Teamfight Tactics

Gameplay Analysis

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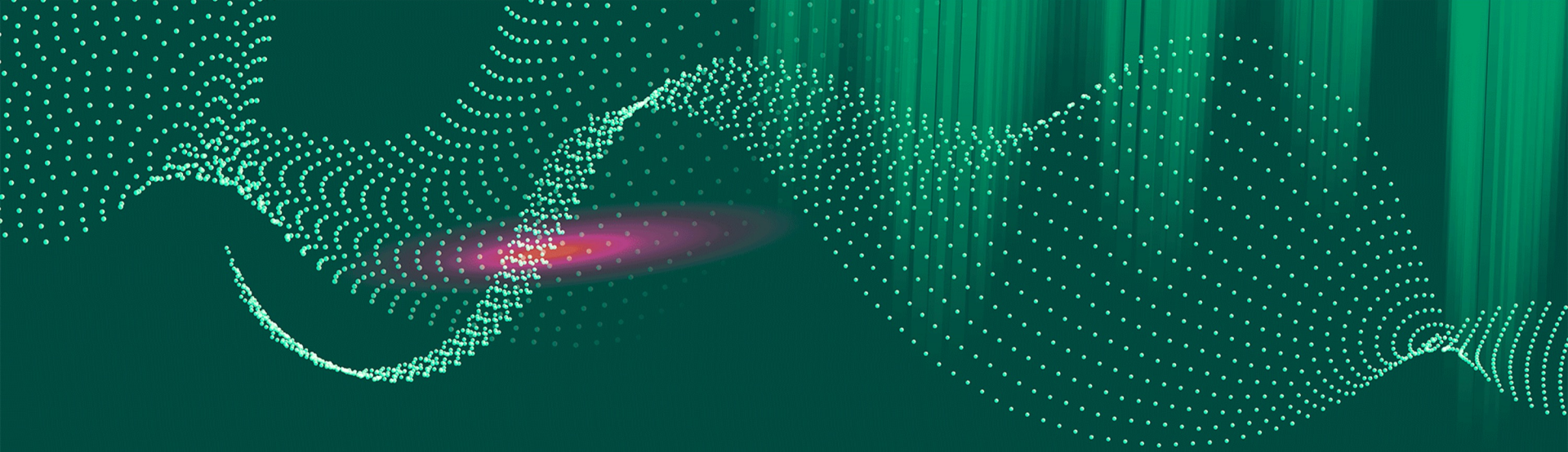


01 Teamfight Tactics

An introduction to the game

Introduction to Teamfight Tactics (TFT)

- Teamfight Tactics (TFT) is an auto battler game, developed by Riot Games, challenges players to think critically, strategize adaptively, and navigate the randomness inherent in each match.
- Players compete against seven others to be the last standing, through careful selection and placement of champions, synergizing traits, and optimizing item use.

Data Source

- The dataset originates from Set 8 of TFT, and focuses specifically on the top-tier player segments within the NA region. Utilizing the Riot Developer API, this collection encompasses endgame statistics from Challenger and Grandmaster ranks—the apex tiers in TFT, representing approximately 5-6% of the global player base.

- The dataset featuring 2,296 records from Challenger-ranked matches and 6,392 records from Grand Master-ranked games, offering a detailed insight into the strategies and outcomes of the game's most elite competitors.

Rank distribution (TFT)

Tier	Rank	Rank %	Tier %
	Challenger	0.021%	0.021%
	GrandMaster	0.042%	0.042%
	Master	1.7%	1.7%
	Diamond I	0.12%	3.1%
	Diamond II	0.34%	
	Diamond III	0.65%	
	Diamond IV	2.0%	

Key Game Features

Placement (Response Variable)

In Teamfight Tactics, placement is redefined to categorize players' performance into binary outcomes: winning (1st to 4th place) and losing (5th to 8th place).

