Data Analytics for E-Sports

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Abstract

This project focus on widening the active gamers count for an e-Sports title. This study gives strategies to the game developers to make the game more interesting and to the new gamers entering an E-Sports title by giving them an introductory guide. The main objective is to address the skill gap between players and giving satisfaction to the gamers while they are gaming.

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Introduction

Why PUBG? PUBG by the PUBG corporation was the first battle royale game made available to the consumers in the year 2017 followed by the epic's Fortnite later in the same year. PUBG even got nominated for game of the year 2017 and it had 1.5M, active average users, by the end of the year (According to steam charts).

Seeing the success of PUBG and Fortnite, many game developers started to make battle royale games. But all this started with the game PUBG, which was the pioneer of the battle royale genre. Unfortunately, the PUBG is not where it is supposed to be right now. The game was in the top 5 most streamed game on twitch in 2017 is now in 20th rank in twitch.
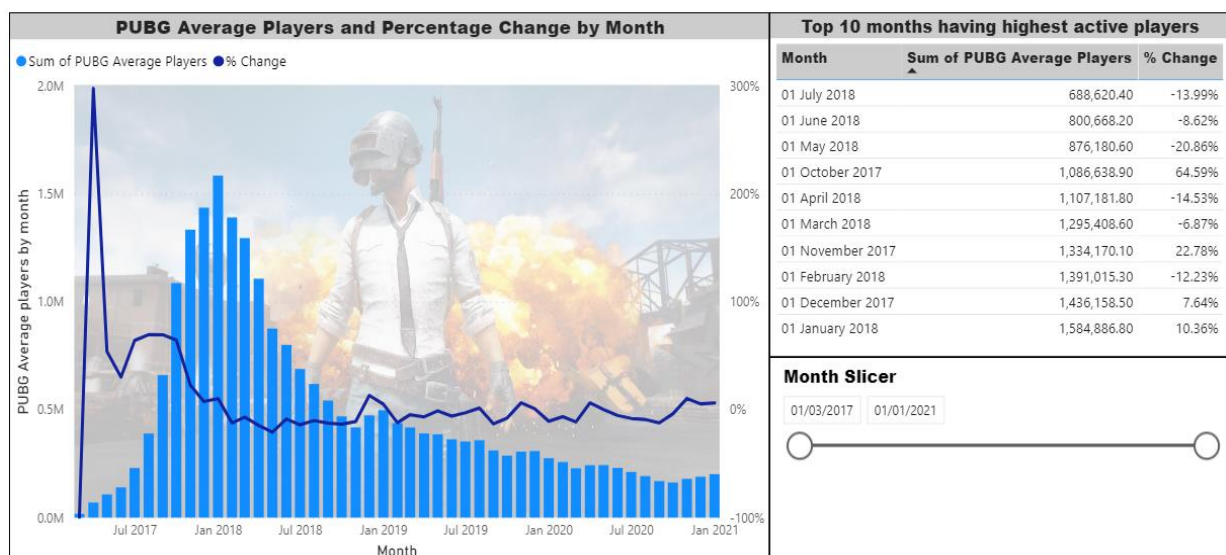
Figure 1: PUBG player count

Without players to play the game, the game will eventually die or let bots play as creating a match would not be possible without the players which what happening right now to PUBG. As witnessed from the visualization, PUBG is losing its player count day by day because of three reasons:

1. Technical issues with the game
2. Problem with the gameplay
3. Skill gap which makes new gamers life difficult to play

The motive of the study

This study can be applied irrespective of the game. PUBG is chosen because it is a great example of a classic downfall of a player count. The main objective of the study is to increase the player count by providing an introductory guide to the new gamers (for addressing the skill gap between the players) and changing certain gameplay decision of the game.

