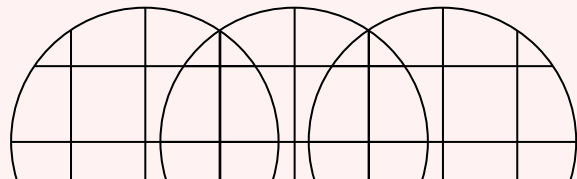
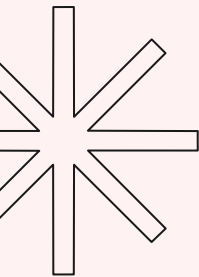
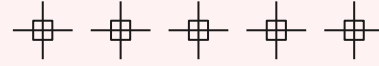
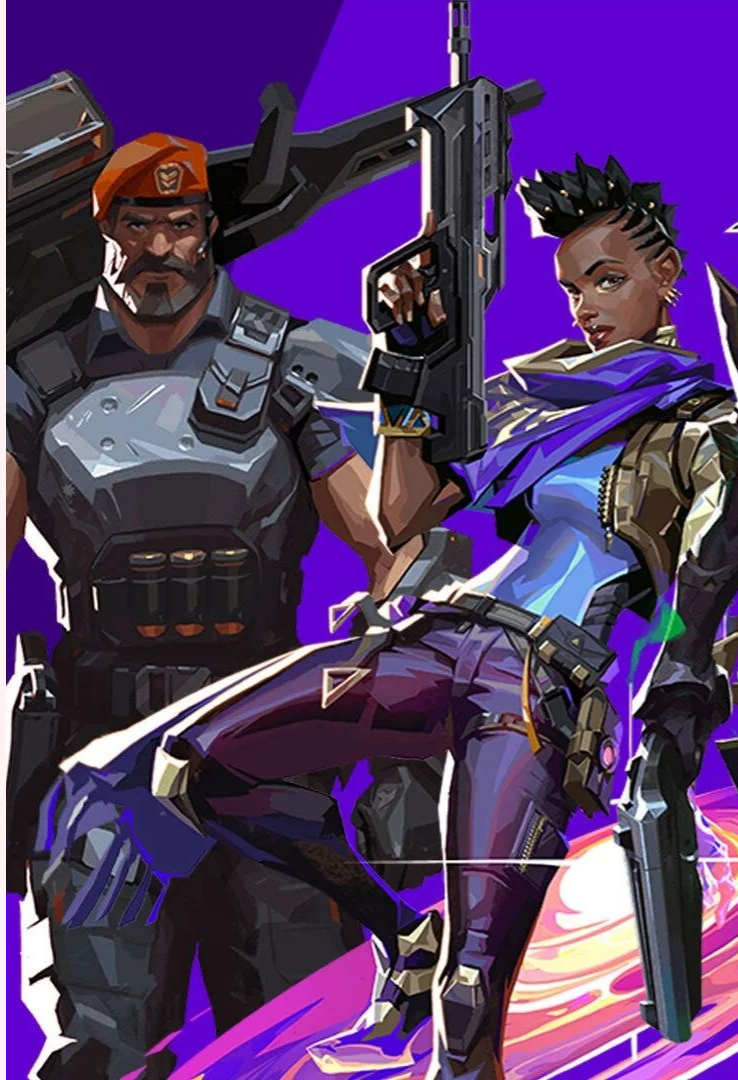


# Gameplay-based Classification of Valorant Players: Insights & Feature importance

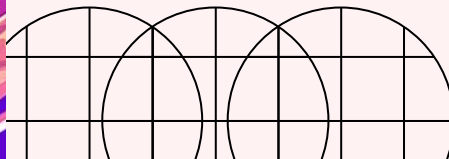
Using machine learning and data analysis to investigate gameplay  
strategy and role classification

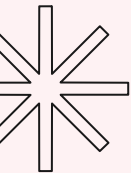




**O1**

# **Background, Motivation, Research Questions**





# Background & Motivation

## What is Valorant?

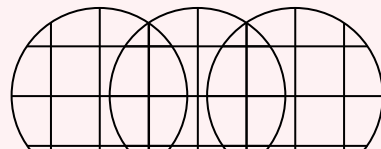
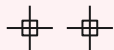
- Free-to-play first-person “hero” shooter
- Published by Riot Games
- Team-based
- Assigned as attacking or defending
- Five players per team
- Highly strategic, multiple ways to win

## Why is ESports relevant?

- Huge & fast-growing market
- LoL 2022 tournament had 5.1 million peak viewers
- Professional players
- Streamers

## Why is this valuable?

- Not much research/data currently out there (but lots of anecdotal advice)
- Can draw parallels to “traditional sports”
  - Are there “positions” in Valorant?
  - Can we identify strategies?



# Research Questions



What “strategy” should  
players use to win a  
round of Valorant?

Specific maps,  
agents?

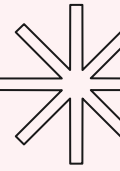
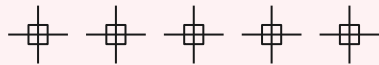
Attacking vs  
defending?

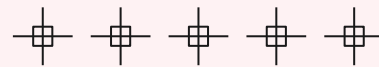
Pre-post spike  
plant?

Is it possible to classify  
Valorant players into  
“roles”?

Do Valorant  
classes truly use  
unique gameplay  
strategies?

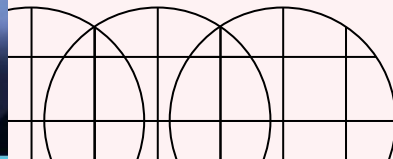
Are there more  
specific roles  
beyond Valorant  
classes?