Leveling

The 'level' variable in the dataset is a crucial indicator of a player's progress, influencing both the quantity and quality of champions they can deploy.

last_round	level	placement	puuid	time_elimin	total_damag	traits_0_nan	traits_0_nun	traits_0_sty	traits_0_tier	traits_0_tier	traits_1_nan
38	9	2	DEbaPlFrC4z	2222.90869	187	Set8_Admin	2	1	1	3	Set8_Aegis
31	8	4	OjsqAVv82-E	1848.07532	61	Set8_Aegis	1	0	0	4	Set8_Anima
34	8	3	jgpLaQ_pq7c	2021.46814	137	Set8_Ace	1	1	1	2	Set8_Aegis
31	8	6	rmOXPE23Zt	1848.17358	81	Set8_Ace	1	1	1	2	Set8_Aegis
38	8	1	t5lnvjlGvNBt	2223.55518	187	Set8_Admin	4	3	2	3	Set8_Brawle
31	8	7	b81WbMwtr	1849.56909	60	Set8_Ace	1	1	1	2	Set8_Aegis
27	8	8	mhwnlT0vFT	1615.71484	70	Set8_Admin	1	0	0	3	Set8_Aegis
31	8	5	3Jm4HjMXuz	1851.01135	63	Set8_Anima	1	0	0	3	Set8_Duelist
26	8	8	OjsqAVv82-E	1513.5249	16	Set8_Anima	1	0	0	3	Set8_Brawle
44	9	2	jDcHhdaj-Oe	2576.63721	194	Set8_Aegis	2	1	1	4	Set8_Channe
28	8	7	zfR79Fa3nM	1660.81421	53	Set8_Ace	1	1	1	2	Set8_Aegis
44	9	1	ik1XgS5EI_JT	2576.63721	207	Set8_Ace	1	1	1	2	Set8_Aegis
40	9	3	D18I28dokYI	2374.02954	117	Set8_Ace	1	1	1	2	Set8_Aegis
32	7	4	t5lnvjlGvNBt	1860.93445	99	Set8_Brawle	1	0	0	4	Set8_Civilian
30	7	6	rSvUj3xx3tBc	1768.40723	40	Set8_Anima	1	0	0	3	Set8_Duelist
31	7	5	R44ZMhdFW	1854.71179	70	Set8_Aegis	1	0	0	4	Set8_Anima
24	7	8	JuqDU5XxRB	1395.56665	27	Set8_Ace	1	1	1	2	Set8_Aegis
33	9	5	gkxljuvp6J7iE	1945.78528	112	Set8_Ace	1	1	1	2	Set8_Aegis
38	8	1	6GQ4m3EVN	2222.1228	168	Set8_Anima	1	0	0	3	Set8_Channe
33	7	4	lfmQclh2hW	1952.96033	82	Set8_Anima	2	0	0	3	Set8_Brawle

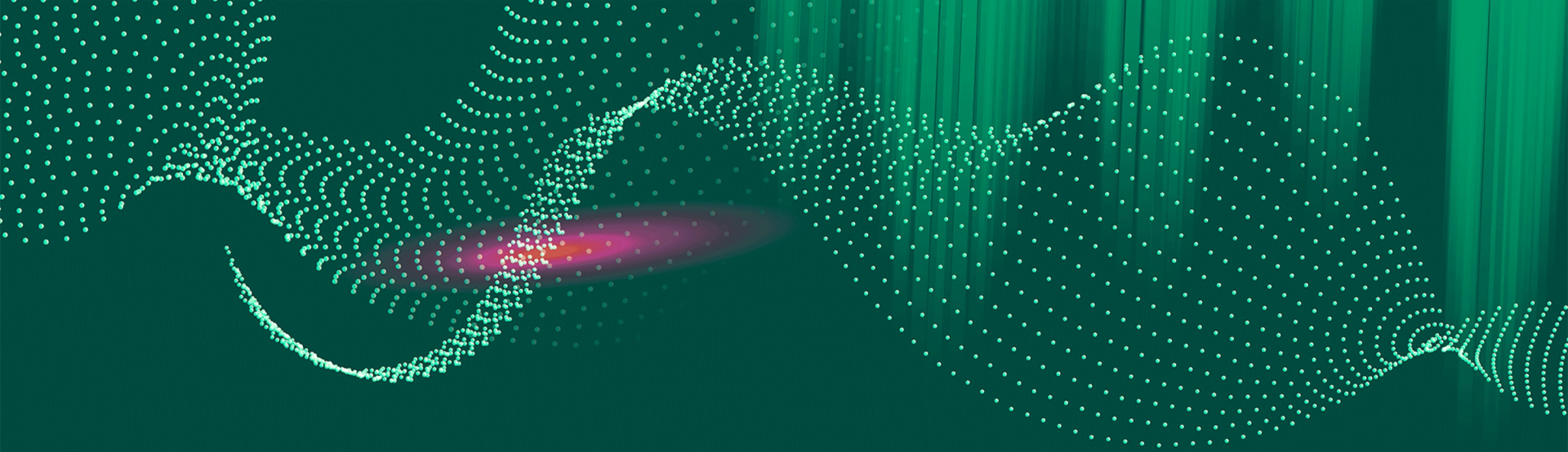
Key Game Features Cont.