Introductory Guide (New players):

1. Analyzing weapon ergonomics
2. Analysis positions in the map
3. Weapons used by top players.

Gameplay recommendation (Game developers to address):

1. Clustering the players
2. Hacker analysis
3. Addressing the satisfaction of a casual gamer

Benefits of doing this:

Saving a game like PUBG is beneficial to the overall E-Sports industry. PUBG has enormous global attention and can attract more audience to the E-Sports industry. Proper background knowledge of the game and analysing its gameplay decisions can prevent any game from dying. That is what I am proving by taking PUBG as an example in this project.

Data description

PUBG Weapon Statistics

Main attributes used:

1. Weapon name
2. Weapon type
3. Range of the weapon
4. Rate of fire of the weapon
5. Damage per second of the weapon
6. Damage of the weapon

Kill match statistics

Attributes used:

1. Killed by (Cause of player's death)
2. Killer placement
3. Killer position (X, Y)
4. Map
5. Victim placement

Aggregate match statistics

Attributes used:

1. Match mode
2. Party size
3. Player assists
4. Player ride and walk distance
5. Player damage

PUBG's Player statistics [Blackboard]

Attributes used:

1. Kill-Death Ratio
2. Headshot Kill Ratio
3. Win Ratio
4. Top 10 Ratio

Data analysis

Weapon Analysis

Weapon analysis is an important factor to add in an introductory game guide. It is important to choose the type of weapon concerning a player's gaming style.

Key points to consider:

While picking a short-range fight, the player must pick SMGs or a Shotgun. Both have their advantages and disadvantages. Recommended shotgun to pick is S686 and SMG is UMP14 or UZI (if the player prefers more rate of fire).

Assault rifles are very reliable as they can be used in both short-range and mid-range fight. A beginner player must an assault rifle as it is a versatile weapon type and played by top players in the game.

For players who wish to pick a medium and long-range fight is advised to pick designed marksman rifle and sniper rifle are only choice to go. The main difference between the two weapon type is the rate of fire [Observed from the visualization].
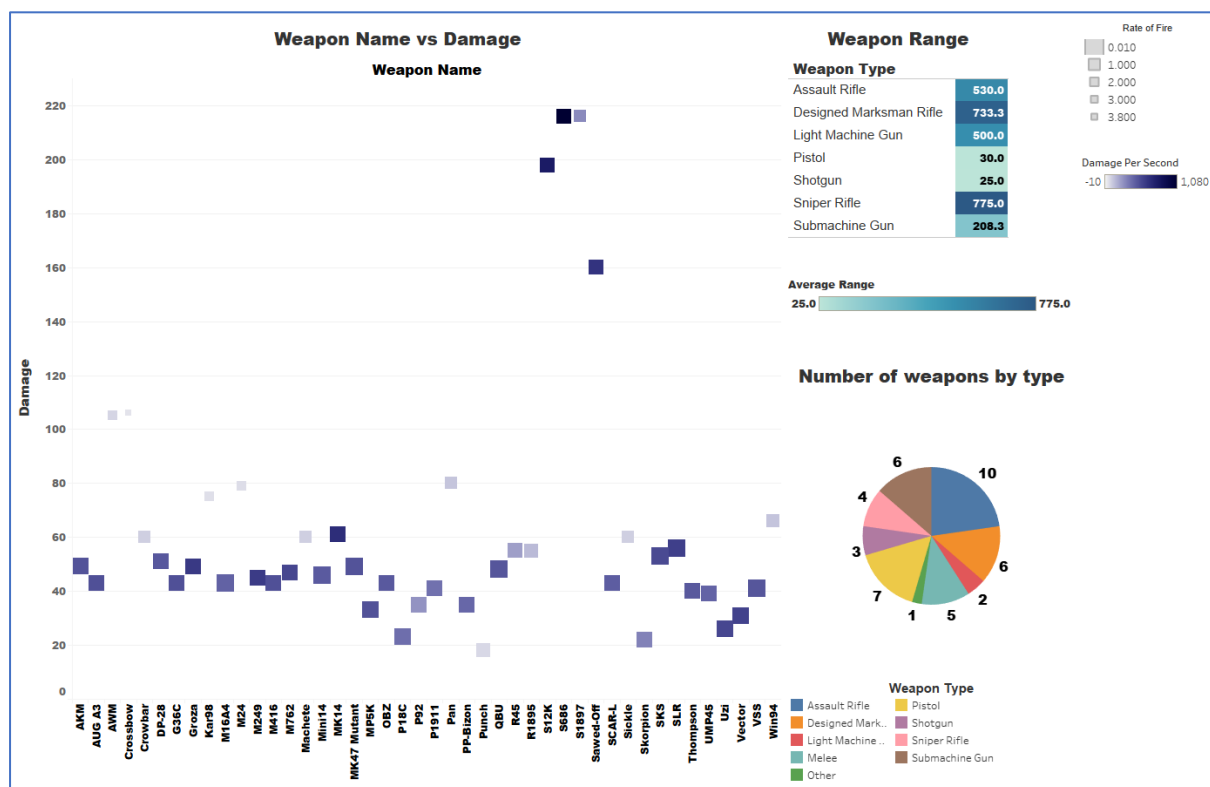

