



# EXPLORATORY DATA ANALYSIS

On Twitch TV Channels

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## **ABSTRACT –**

Within the gaming industry, live-streaming is becoming very popular as a form of online entertainment. Especially the so called social live streaming services (SLSSs) as a new type of social media have established in the last few years. One of the most prominent and current examples is Twitch.tv which provides the opportunity for streamers to broadcast a game and react to viewers' comments in real time. The pandemic was a major catalyst for the explosion of gaming and live streaming into the mainstream culture.

The main goal of this study is to analyse the spread of Twitch users among different channels. This Project explores the Top 1000 channels of Twitch.tv platform. The data has been collected from Kaggle.

Moreover, esports as an industry is growing at an alarming rate in India due to the popularity of mobile phone games such as PUBG mobile. The total size of India's esports industry will touch Rs 1100 crore by FY25.

## **Introduction:**

Twitch is an American video live streaming service that focuses on video game live streaming, including broadcasts of esports competitions, in addition to offering music broadcasts, creative content, and "in real life" streams. It is operated by Twitch Interactive, a subsidiary of Amazon.com, Inc. It was introduced in June 2011 as a spin-off of the general-interest streaming platform Justin.tv. Content on the site can be viewed either live or via video on demand.

The popularity of Twitch eclipsed that of its general-interest counterpart. In October 2013, the website had 45 million unique viewers, and by February 2014, it was considered the fourth-largest source of peak Internet traffic in the United States. At the same time, Justin.tv's parent company was re-branded as Twitch Interactive to represent the shift in focus – Justin.tv was shut down in August 2014. That month, the service was acquired by Amazon for US\$970 million, which later led to the introduction of synergies with the company's subscription service Amazon Prime. Twitch acquired Curse in 2016, an operator of online video gaming communities and introduced means to purchase games through links on streams along with a program allowing streamers to receive commissions on the sales of games that they play.

By 2015, Twitch had more than 100 million viewers per month. In 2017, Twitch remained the leading live streaming video service for video games in the US, and had an advantage over YouTube Gaming, which shut down its standalone app in May 2019. As of February 2020, it had 3 million broadcasters monthly and 15 million daily active users, with 1.4 million average concurrent users. As of May 2018, Twitch had over 27,000 partner channels.

Twitch is designed to be a platform for content, including esports tournaments, personal streams of individual players, and gaming-related talk shows. A number of channels do live speed running. The Twitch homepage currently displays games based on viewership. As of June 2018, some of the most popular games streamed on Twitch are *Fortnite*, *League of Legends*, *Dota 2*, *PlayerUnknown's Battlegrounds*, *Hearthstone*, *Overwatch* and *Counter-Strike: Global Offensive* with a combined total of over 356 million hours watched.

Twitch has also made expansions into non-gaming content; such as in July 2013, the site streamed a performance of 'Fester's Feast' from San Diego Comic-Con, and on July 30, 2014, electronic dance music act Steve Aoki broadcast a live performance from a nightclub in Ibiza. In January 2015, Twitch introduced an official category for music streams, such as radio shows and music production activities, and in March 2015, announced that it would become the new official live streaming partner of the Ultra Music Festival, an electronic music festival in Miami.

## **Charity**

Broadcasters on Twitch often host streams promoting and raising money towards charity. By 2013, the website has hosted events which, in total, raised over US\$8 million in donations for charitable causes, such as Extra Life 2013. As of 2017, Twitch has raised over US\$75 million in donations for charitable causes. The biggest charity event of Twitch is Zevent, a French project created by Adrien Nougaret and Alexandre Douchary, with more than US\$10 million raised for Action Contre la Faim in October 2021.

## **Esports**

ESL tournaments have aired on Justin.tv and later Twitch.tv since 2009. The platform has also been a long time broadcaster of the Evolution Championship Series.

Twitch has been the official broadcaster of the League of Legends World Championship since 2012, as well as other League of Legends tournaments organized by Riot Games.

Dota 2's premier tournament The International has been livestreamed on Twitch since 2013.

The platform airs *Rocket League* tournaments organized by Psyonix since 2016. The ELeague also broadcasts events on Twitch since 2016.