Trait Variables

trait_._name(cat.)
trait_._num(int.)
trait_._tier_current(int.)
trait_._tier_total(int.)

Unit Variables

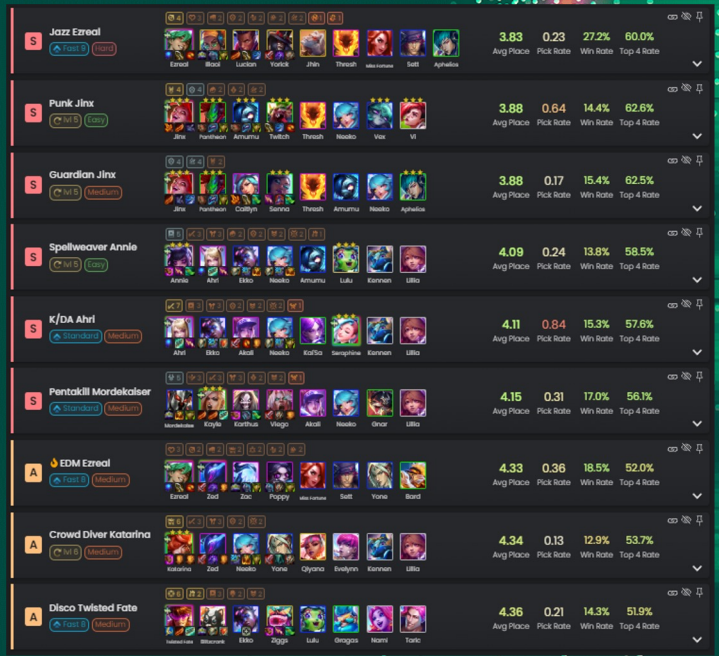
units_._character_id(cat.)
units_rarity(int.): 0-4
units_tier(int.): 1-3