02

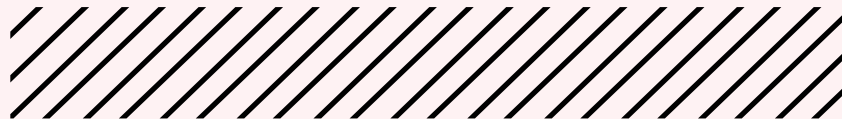
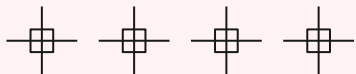
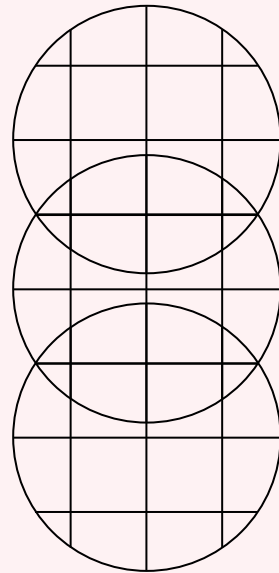
## About the Data

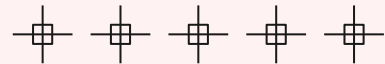




## About the Data

- Provided by Omnic Data
- ~30k rounds of Valorant gameplay
- Professional Valorant streamers only
- Data is captured using CV from publicly available gameplay streams
- Raw data is organized as a time-series, where each event is captured with a timestamp
- Independent from the game's API
- Limited information space





# Preparing the Data

## Normalization

- Normalize by round rather than match
- Provided more granularity & made game-types comparable

## Parsing

- Carefully “flatten” the tree (creates high dim)
- Creating my features (avgs, max, min, etc)

## Binning

- Reduce the feature space, makes the data a less high dim
- Multiple levels of time-resolution

## Unique features

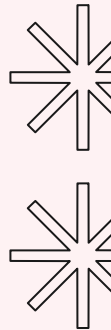
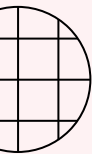
- Create features like map % covered
- Ability enhancement

## Re-mapping

- Fix data inconsistency so the information space is the same round-to-round

## Cleaning

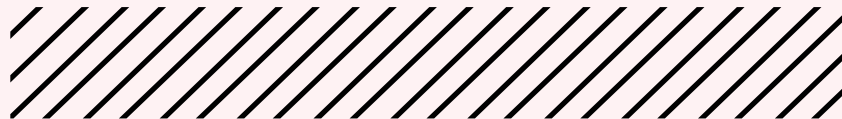
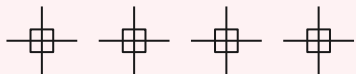
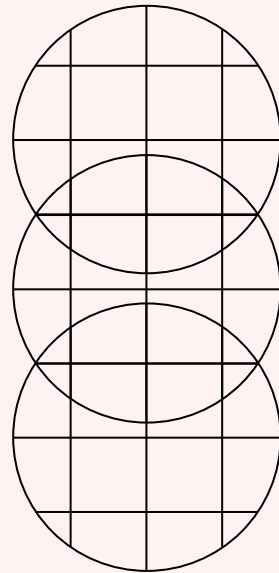
- Luckily after all that work, I didn't have many rows with missing information (still dropped some)



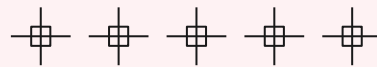


# About the Data - example features

- Max health lost (during the round)
- Average damage dealt
- Team health information
- Damage dealing ability used
- Map % covered
- Eliminations
- Deaths
- Type of most used weapon
- Etc...
- Data is somewhat sparse

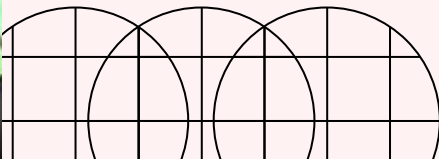


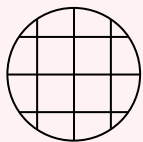




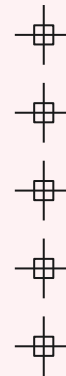
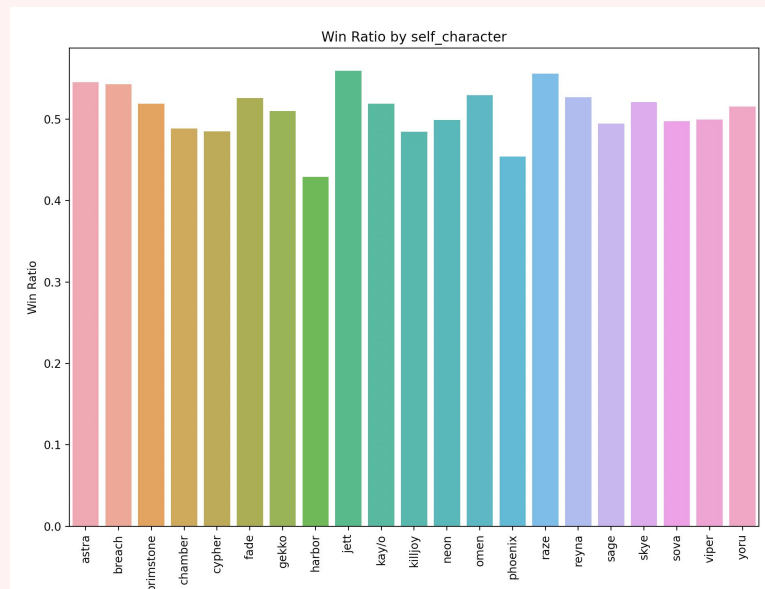
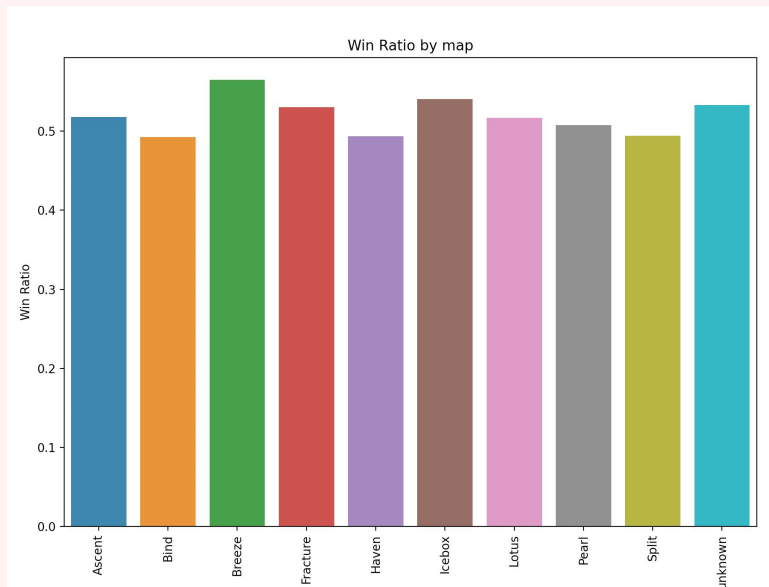
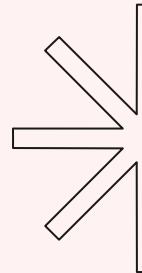
**03**