Twitch and Blizzard Entertainment signed a two-year deal in June 2017 to make Twitch be the exclusive streaming broadcaster of select Blizzard esports championship events, with viewers under Twitch Prime earning special rewards in various Blizzard games. Twitch also reached a deal in 2018 to be the streaming partner of the Overwatch League, with the site also offering an "All-Access Pass" with exclusive content, emotes, and in-game items for *Overwatch*. Blizzard switched to rival platform YouTube in 2020.

*Fortnite Battle Royale* competitions have aired on Twitch since its launch in 2017, including the E3 2018 Fortnite Pro-Am and the 2019 Fortnite World Cup.

The NBA 2K League has been livestreamed on Twitch since its inception in 2018.

As the COVID-19 pandemic suspended motorsports competitions around the world, several series launched simulated racing competitions with real-life professional drivers. Some series had official broadcasts on Twitch, such as Formula One and IMSA. Many drivers also had their personal live streams on Twitch, as was the case of several eNASCAR iRacing Pro Invitational Series and INDYCAR iRacing Challenge drivers.

Creators and audience

## **Streamers**

Streamer Ninja had been among Twitch's top personalities, with over 14 million followers. In August 2019, however, Ninja announced that he would move exclusively to a Microsoft-owned competitor, Mixer. After Ninja left, the top three streamers in October 2019 based on follower count were Tfue (7.01 million followers), Shroud (6.45 million followers) and TSM Myth (5.1 million followers). Twitch began signing exclusivity deals with high-profile streamers in December 2019, starting with DrLupo, TimTheTatman, and Lirik, who had a combined 10.36 million followers at the time. Dr DisRespect signed a multi-year deal in March 2020. In May 2020, Twitch signed popular streamers Summit1g, dakotaz and JoshOG to multi-year exclusive deals. On June 26, 2020, Dr DisRespect was banned from Twitch for unexplained reasons and his channel was removed from the site. Following the discontinuation of Mixer in late-July 2020, both Ninja and Shroud (who had also defected to the service) re-signed exclusively with Twitch.

As of March 2022, there have been six streamers to have reached over 100,000 concurrent subscribers. These streamers are Ninja, Shroud, Ranboo, Ludwig Ahgren, Casimiro and Ironmouse. In April 2021, *Business Insider* reported that "over the past 31 days, Ahgren has streamed non-stop in an attempt to break the record of 269,154 subscribers held by gaming personality Tyler 'Ninja' Blevins. By the end of the month-long stream, Ahgren had over 282,000 subscribers on his channel. [...] At one point during his sleep cycle, his channel had the most concurrent viewers of any on the platform". In analysis of the October 2021 data leak, multiple news outlets reported that the

three top-earning Twitch content creators are *Critical Role* (\$9,626,712), XQc (\$8,454,427), and Summit1g (\$5,847,541). Sisi Jiang, for *Kotaku*, reported that "excluding streams that are run by multiple people (such as *Critical Role*), there are no women in the top third of top-earning Twitch content creators"; in total, there are only three women in the top 100 and only one is a woman of colour. Jiang highlighted that these streamers are "*Valorant* streamer Pokimane at 39th place, cosplayer Amouranth at 48th, and music streamer Sintica at 71st" and commented that "in spite of the complaints about the 'hot tub meta,' 'titty streamers,' and how some male streamers perceive that female streamers are stealing views from men, the numbers show that only a small percentage of women are among the ranks of Twitch's highest-earning content creators".

In August 2021, DrLupo left Twitch for an exclusivity deal with YouTube; TimTheTatman followed in September 2021, as did Ludwig Ahgren in November 2021. Nathan Grayson, for *The Washington Post*, commented that when streamers moved to Mixer in 2019, Twitch quickly locked down multiple streamers in exclusivity deals; however, streamers who moved to Mixer saw their audiences undergo "a marked downsizing. [...] It demonstrated that many viewers within Twitch's ecosystem, when deprived of their favourite big streamers, will just find other Twitch streamers to take their place. [...] Now Twitch is bargaining from a place of confidence. That allows it to re-evaluate previous deals made when streamers had more leverage". Grayson reported that lower offers from Twitch coupled with Twitch's higher streaming hour requirement ("YouTube's contracts start at 100 hours of streaming time per month while Twitch's start at 200") has made YouTube's exclusivity deals "tantalizing" to some Twitch streamers. Grayson wrote that "Ryan Wyatt, head of YouTube Gaming, said that allowing streamers to have a better work-life balance is a big priority for him"; DrLupo cited work-life balance as part of his decision to leave Twitch.