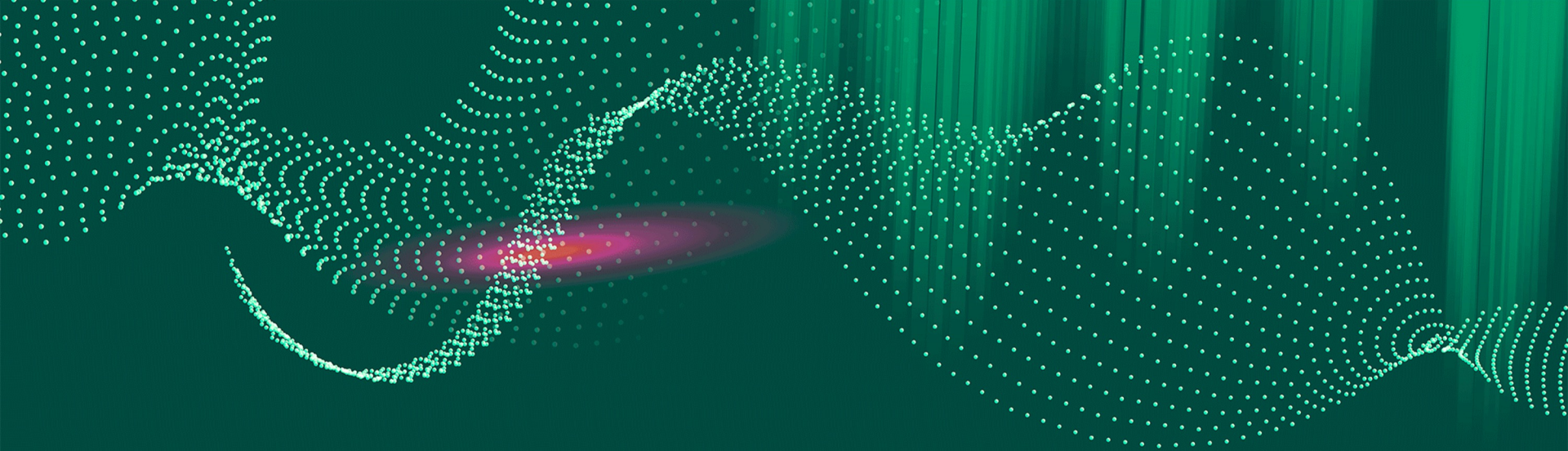


02 BUSINESS CASE

Business Case: Problem Statement

- Existing websites dedicated to analyzing Teamfight Tactics (TFT) predominantly offer descriptive analytics, lacking in-depth model-based analyses.
- This project seeks to bridge this gap by developing sufficient prediction models, utilizing numerical variables to uncover effective strategies aimed at achieving top placements, thereby offering valuable insights to players.
- Additionally, it aims to assist game developers in fine-tuning game balance through the deployment of predictive models focused on trait and unit importance values.





03 MODELING

Model Development and Model Deployment

MODEL Methodology: Regression vs. Classification

Target?

What we are trying to predict:

- *Win/Lose(Binary)*

Regression Model

- **Continuous** distribution – numerical magnitude matters
- Suited for **ordinal** response variables (such as TFT placement scores)
- Predictors are easily **interpretable**

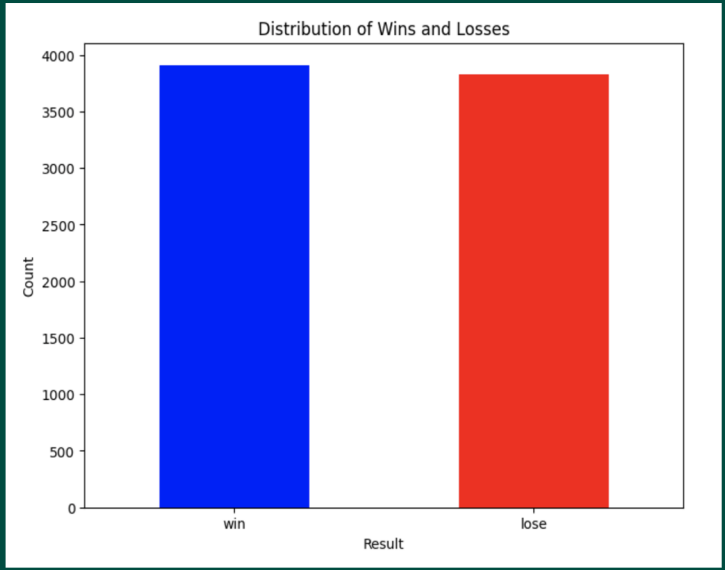
vs.

Multiclass Classification Model

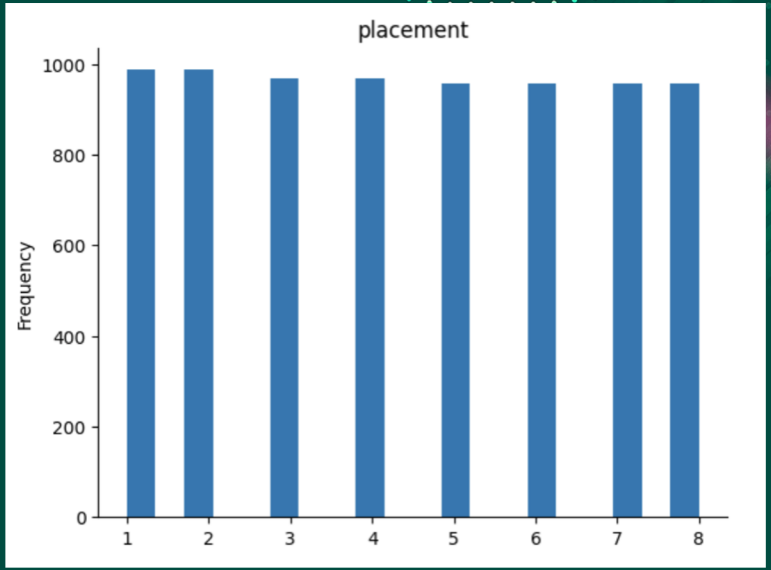
- **Discrete** distribution – unintuitive for magnitude
- Suited for **nominal** response variables
- Predictors are **difficult to interpret**

Exploratory analysis shows balanced Target variable

‘Win/Lose’



‘Placement’