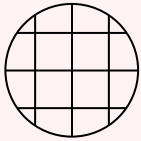
**Winning Rounds**



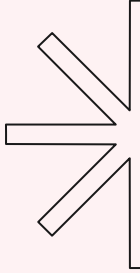


# Are there certain agents, maps that are more likely to lead to a win?





# Research Questions



## More background

- If you are on the **attacking side**, you win by either **planting the spike** on the opposing side and it **detonates**, or you **eliminate** all opponents
- If you are on the **defending side**, you win by either **deactivating** a planted spike, **eliminating** all opponents, or just **surviving** without the spike being planted

## Hypothesis

**Depending on if you are attacker or defender, and if the spike has been planted or not, your strategy will change**



# Models

## Logistic Regression

- Good starting point for binary classification
- Easy to interpret
- Linear relationship
- Finds the best values for the coeffs that minimize the error between the predicted actual class labels
- L1 regularization for feature selection
- L2 to prevent overfitting
- Hyper-param tuning

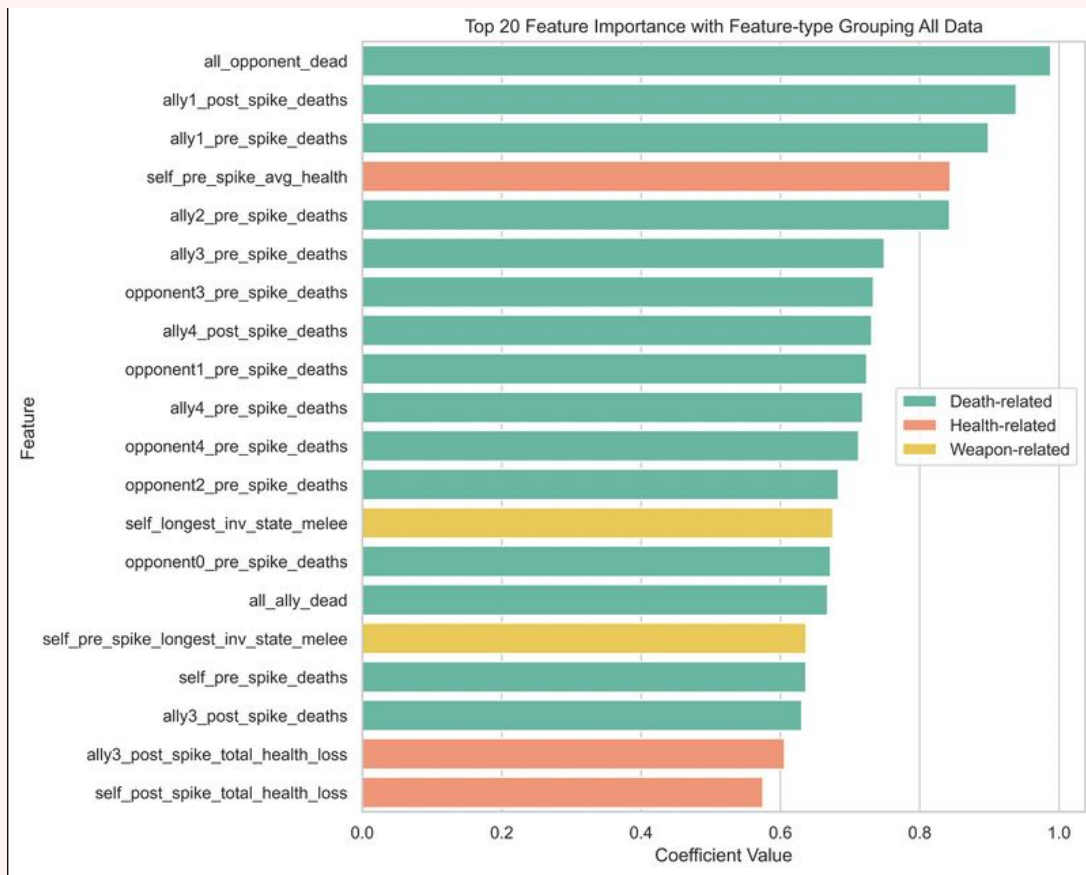
## Decision Tree

- Non-linear
- Recursively partitions the input space into smaller regions, makes predictions based on the majority class or average value of the target variable
- Chooses features that maximizes the separation of the classes
- Gini impurity to “split the data”
- Hyper-param tuning