Figure 2: Weapon Ergonomic analysis

Player Position Analysis

Map considered: Miramir

     An interactive dashboard has been developed to observe the common camping position of top players and common places where new gamers die. One of the interesting observations monitored from the dashboard is given below in the visualization and discussed below.

Sniper prone areas for new gamers:

1. Pecado
2. Hacienda del patron
3. Power grid

     Minas Generales, Los Leones and El Pozo are some of the best camping places for sniping the enemy beside Pecado and San martin.

NOTE: Several interesting finding can be gathered from the visualization. CTRL + Right-click on the visualization will open an interactive dashboard.
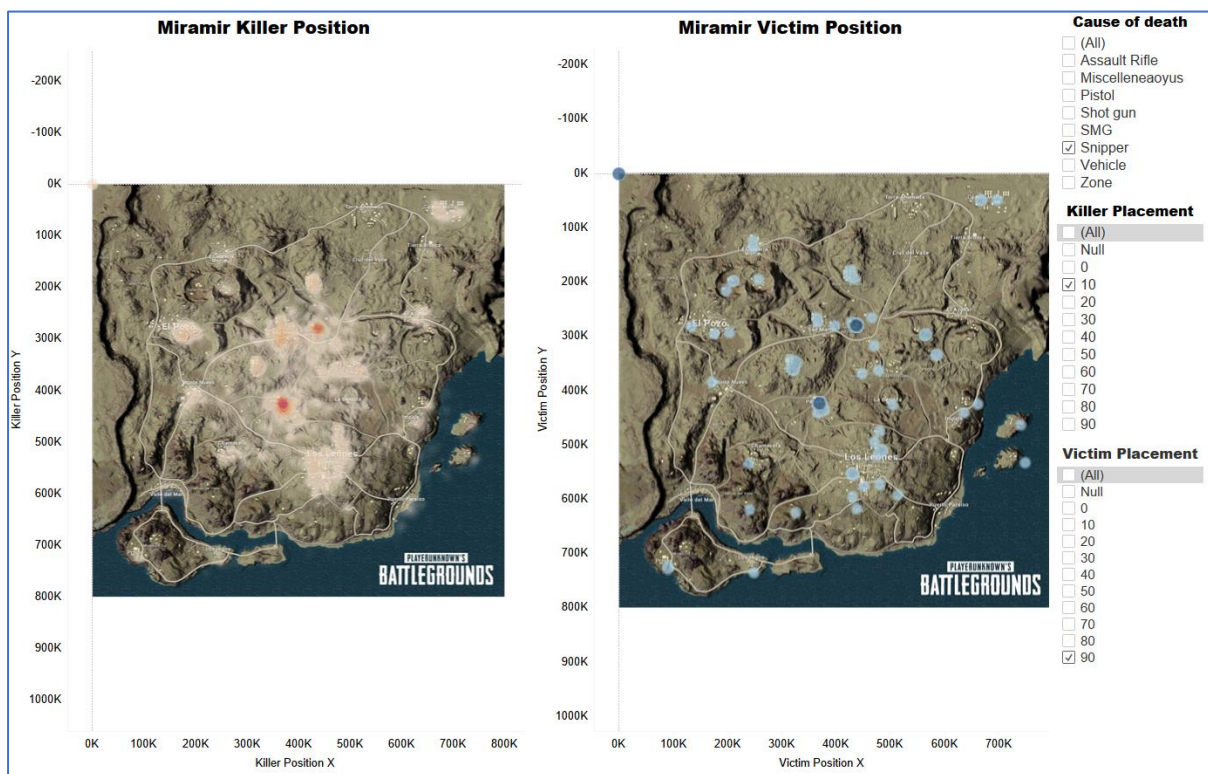