Balanced data prevent the model from becoming biased

Logistic Regression Coefficients

	Feature	Coefficient
0	level	1.153103
44	units_4_tier	0.970698
48	units_8_tier	0.885505
45	units_5_tier	0.885340
42	units_2_tier	0.769808
46	units_6_tier	0.757524
43	units_3_tier	0.697703
41	units_1_tier	0.645209
47	units_7_tier	0.629268
40	units_0_tier	0.476318
49	total_items	0.314573
19	traits_8_tier_current	0.249029
36	units_5_rarity	0.220336
11	traits_0_tier_current	0.183728
23	traits_2_tier_total	-0.180285
32	units_1_rarity	0.167206
5	traits_4_num_units	-0.164810
1	traits_0_num_units	-0.160798
25	traits_4_tier_total	-0.160779
24	traits_3_tier_total	-0.152039

- Drop all **categorical variables**.
- Replace the 'placement' column with binary values for classification.
- Get the coefficients of the features

Feature Engineering I

Pre-process	Categorical variables	Binning Target variable	GridSearchCV	Model Fit
convert dtypes fillna	Create Dummy Variable Via 2 approach: -One-hot Encoding -MultiLabelBinarizer	Classification of Placement to Binary: 1-4 -> Lose(0) or 5-8 -> Win(1)	Find the best combination of hyperparameter that produces the best result + Cross-validation	Model 1: Logistic Regression Model 2: XGBoost Classification (One-hot Encoding) Model 3: XGBoost Classification (MultiLabelBinarizer)

Feature Engineering Ⅱ : Categorical Feature

One-hot Encoding

units_8_character_id_TFT8_Sett	units_8_character_id_TFT8_Soraka	units_8_character_id_TFT8_Sylas
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

141 features

⇩

Random Combination

688 features

MultiLabelBinarizer

TFT8_Alistar	TFT8_Annie	TFT8_Aphelios	TFT8_Ashe	TFT8_AurelionSol
1	1	0	0	0
1	0	0	0	0
0	0	0	0	0
1	0	0	0	0
0	0	0	0	0

For model improvement

Combined the item columns into a single list and convert all the items in a combined list

688 features

⇩

136 features

Model Result- XGBoost Classification outperformed

	Logistics Regression	XGBoost Classification -OneHotEncode	XGBoost Classification -MultiLabelBinarizer
Accuracy	0.817	0.824	0.819
F-1 score	0.819	0.822	0.816
Interpretability	Assumes linearity, **prone to Overfitting** **Challenged Feature interpretation**, especially mixed set and trait features.	**Computational Limit** due to large number of ordinal categorical 600+ variables **Challenged Feature interpretation**	**Suitable** for binary classification or **ordinal categorical variables** **Precise Feature interpretation**

Model Problems

- **While Model 2 (XGBoost) was a promising model, interpretation by category was overcomplicated**

Top 3 most important traits:
Here the traits are ranked along with position, contributing to complicated interpretation

Feature	Importance
traits_5_name_Set8_Deadeye	0.006213
traits_1_name_Set8_Defender	0.006156
traits_6_name_Set8_Supers	0.005673

Position **Trait Name**

XGBOOST MODEL REVISION

1. Combine Units & Traits into a single list columns

2. Apply **multilabel binarizer**

Function used to transform multi-label labels into a binary representation

3. Convert all items in combined list to strings

4. Re-apply multilabel binarizer

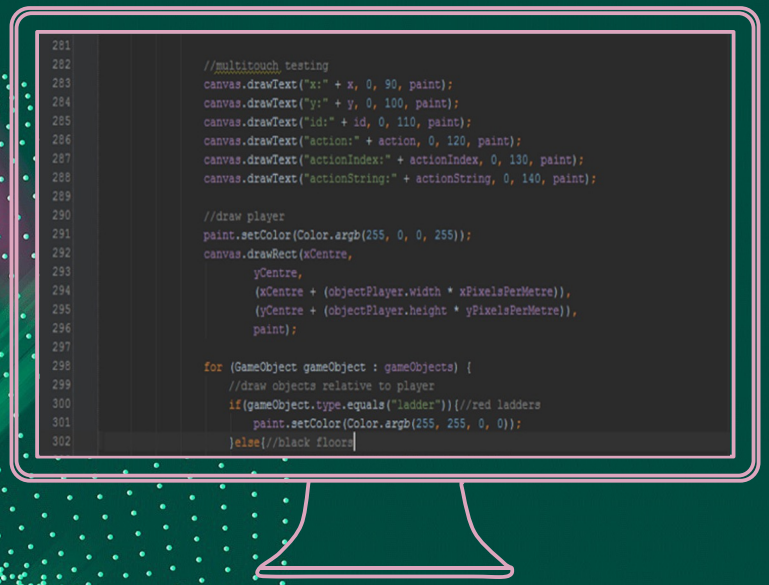
04 RESULTS

FINAL MODEL

Feature	Importance
Set8_Corrupted	0.018630
Set8_Hacker	0.011768
Set8_Arsenal	0.008219