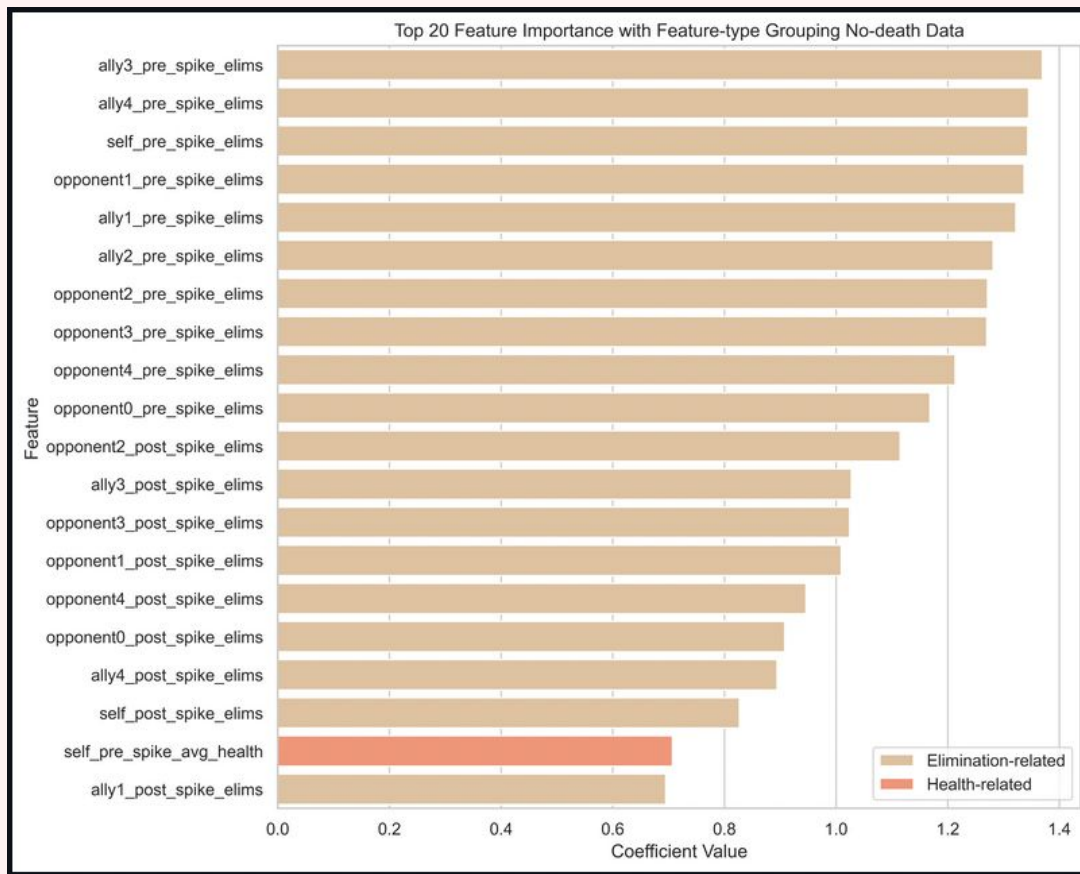
Test accuracy and F1 scores from  
90%-95%

# Results - Logistic Regression



Test accuracy and F1 scores from  
90%-95%

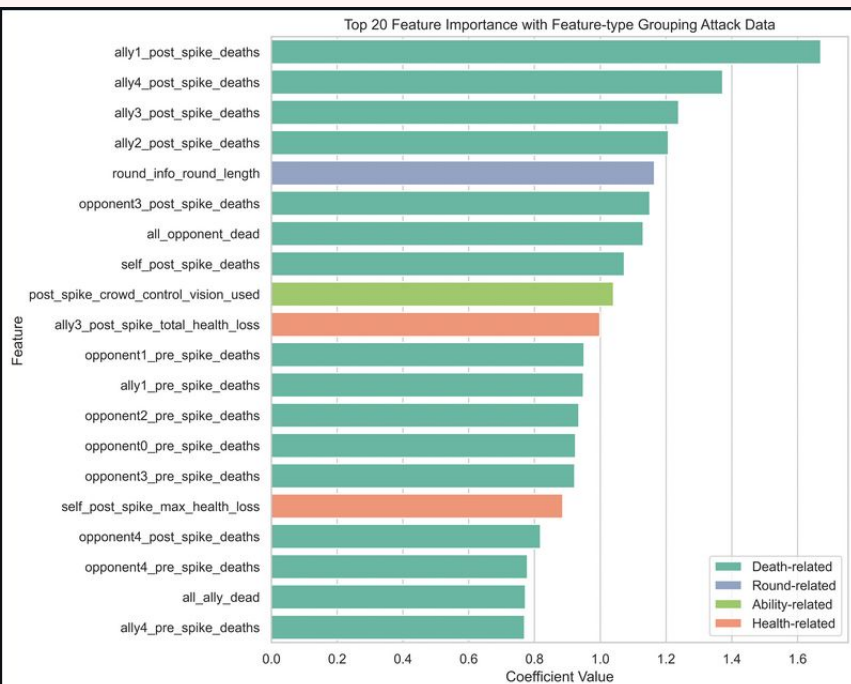
# Results - Logistic Regression



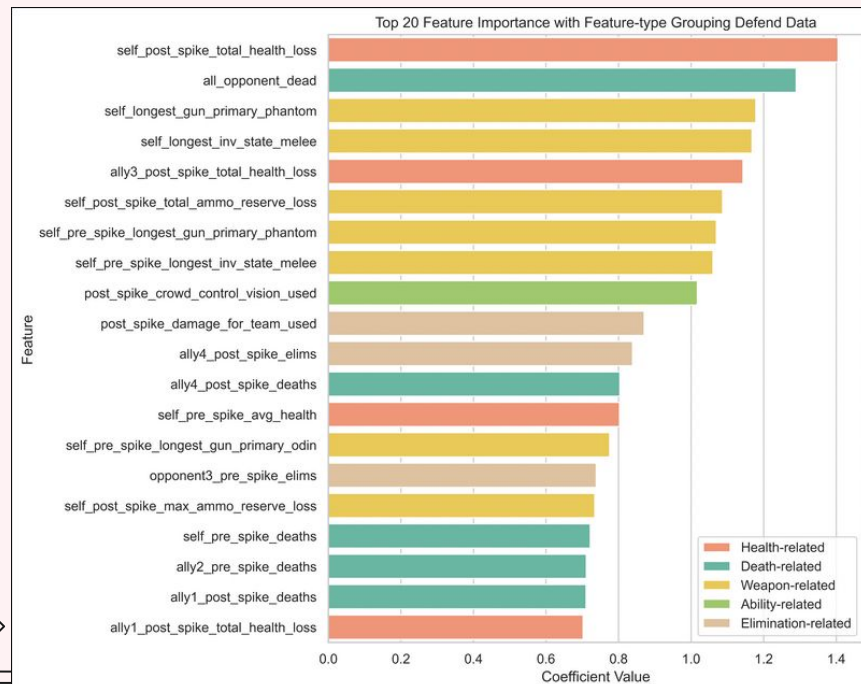
Test accuracy and F1 scores from  
90%-95%