# Exploratory Data Analysis on Streamers of Twitch

Importing all the necessary libraries that we will require for the analysis

```
# Import necessary modules
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from wordcloud import WordCloud

# Importing libraries
import sys
import warnings
warnings.simplefilter("ignore")
```

We are using a dataset consisting of the Top 1000 Twitch Streamers of the year 2020.

```
# Read data
df = pd.read_csv('twitchdata-update.csv')
```

Checking for any NULL values

```
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 11 columns):
 #   Column                Non-Null Count  Dtype
---  --
 0   Channel               1000 non-null   object
 1   Watch time (Minutes)  1000 non-null   int64
 2   Stream time (minutes) 1000 non-null   int64
 3   Peak viewers           1000 non-null   int64
 4   Average viewers        1000 non-null   int64
 5   Followers              1000 non-null   int64
 6   Followers gained       1000 non-null   int64
 7   Views gained           1000 non-null   int64
 8   Partnered              1000 non-null   bool
 9   Mature                1000 non-null   bool
10   Language              1000 non-null   object
memory usage: 72.4+ KB

Dataset Details:-

1. Watch Time - Total watch time by every unique viewer combined.
2. Stream Time - The total time the channel has been live.
3. Peak Viewers - The highest number of viewers at any moment in the live stream.
4. Average Viewers - Calculated over a period of one year.
5. Followers - Number of Twitch users following the channel.
6. Followers gained - Number of new followers for that channel.
7. Views gained - Overall views of a particular channel.
8. Partnered - Twitch's second stage of monetization program, after Affiliate.
9. Mature - If the channel streams explicit content.
10. Language - The language primarily used on that channel.
```

```
df.isna().sum()

Channel                0
Watch time (Minutes)  0
Stream time (minutes)  0
Peak viewers           0
Average viewers        0
Followers              0
Followers gained       0
Views gained           0
Partnered              0
Mature                0
Language              0
dtype: int64
```

As we can see from the above two tables the dataset doesn't contain any null values.