Trait Name

Developer End



Key Takeaways

- Top 3 Units
- Top 3 Traits
- Lowest 3 Units
- Lowest 3 Traits

Why

- Developers can modify units/ traits that are over/under powered

TOP 3 UNITS

1. Poppy

2. Zed

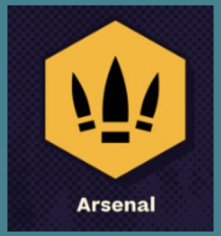
3. Ekko

TOP 3 TRAITS

1. Corrupted

2. Hacker

3. Arsenal



BOTTOM 3 UNITS

*0 feature importance

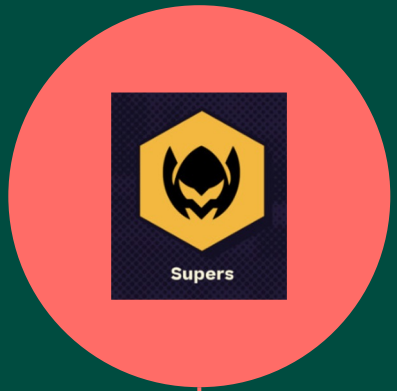
Sett

Rell

Nasus

BOTTOM 3 TRAITS

*0 feature importance



Gamer End

Key Takeaways

- Most important features that contribute to a high win rate

Why

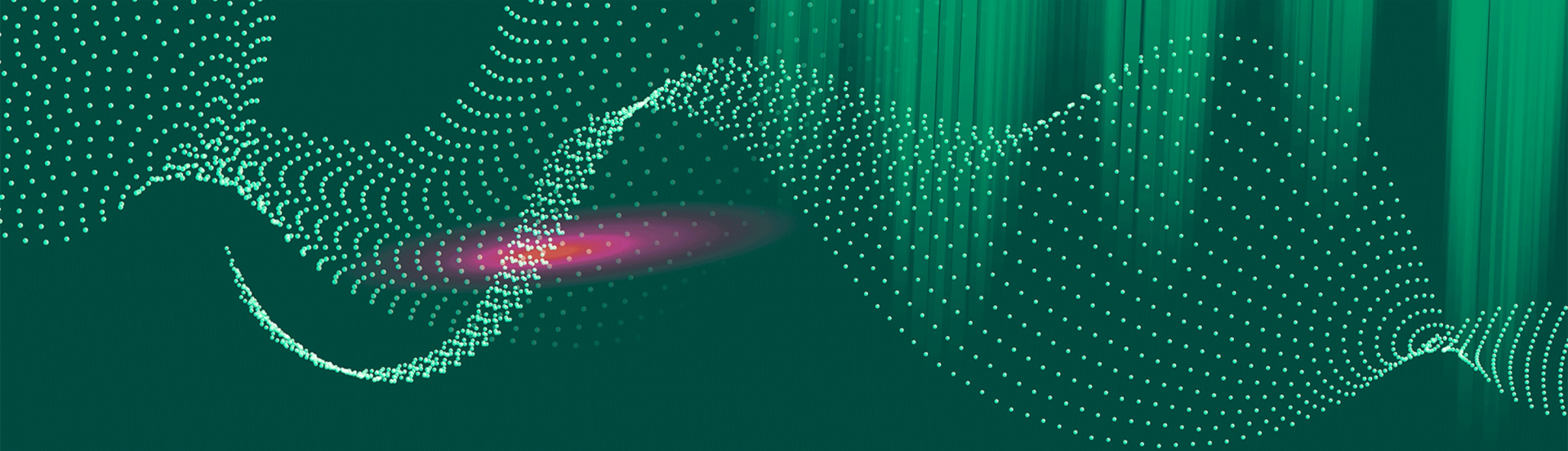
- Gamers can re-strategize to improve

TOP 3 FEATURES

1. Total Items

2. Level

3. Tier



Thank You!