# Results - Logistic Regression

Attack



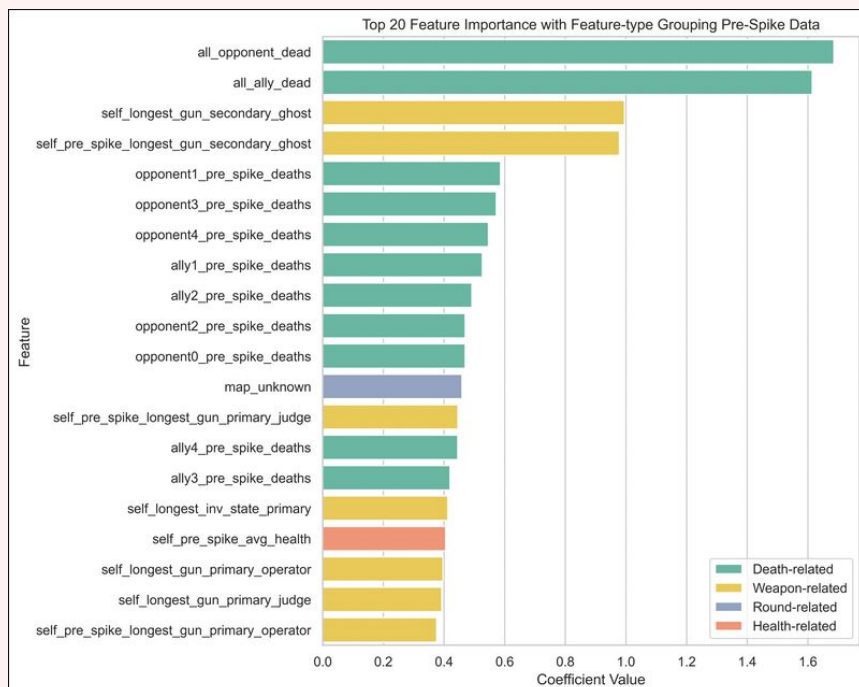
Defend



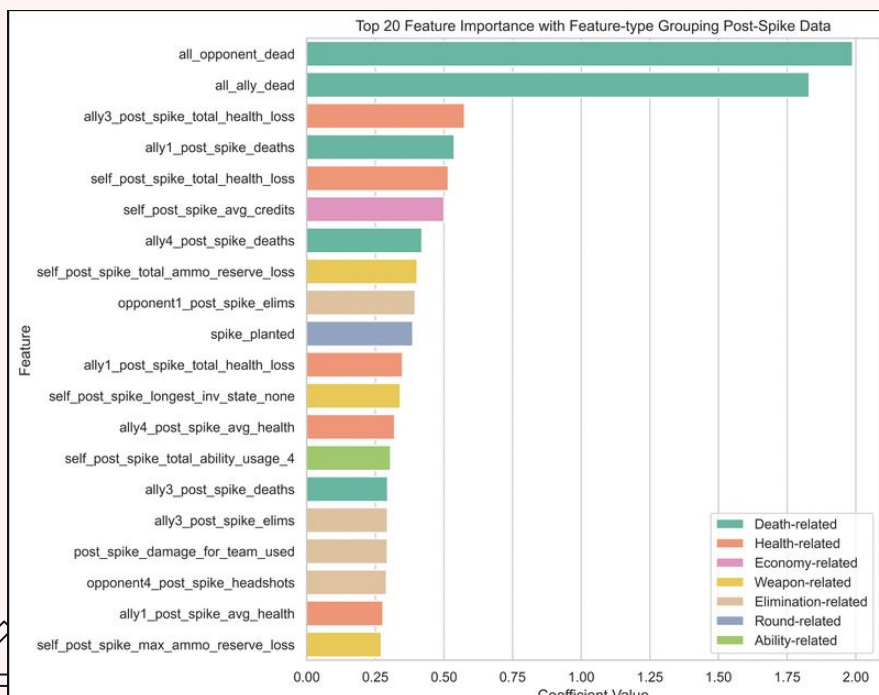
Test accuracy and F1 scores from  
90%-95%