Figure 3: PLAYER POSITION ANALYSIS

Players favourite gun

For this analysis, four classifications have been created as follows:

Classification 1: Professional Players	0-25 Placement
Classification 2: Experienced Players	25-50 Placement
Classification 3: Casual Players	50-75 Placement
Classification 4: New gamers	75-100 Placement

Killer Placement (bin)	AKM	Kar98k	M16A4	M416	Mini 14	Punch	S1897	SCAR-L	SKS	UMP9
					Killed By					
0	93	39	126	155	43	35	37	136	30	62
25	13	1	15	8	4	15	6	13	5	6
50	8		3	1		1	12	1		3
75			1			2		3		

Figure 4: TOP 10 WEAPON BY KILL COUNT AND CLASSIFIED BY PLAYER'S PLACEMENT

Inference:

AKM, M164A, M416, SCAR-L are the most used weapons by a professional player and an interesting point to note is that all these weapons are assault rifles. Due to the versatility of assault rifles, it is expected to be picked and kills obtained by these weapons are relatively more than other weapon types.

KAR98k is the most used sniper in the game and picked by professional players. Similarly, Mini14 and SKS are the best marksmen rifles. Interesting to see that players punch their opponent to death in the starting stage of the game.

Data Clustering

Cluster by player skills

Algorithm used: DBSCAN clustering.

Cluster 1: Human

Cluster 2: Hacker

Index	Attributes used
1.	Win Ratio
2.	Kill-Death Ratio
3.	Headshot Kill Ratio
4.	Top 10 placement Ratio

A combination of all four attributes is plotted in a two-dimensional graph and they are clustered by DBSCAN to give two clusters namely Hacker and Human. As we can see from the visualization, Hackers have statistics that are way abnormal than normal players and they are colour coded as green.

