having a specific card affect the odds of winning or losing?



G Squared Test

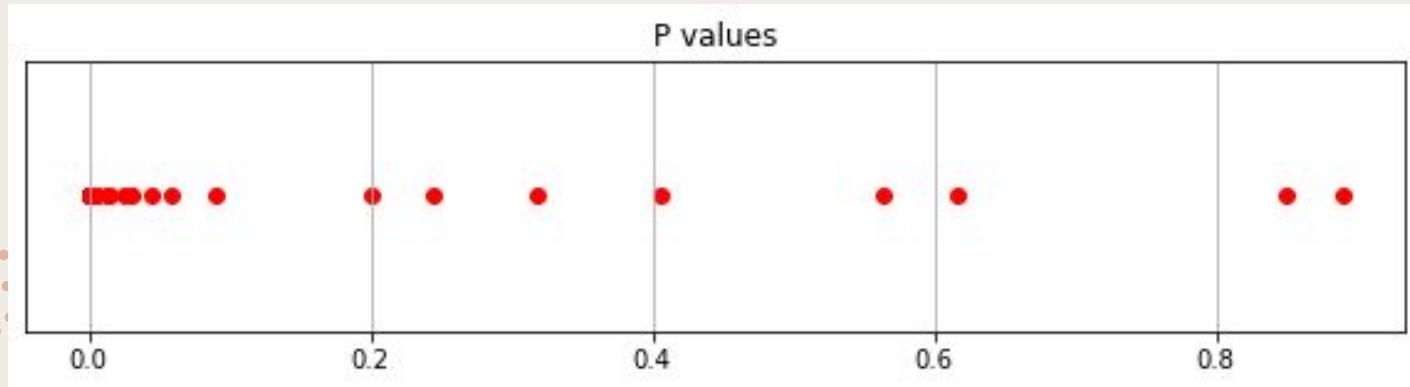
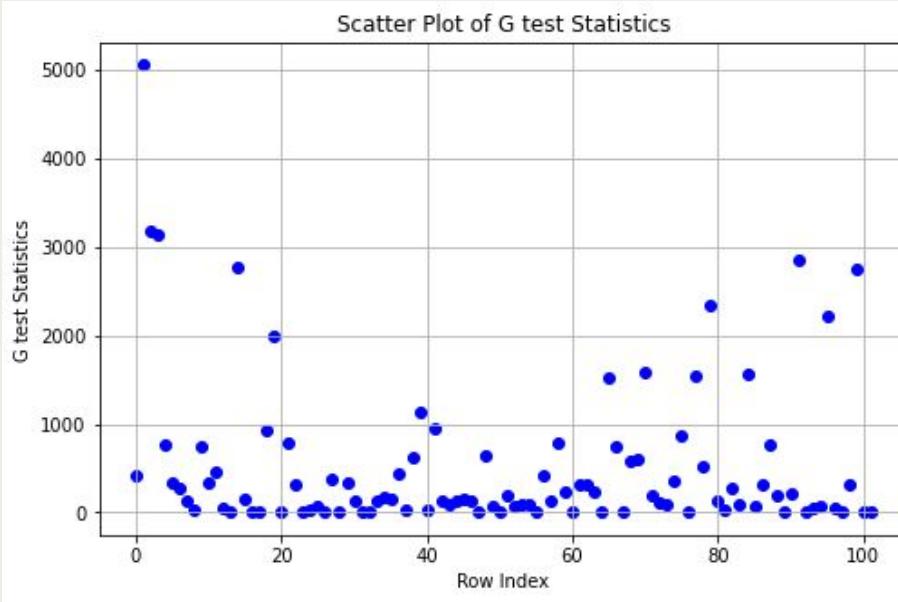
How do our observed values and expected values differ?

Null: They do not differ.

Alternative: They do differ.

$$G = 2 \sum \left[O \times \ln \left(\frac{O}{E} \right) \right]$$

```
# Expected values with independence
expected_wins = total_wins * (total_uses / (total_wins + total_losses))
expected_losses = total_losses * (total_uses / (total_wins + total_losses))
```



04

Summary / Takeaway

Conclusion

- We were able to create a successful model that determines whether a deck will win or lose given cards and their levels.

Limitations:

- Lack of application to current gameplay
 - Card mechanics
 - Game mechanics
- It also seems that cards and levels are not the only factor that determine a win or loss
 - Experience
 - Strategy

Thank You



Sources

social, alter ego. "All 6 Deck Types in Clash Royale." *YouTube*, YouTube, 15 Oct. 2025, www.youtube.com/shorts/bPjRQsIZSMI.

Wando, Bwando. "Clash Royale S18 Ladder Datasets (37.9m Matches)." *Kaggle*, 28 Nov. 2024, www.kaggle.com/datasets/bwandowando/clash-royale-season-18-dec-0320-dataset.

Wiki, Contributors to Clash Royale. "Basics of Battle." *Clash Royale Wiki*, Fandom, Inc., clashroyale.fandom.com/wiki/Basics_of_Battle. Accessed 13 Nov. 2025.

Witt, Jeff. "A Tale of Two Games: How Clash Royale and AFK Arena Handled Their Monetization Differently." *Medium*, ggDigest.com, 25 Feb. 2021, medium.com/ggdigest/a-tale-of-two-games-how-clash-royale-and-a-fk-arena-handled-their-monetization-differently-8f58a05d9985.

Github: <https://github.com/CyberVison24/Datathon-Fall-2025.git>