# Results - Logistic Regression

## Pre-Spike



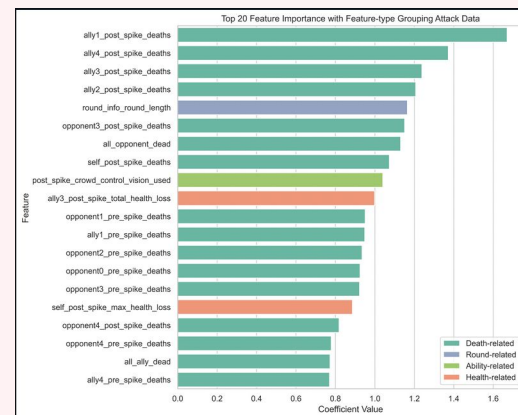
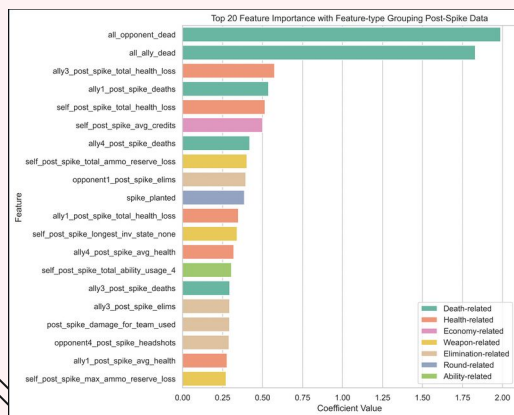
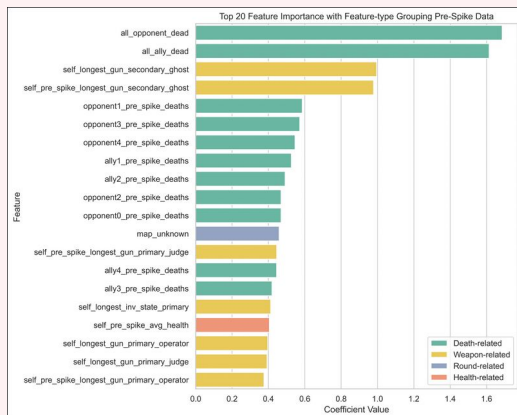
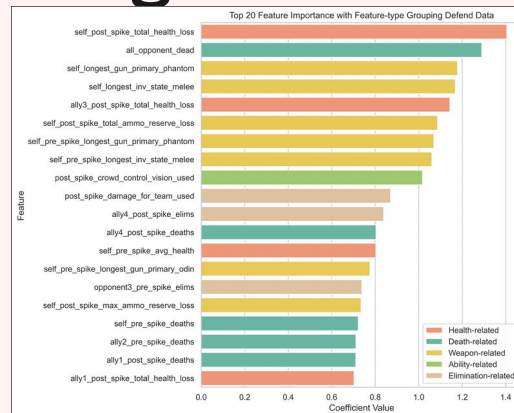
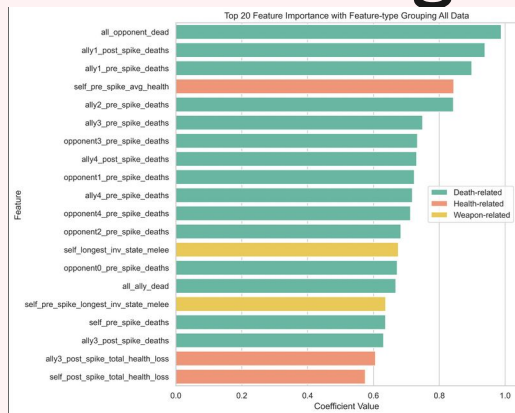
## Post-Spike

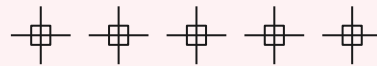




Test accuracy and F1 scores from  
90%-95%

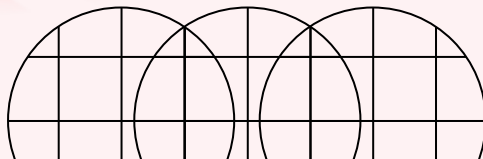
# Results - Logistic Regression

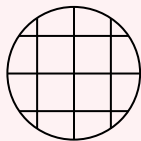




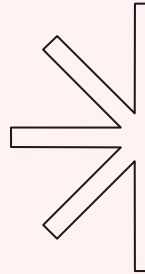
**O4**

## Classifying into Roles





# Research Questions

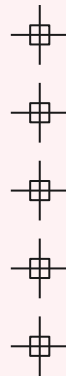


## More background

- 19 agents are automatically organized into **4 classes: sentinels, controllers, duelists, and initiators**
- Classes have **general attributes**, but some are more flexible than others
- The Valorant community has loosely defined more specific "roles" that go beyond the predefined classes and resemble positions in sports

## Hypothesis

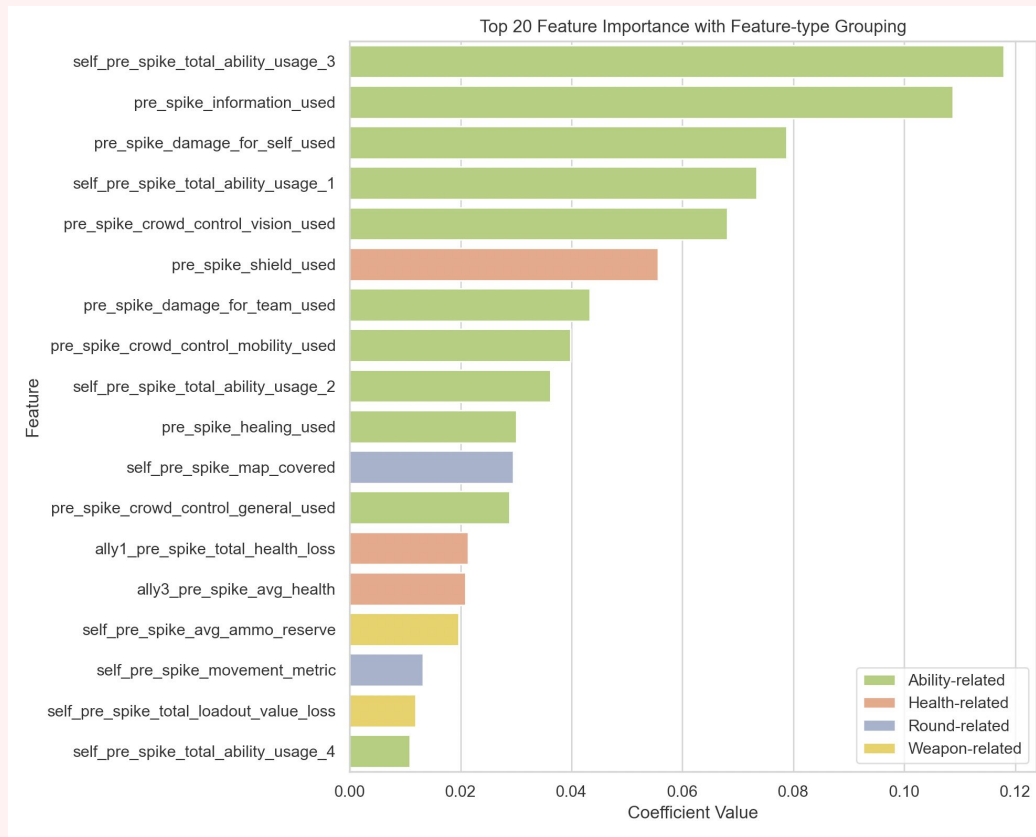
**It possible to classify Valorant players into "classes" or "roles" based solely on game-play data**