Real-time Hacker analysis must be done in a game to ensure a fair competitive spirit of a battle royale game.
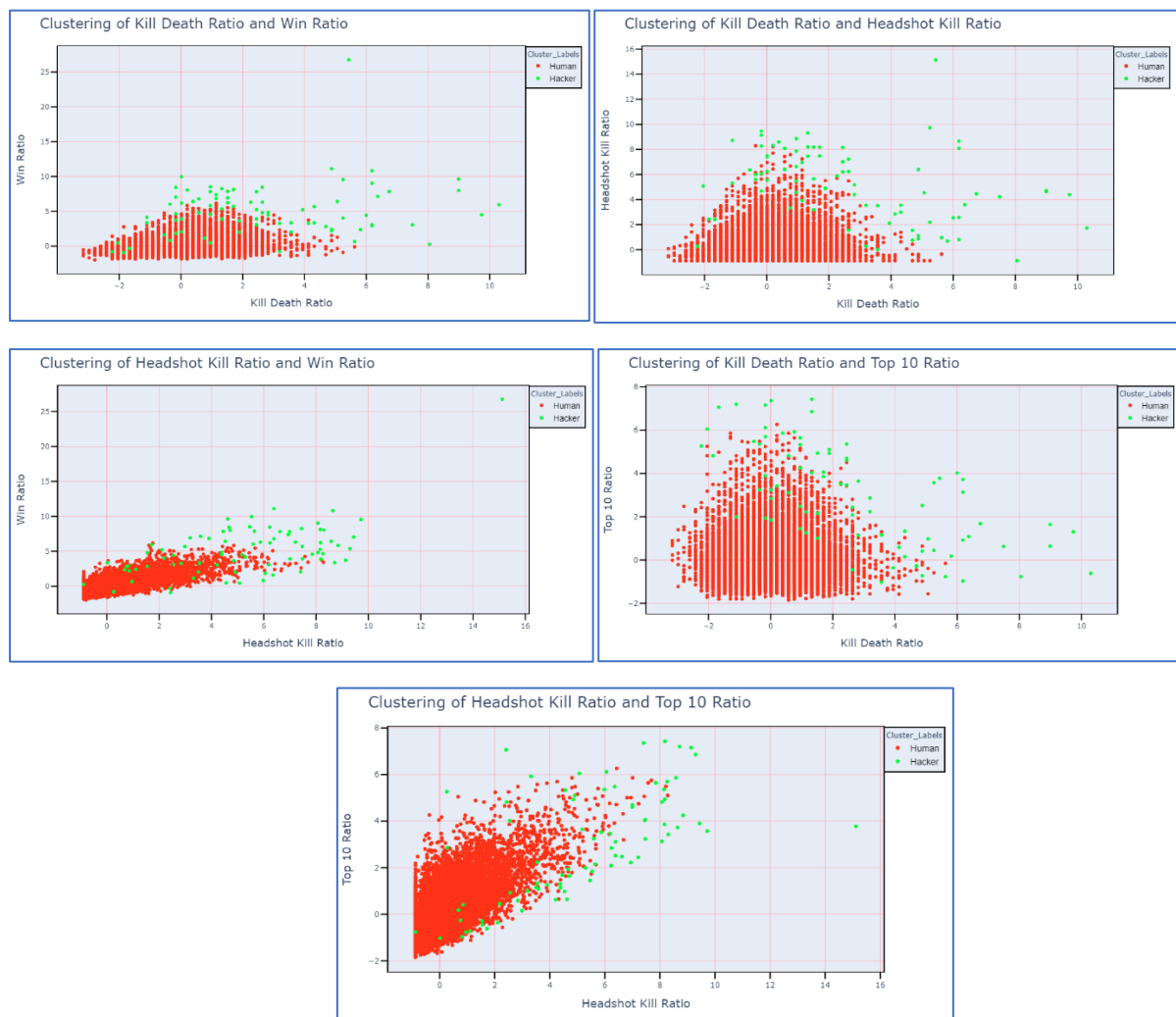

Figure 5: 2D CLUSTERED PLOT W.R.T PLAYER'S PERFORMANCE (2-CLUSTERS)

Skill gap clustering

Algorithm used: KNN (n=4) clustering.

The same attributes are used as above.

Cluster 1 (Red)	Beginners
Cluster 2 (Green)	Hackers
Cluster 3 (Blue)	Experienced
Cluster 4 (Cream white)	Professional

Importance of skill gap analysis:

The skill gap between players should be constantly monitored by the game developers. Gameplay changes must be considered every season to increase the stability of the player's performance. PUBG released in the year 2017. What if they did not change any aspect of their gameplay? The player who started the game from day 1 will have an advantage over the new gamers joining the game.

A professional player will kill a new gamer who is playing the game for a month. But the point to consider is that the gameplay should not be more complex so that the new gamers can not even take the fight.