	Channel	Watch time (Minutes)	Stream time (minutes)	Peak viewers	Average viewers	Followers	Followers gained	Views gained	Partnered	Mature	Language
0	xQcOW	619616750	215250	222720	27716	3246298	1734810	93036735	True	False	English
1	summit1g	6091677300	211845	310998	25610	5310163	1370184	89705964	True	False	Portuguese
2	Gaules	5644590915	515280	387315	10976	1767635	1023779	102611607	True	False	English
3	ESL_CSGO	3970318140	517740	300575	7714	3944850	703986	106546942	True	False	English
4	True	3671000070	123660	285644	29602	8938903	2068424	78998587	True	False	English
5	Amonggod	3668799075	82260	263720	42414	1563438	554201	61715781	True	False	English
6	NICKMERCS	3360675195	136275	115633	24181	4074287	1098924	46084211	True	False	English
7	Fextralife	3101674895	147485	68795	18985	508816	425468	670137548	True	False	English
8	100tuber1	2928356940	122490	89387	22381	3530767	951730	51349926	True	False	English
9	Anomaly	2865429915	92880	125408	12377	2607076	1532689	36350662	True	False	English

```
df.describe()

               Watch time(Minutes)  Stream time(minutes)  Peak viewers  Average viewers  Followers  Followers gained  Views gained
count                        1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03
mean                        4.184279e+08              1.205115e+0600              3.706510e+0500              4.078104e+0000              5.700541e+05              2.055185e+04              1.166817e+07
std                         5.496355e+08              8.785762e+0164              4.6314307686              8.45316849e5              8.044134e+05              3.399137e+05              2.490572e+07
min                        1.221928e+08              3.465100000e+00              496.000000              235.000000              3.660000e+03              -1.577200e+04              1.757880e+05
25%                        1.631899e+08              7.3758175e+0000              9113.750000              1457.750000              1.705462e+05              4.375825e+04              3.880602e+06
50%                        2.439908e+08              102403.000000              16676.000000              2425.000000              3.180630e+05              9.835200e+04              6.456324e+06
75%                        4.337399e+08              1.1848375e+0000              47862.000000              47362.000000              6.243322e+05              2.361308e+05              1.219676e+07
max                        6.196162e+09              5.214450000e+0000              639375.000000              147643.000000              8.938093e+06              3.966525e+06              6.701375e+08
```

```
# Adding new calculated columns in the df for better readability
df['Stream Time (Days)'] = df['Stream time (minutes)']/(60*24)
df['Watch Time (Years)'] = df['Watch time (Minutes)']/(60*24*365)
```

```
df

Channel                Watch time(Minutes)  Stream time(minutes)  Peak viewers  Average viewers  Followers  Followers gained  Views gained  Partnered  Mature  Language  Stream Time(Days)
0   xQcOW                619616750          215250          222720          27716          3246298          1734810          93036735          True     False     English          148.4791
1   summit1g             6091677300          211845          310998          25610          5310163          1370184          89705964          True     False     Portuguese          147.1143
2   Gaules               5644590915          515280          387315          10976          1767635          1023779          102611607          True     False     English          359.5433
3   ESL_CSGO             3970318140          517740          300575          7714          3944850          703986          106546942          True     False     English          359.5433
4   True                 3671000070          123660          285644          29602          8938903          2068424          78998587          True     False     English          85.87
5   Amonggod             3668799075          82260          263720          42414          1563438          554201          61715781          True     False     English          8.41
6   NICKMERCS            3360675195          136275          115633          24181          4074287          1098924          46084211          True     False     English          106.259
7   Fextralife           3101674895          147485          68795          18985          508816          425468          670137548          True     False     English          9.21
8   100tuber1            2928356940          122490          89387          22381          3530767          951730          51349926          True     False     English          68.8756
9   Anomaly              2865429915          92880          125408          12377          2607076          1532689          36350662          True     False     English          36.8756
```

```
df.describe()

               Watch time(Minutes)  Stream time(minutes)  Peak viewers  Average viewers  Followers  Followers gained  Views gained
count                        1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03              1.000000e+03
mean                        4.184279e+08              1.205115e+0600              3.706510e+0500              4.078104e+0000              5.700541e+05              2.055185e+04              1.166817e+07
std                         5.496355e+08              8.785762e+0164              4.6314307686              8.45316849e5              8.044134e+05              3.399137e+05              2.490572e+07
min                        1.221928e+08              3.465100000e+00              496.000000              235.000000              3.660000e+03              -1.577200e+04              1.757880e+05
25%                        1.631899e+08              7.3758175e+0000              9113.750000              1457.750000              1.705462e+05              4.375825e+04              3.880602e+06
50%                        2.439908e+08              102403.000000              16676.000000              2425.000000              3.180630e+05              9.835200e+04              6.456324e+06
75%                        4.337399e+08              1.1848375e+0000              47862.000000              47362.000000              6.243322e+05              2.361308e+05              1.219676e+07
max                        6.196162e+09              5.214450000e+0000              639375.000000              147643.000000              8.938093e+06              3.966525e+06              6.701375e+08
```

```
# Adding new calculated columns in the df for better readability
df['Stream Time (Days)'] = df['Stream time (minutes)']/(60*24)
df['Watch Time (Years)'] = df['Watch time (Minutes)']/(60*24*365)
```

```
df

Channel                Watch time(Minutes)  Stream time(minutes)  Peak viewers  Average viewers  Followers  Followers gained  Views gained  Partnered  Mature  Language  Stream Time(Days)
0   xQcOW                619616750          215250          222720          27716          3246298          1734810          93036735          True     False     English          148.4791
1   summit1g             6091677300          211845          310998          25610          5310163          1370184          89705964          True     False     Portuguese          147.1143
2   Gaules               5644590915          515280          387315          10976          1767635          1023779          102611607          True     False     English          359.5433
3   ESL_CSGO             3970318140          517740          300575          7714          3944850          703986          106546942          True     False     English          359.5433
4   True                 3671000070          123660          285644          29602          8938903          2068424          78998587          True     False     English          85.87
5   Amonggod             3668799075          82260          263720          42414          1563438          554201          61715781          True     False     English          8.41
6   NICKMERCS            3360675195          136275          115633          24181          4074287          1098924          46084211          True     False     English          106.259
7   Fextralife           3101674895          147485          68795          18985          508816          425468          670137548          True     False     English          9.21
8   100tuber1            2928356940          122490          89387          22381          3530767          951730          51349926          True     False     English          68.8756
9   Anomaly              2865429915          92880          125408          12377          2607076          1532689          36350662          True     False     English          36.8756
```