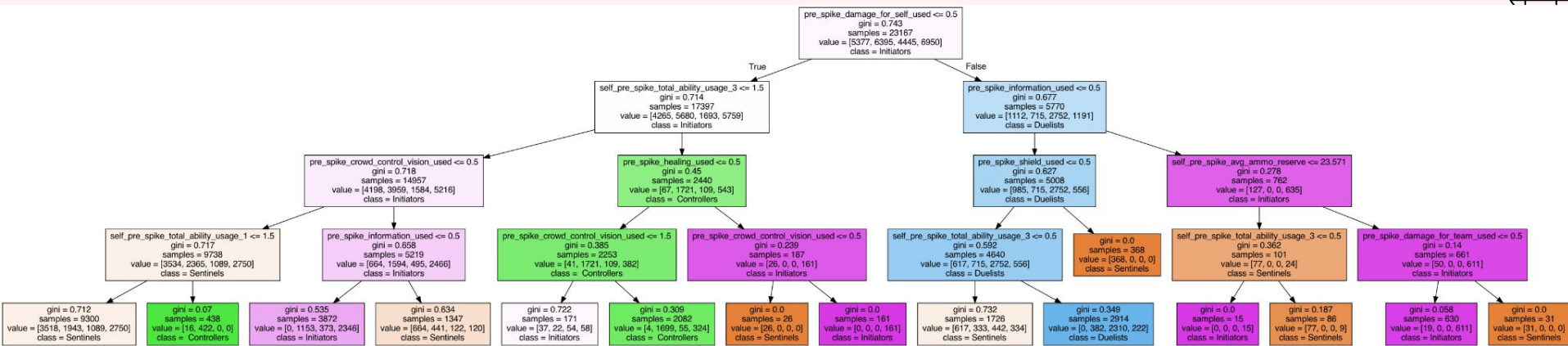
Final test accuracy and F1 scores

79%

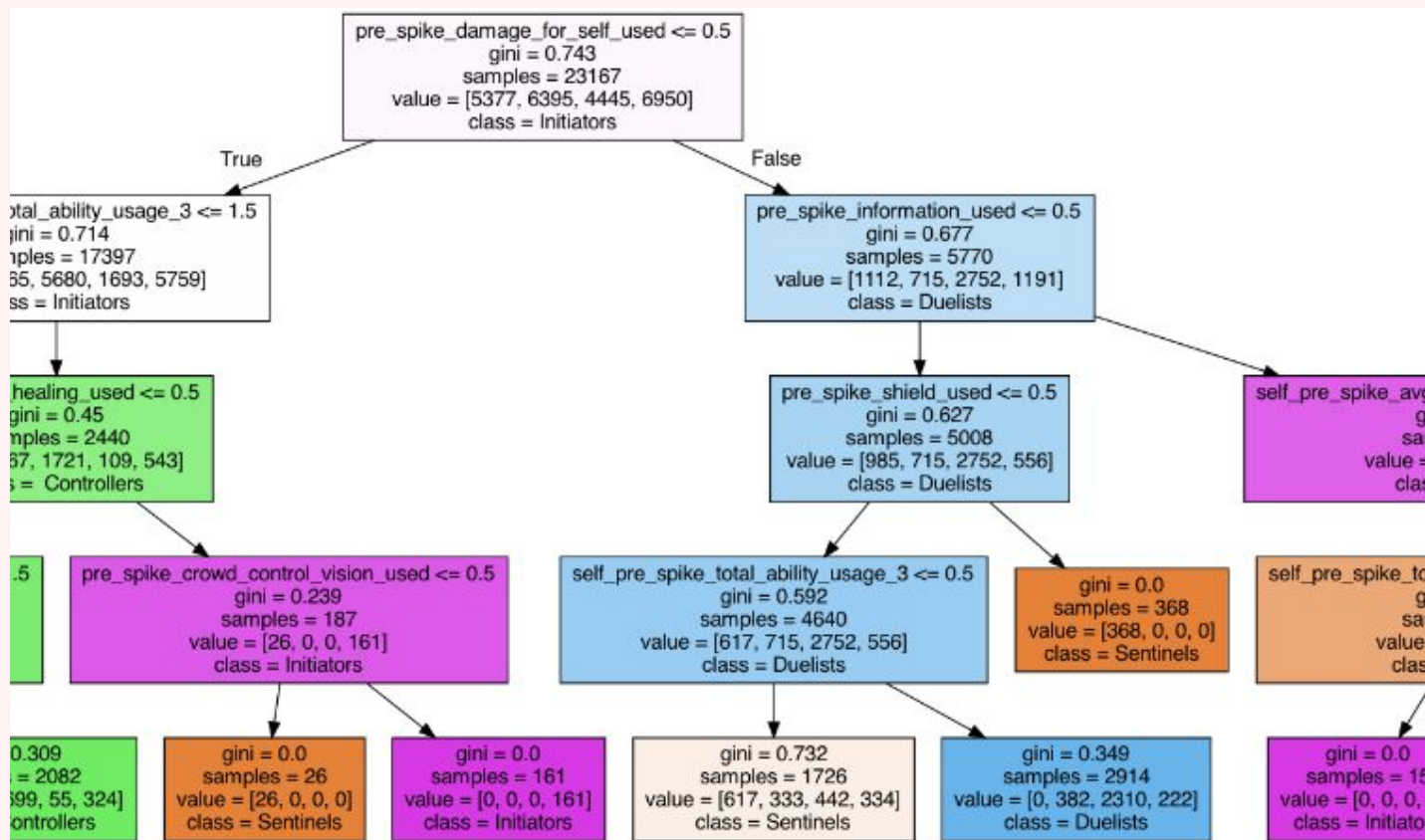
# “Classes” Results - Decision Tree



# “Classes” Results - Decision Tree



# “Classes” Results - Decision Tree





# “Roles” Results

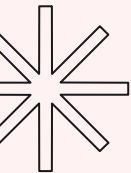
Possible roles			Info about role	Associated	Associated	Associated Characters
Support	Defense	Anchor	Defend/anchor a bomb site with abilities	High ability use?	- Sentinels - Initiators - Controllers	- <b>Killjoy</b> : known as an anchor b/c of her abilities, turret ability is defensive in nature, recon ability, ultimate is about the site/bomb site - <b>Cypher</b> : abilities focus on slowing opponents - <b>Chamber</b> : can single handily defend a site - Brimstone: seems like abilities are split between attacking and defending sites - Astra: seems like abilities are split between attacking and defending sites - Viper: can aid in locking down a site
			Don't move around as much	Low movement		
			Aren't expected to perform as well on the scoreboard	Low elims		
	Offense	Healer	Aren't expected to perform as well	Low elims	- Sentinels - Initiators	- <b>Sage</b> : healer ability - <b>Skye</b> : healer ability
			Heal teammates/revive	High ability		
			Move around the map to use abilities to gather more information about the state of the game & enemies	High movement High ability use?		
	Crowd Control	Recon	Use abilities to allow control flow of the game	High ability N/A	- Sentinels - Initiators - Controllers	- <b>Cypher</b> : ultimate is about revealing locations of enemies - <b>Sova</b> : abilities inform about team's location, weaponry, and approach - <b>Skye</b> : has ability that can reveal enemy location - <b>Sova</b> : used offensively to set plays up for his team, Ultimate Ability - <b>Omen</b> : ability that reduces the vision of ALL agents - <b>Breach</b> : All abilities are about breaking into sites and inhibiting enemies - <b>Skye</b> : has abilities that initiate fights, break into sites - <b>Harbor</b> : seems to be focused on blocking and moving opponents - Astra: seems like abilities are split between attacking and defending sites - Brimstone: seems like abilities are split between attacking and defending sites
			Use of Daze or Stun to slow agents, obstruct vision and aiming	High ability use?		

# “Roles” Results

Leader	Defense	Lurker	Located away from team	not really sure	- Controllers - Sentinels	- <b>Astra</b> : ability to deploy abilities from any part of the map - <b>Omen</b> : abilities allows him to be anywhere across the map at any given time, teleport - <b>Cypher</b> : abilities allow him to know where teammates are - Viper: possibly, some abilities - Killjoy: possibly, abilities are not dependent on others, can enter a site without help - Phoenix: flexible kit that could also be a lurker if you have another entry fragger