The result of the fight between a professional player and a new gamer is not going to change. But it will make the fight more enjoyable for both groups of players. Monitoring the skill gap is a crucial metric to provide better stability of the game.
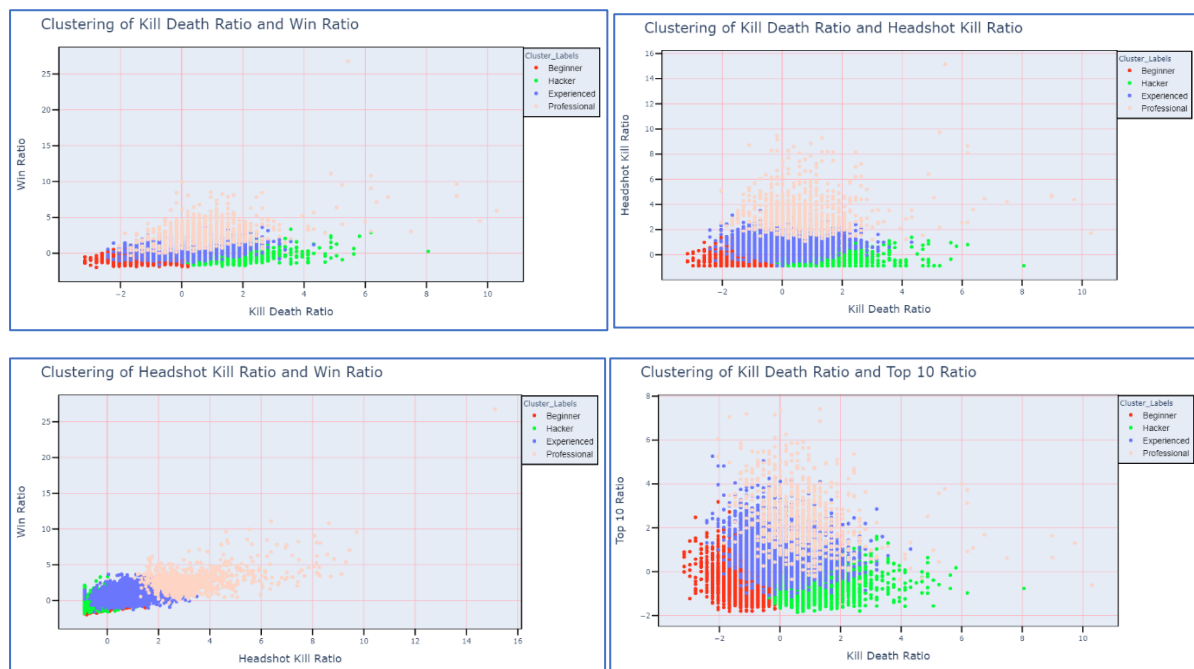

Figure 6: 2D CLUSTERED PLOT W.R.T PLAYER'S PERFORMANCE (4-CLUSTERS)

Gameplay exploration

FILTER CONTROL: Party size [CTRL + Right-click to iteract with the dashboard]

Party size can be varied, and corresponding results can be obtained in the tableau public. An interesting finding is that when the party size is 4 for all players, their overall performance is improved a lot. That is when players are playing with their known people match tends to get more excited resulting in a better performance.

Player walking distance shows a strong positive correlation in the visualization as when the player walking distance increases the player damage is also increase. On the contrary, the Player's ride distance has zero correlation with the player's damage.