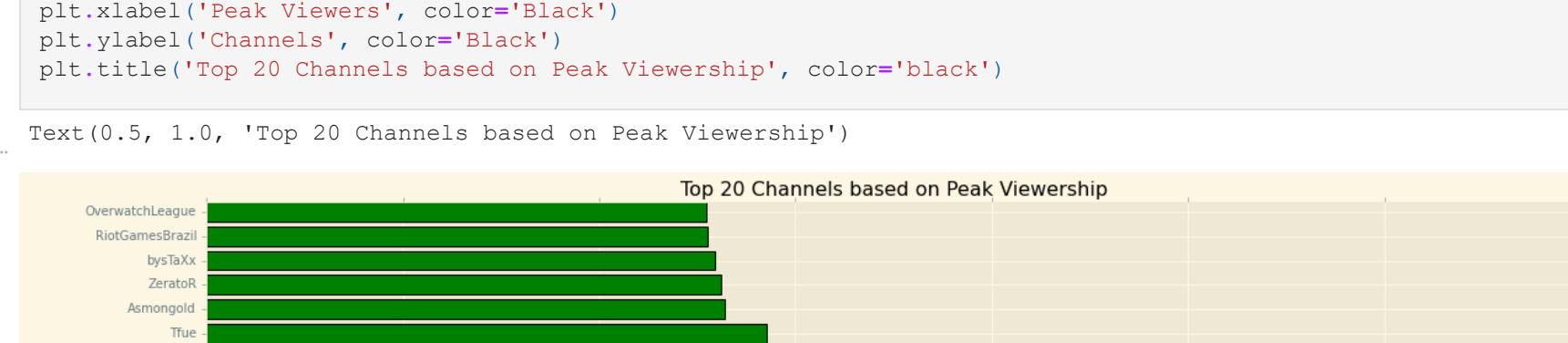
Converted the columns Watch Time(minutes) & Stream Time(minutes) into Watch Time(Years) & Stream Time(Days) respectively because the former columns values are really high and hard to understand.

```
# Top 20 Channels with the Highest Stream Time in Days
avg_stream = df.sort_values(by=['Stream Time (Days)'], ascending=False)
most_stream.head(20)
```