			Provides information on rotations and map state	not really sure how to capture this, without information on where teammates/op		
			Lurkers need to have a strong kill	N/A		
			Get kills from the opposite side of the map	not really sure how to capture this, without information on where		
	Oper/sniper		Use of operator	use of operator	I think this can be anyone, but maybe specifically: - Duelists - Controllers	I think any character could be a sniper, but I think its usually Jett, Chamber, Sage, Omen, Reyna, Killjoy, Raze b/c of helpful abilities
			high elims	high elims		





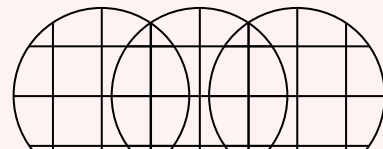
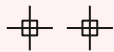


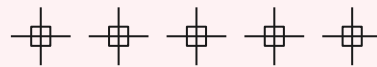
# “Roles” ...?

**More Data?**

**Labels?**

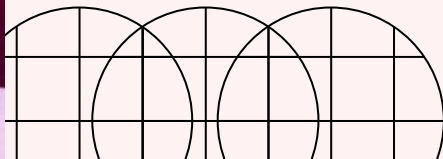
**Information  
Space?**

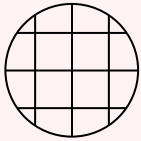




**06**

## Conclusion





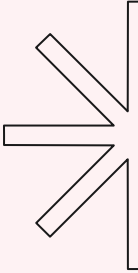
# Concluding Thoughts

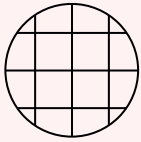
## Successes

- Current data preprocessing can make accurate predictions
- High-level game-play strategy is consistent, details do change depending on round characteristics
- It is possible to classify Valorant players into roles based solely on game-play features
- Developed a base-line/starting point for working with this kind of data

## Future work

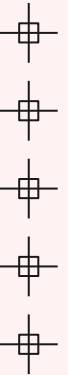
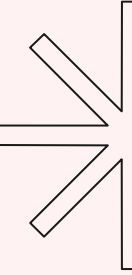
- Role identification
  - Team data
- Time series
  - Real time win probability
  - Parsing code
  - Identifying major events

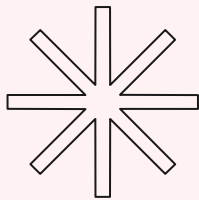




# THANKS!

[https://github.com/sophiacofone/valorant\\_omnic](https://github.com/sophiacofone/valorant_omnic)





## Images

- [https://www.google.com/url?sa=i&url=https%3A%2F%2Fvalo2asia.com%2Friot-games-official-valorant-tournament-guidelines%2F&psig=AOvVaw0t2hCB4YDcb\\_AgL4vK7kkN&ust=1691553585951000&source=images&cd=vfe&opi=89978449&ved=0CBAQjRxqFwoTCKCM0KaWzIADFQAAAAAdAAAAABA R](https://www.google.com/url?sa=i&url=https%3A%2F%2Fvalo2asia.com%2Friot-games-official-valorant-tournament-guidelines%2F&psig=AOvVaw0t2hCB4YDcb_AgL4vK7kkN&ust=1691553585951000&source=images&cd=vfe&opi=89978449&ved=0CBAQjRxqFwoTCKCM0KaWzIADFQAAAAAdAAAAABA R)
- <https://playvalorant.com/en-us/agents/>
- <https://www.ign.com/wikis/valorant/Concepts: Roles in Valorant>
- <https://exclaim.gg/store/omnic>
- <https://www.insidesport.in/valorant-is-considering-to-add-the-prioritize-strongest-weapons-setting-with-plans-for-yoru-buff/>

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