Survive time, Player kills and Player damage has a strong positive correlation as observed in the visualization irrespective of the party size.
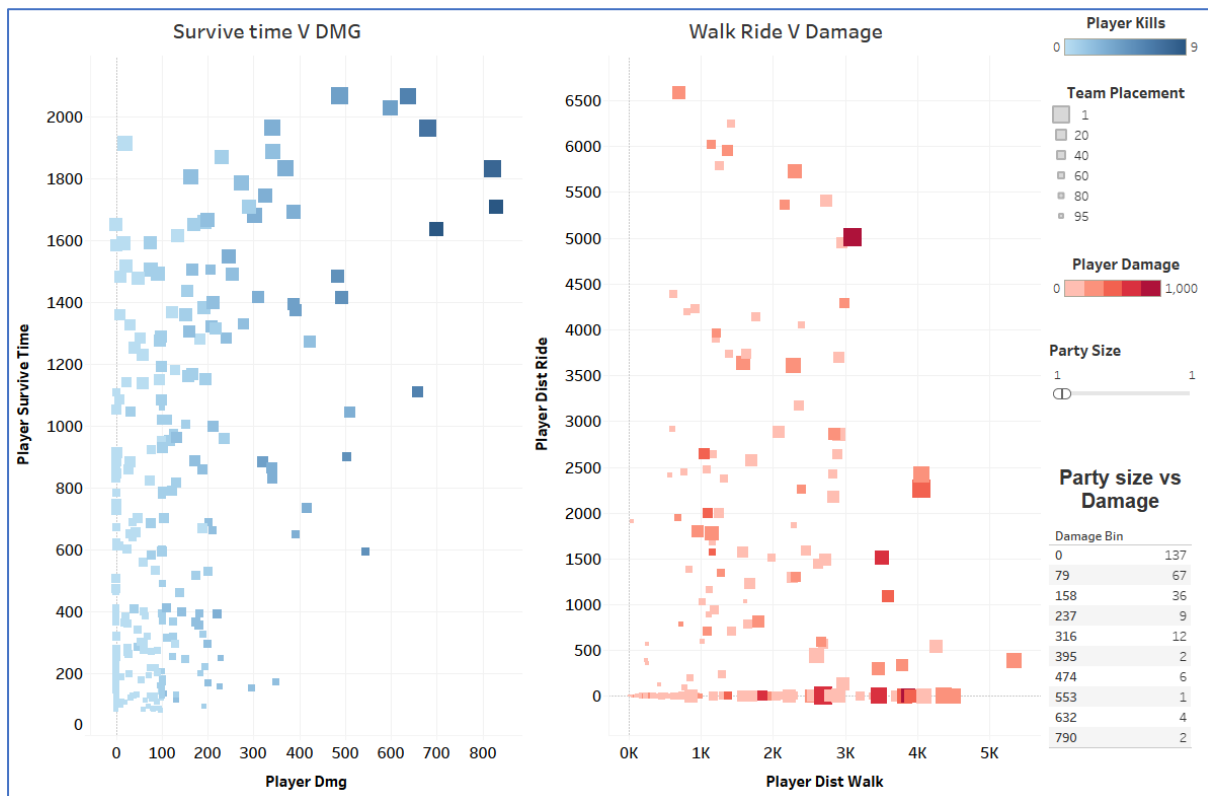

Figure 7: GAMEPLAY DATA EXPLORATION [CLTR+R CLICK ON THE IMAGE TO INTERACT]

Gameplay recommendations

PUBG is known for its realistic gameplay and gunfights. At the same time, we also need to think from the perspective of a casual gamer. Addressing the player's satisfaction is also a key factor to consider and make them entitled to a particular game. Though battle royale's motive is to be the last person standing, casual players play the game for some decent gunfight. Players survive time and player damage does not show any correlation which is expected to show some positive correlation.

- Increasing player's health and Armor's hit point will encourage players to pick the fight.
- Better consumables will let players heal faster and continue the fight.

Basically, increasing gun time will encourage people to continue playing the game.

PUBG has bots and now players are complaining about it [1]. As discussed earlier, to counter fewer people playing the game, PUBG cooperation decided to introduce bots to the game which is a questionable decision as it may make the game boring. Instead of introducing bots to the game, PUBG cooperation should have limited the game modes. This will narrow the players' count and encourage them to play the game with real players.

Reference

[1] https://www.eurogamer.net/articles/2020-05-13-pubg-brings-controversial-bots-to-pc-servers#:~:text=As%20explained%20by%20PUBG%20Corp,due%20to%20declining%20player%20numbers.

Software used:

1. Tableau [Link to all visualization]
2. Jupyter notebook