	Channel	Watch time(Minutes)	Stream time(minutes)	Peak viewers	Average viewers	Followers	Followers gained	Views gained	Partnered	Mature	Language	Stream Time(Days)
392	RiftRax	293583075	521445	24765	562	79099	17200	3313465	True	False	English	362.
992	RelaxBeats	123273930	521430	2830	235	166162	29595	1094850	True	False	English	362.
746	Monstercat	691673700	519675	14261	731	788664	632587	4084222	True	False	English	360.
900	RocketBeansTV	360858030	518415	5223	696	416018	27024	5973152	True	False	German	360.
469	SaltyTemo	247613265	517980	1803	476	171916	36103	2117741	False	False	English	359.
3	ESL_CSGO	3970318140	517740	300575	7714	3944850	703986	106546942	True	False	English	359.
433	Ilexivis	565951895	517260	7435	520	31323	2447	1641644	True	False	Chinese	359.
2	Gaules	5644590915	515280	387315	10976	1767635	1023779	102611607	True	False	Portuguese	357.
758	voice1r	162510660	518445	18734	314	3660	1328	4001475	True	False	Thai	357.
417	DownToNost	281365035	513540	20723	543	82299	53724	3524088	True	True	English	357.
890	Japan_ASMR	138935670	509670	496	271	67707	32349	1272641	True	False	Japanese	353.
232	JohnPitterTV	461605275	508955	4148	900	286184	21365	4950406	True	False	Portuguese	353.
397	SaltyBet	293091045	508140	3467	571	224099	69465	4509671	True	False	English	352.
49	BeyondTheSummit	1333907490	505080	116647	2635	932689	11498	40423593	True	False	English	350.
641	Speedrun	168600430	500010	16604	373	93338	10948	13862339	True	False	English	347.
247	mcl_AGG	443238990	499575	11191	884	219431	124548	11142089	True	True	Portuguese	346.
282	MarketTradersTV	148900110	499215	1357	297	30413	12081	981536	True	False	English	346.
158	SkipNOLIVE	600910875	498765	7940	1196	324765	271487	6544645	True	False	Portuguese	346.
34	OgamingLOL	1483207890	496950	204941	3020	523758	115965	71583995	True	False	French	345.
605	Streamehouse	199501650	496545	12609	402	630255	10659	2800864	True	False	English	344.

```
plt.style.use('Solarize_Light2')
plt.figure(figsize=(20,7))
plt.barh(most_stream['Channel'].head(20), most_stream['Stream Time (Days)'].head(20), color = "green")
plt.xlabel('Channels', color="black")
plt.ylabel('Stream Time in Days', color="black")
plt.title('Top 20 Channels based on Highest Stream Time in Days', color="black")
```

Text(0.5, 1.0, 'Top 20 Channels based on Highest Stream Time in Days')



The above graph shows that the Top 20 Channels with the Highest Stream Time have streamed for more than 350 days out of 365 days in a year. This is due to the fact that some of these channels re-broadcast their streams when they are offline. Also, some channels have multiple people streaming on a single channel. Special mentions :-

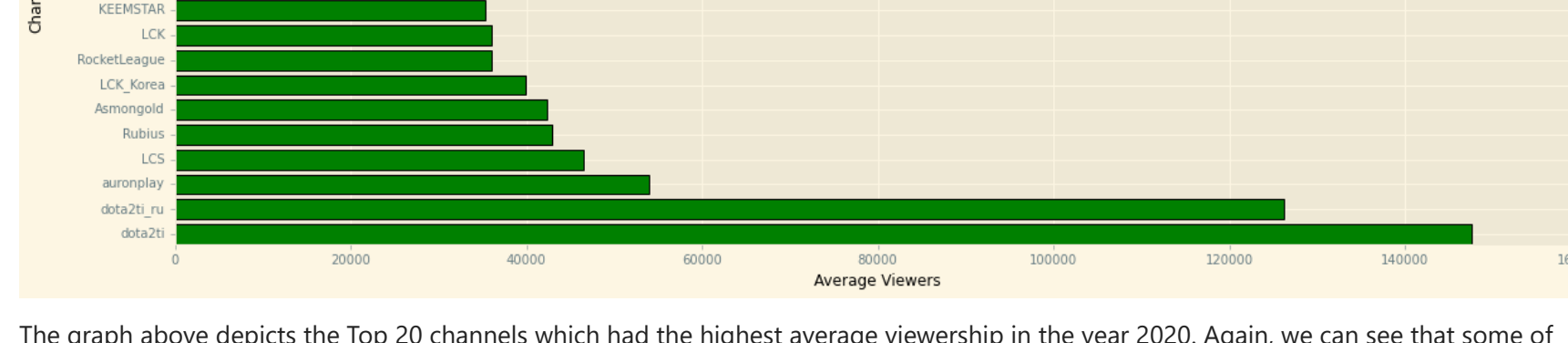
- RiftRax - is an American company that involves roasting particular television films and programmes by comedians Michael J. Nelson, Jimmy Murphy, Bill Corbett, and others.
- Streamehouse - A group of online friends hit Start Streaming the summer of 2013 and never thought to stop, now with over 45,000 hours broadcast to Twitch.
- ESL\_CSGO - Home of all CS:GO broadcasts. Does a lot of RERUN of tournament matches.
- RelaxBeats - Stay live 24/7 playing relaxing music.
- Monstercat - A 24/7 music stream of non stop Monstercat music.

```
# Top 20 Channels with the Highest Peak Viewership
high_peak = df.sort_values(by=['Peak Viewers'], ascending=False)
high_peak.head(20)
```

	Channel	Watch time(Minutes)	Stream time(minutes)	Peak viewers	Average viewers	Followers	Followers gained	Views gained	Partnered	Mature	Language	Stream Time(Days)
12	Riot Games (proptorOver)	267446715	80820	63975	20960	4487489	497678	56855694	True	False	English	56.1
25	TheGrefg	1757406750	54855	538444	28887	3795667	3593081	47094362	True	False	Spanish	38.0
81	dotazh1	1017577605	6315	483530	147643	663297	121422	16228039	True	False	English	4.3
96	shroud	888055170	30240	471281	29612	7740666	833587	30621257	True	False	English	21.0
109	dotazh1u	812538090	6195	457060	126232	541664	108438	10268376	True	False	Russian	4.3
2	Gaules	5644590915	515280	387315	10976	1767635	1023779	102611607	True	True	Portuguese	357.8
53	cgsmc_ru	130896280	77955	364616	17020	429554	447601	42352835	True	False	Russian	54.1
444	Warframe	2667260025	13740	346131	12843	1254031	282880	5405191	True	False	English	9.5
73	StarLadder_cs_en	1068832810	32880	329195	29956	562993	29821627	16228039	True	False	English	22.8
431	JoinedTV	271815660	12065	318662	2013	153984	157656	9070954	True	True	English	83.4
1	summit1g	6091677300	211845	310998	25610	5310163	1370184	89705964	True	False	English	147.1
38	LEC	1440341925	45660	305119	28830	973277	551345	25924096	True	False	English	31.7
3	ESL_CSGO	3970318140	517740	300575	7714	3944850	703986	106546942	True	False	English	359.5
24	TheHaklKlonski	1811696100	56010	288459	24595	1260160	1082039	25342894	True	True	German	38.8
4	True	3671000070	123660	285644	29602	8938903	2068424	78998587	True	False	English	85.8
5	Amonggod	3668799075	82260	263720	42414	1563438	554201	61715781	True	False	English	57.1
84	Zevator1	1011013035	84960	262373	10516	880728	22341	31456198	True	True	French	59.0
336	bysTaXx	331963505	121845	48518	195920	1037912	795396	10207313	True	False	Spanish	33.9
18	RiotGamesBrazil	1228613130	38370	25542	25918	1011924	325801	37396768	True	False	Portuguese	26.6
111	OverwatchLeague	805163370	24480	254493	33312	1796619	83198	27099682	True	False	English	17.0

```
plt.style.use('Solarize_Light2')
plt.figure(figsize=(20,7))
plt.barh(high_peak['Channel'].head(20), high_peak['Peak Viewers'].head(20), color = "green")
plt.xlabel('Channels', color="black")
plt.ylabel('Peak Viewers', color="black")
plt.title('Top 20 Channels based on Peak Viewership', color="black")
```

Text(0.5, 1.0, 'Top 20 Channels based on Peak Viewership')



The above graph represents the Top 20 Channels that had the highest number of peak viewership in the year 2020. Some of these channels include official tournament organization channels. Moreover, some of the individual streamer channels also had their highest concurrent viewership in 2020 due to variety of





# Conclusion

All of the different channels used in this study for analysis have something unique to offer to the viewer in terms of entertainment that's why they are in the Top 1000 ranking out of millions of channels. Using the insights generated in our report, we can see how Exploratory Data Analysis is useful and exposes the trends, patterns, and relationships in the data.

In our report, We are able to analyze which channels are the most popular on the website i.e on the basis of Watch Time, Peak viewership or Average viewership. Also, Which channels have gained the most number of followers and unique viewers over a period of 1 year. Moreover, We are able to analyze the spread of users among different language speaking communities.

To conclude, this report gives us a really unique perspective into the interaction of users across different channels.