Games Popularity Analysis

01416504 - MACHINE LEARNING IN PRACTICE

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ARTIFICIAL INTELLIGENCE MINOR PROGRAM

Report: The International 10 sets audience records

By FIELD LEVEL MEDIA 2 MIN READ

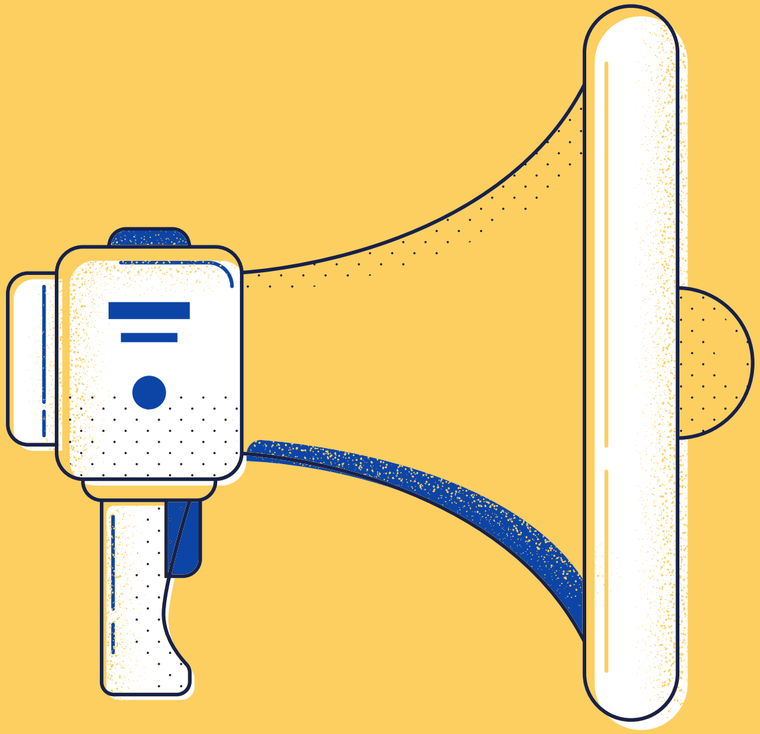
The grand final peaked at 2.7 million viewers (across all platforms excluding China), making it the most watched Dota 2 event ever. The figure represented a 37 percent increase over its peak in 2019. (The event wasn't held in 2020 due to the coronavirus pandemic).

Place	$ USD	Percent	Team
1st	$18,208,300	45.5%	Team Spirit
2nd	$5,202,400	13%	PSG.LGD
3rd	$3,601,600	9%	Team Secret
4th	$2,401,100	6%	Invictus Gaming
place 5 to 18 ^			
5th-6th	$1,400,600	3.5%	Virtus.pro
			Vici Gaming
7th-8th	$1,000,500	2.5%	OG
			T1
9th-12th	$800,400	2%	Fnatic
			Quincy Crew
			Alliance
			Evil Geniuses
13th-16th	$600,300	1.5%	Team Undying
			Team Aster
			beastcoast
			Elephant
17th-18th	$100,000	0.25%	Thunder Predator
			SG esports

Ref : Reuters (https://www.reuters.com/article/esports-dota-ti10-viewership-idUSFLMbxmwqG)


RENAULT
Red Bull
adidas
VITALITY


PGL
Bitget
GGBET
SECRET LAB

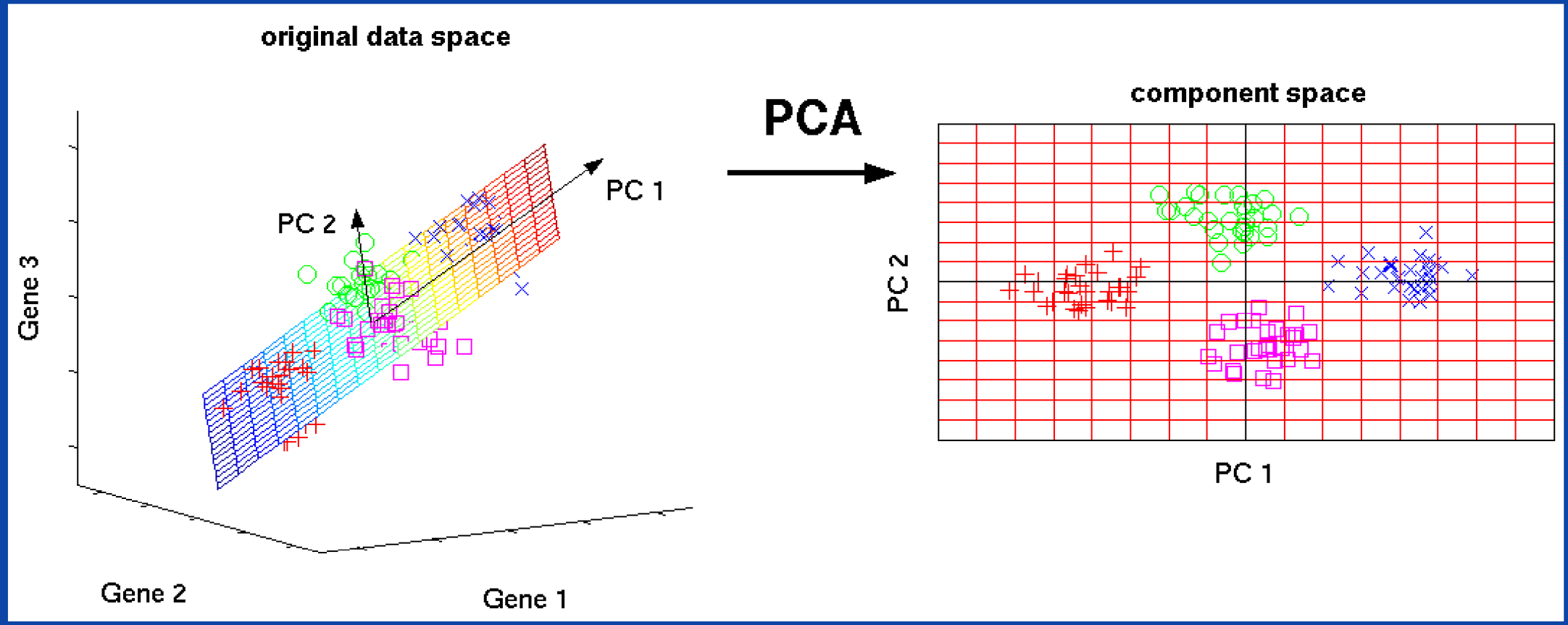


MOTIVATION

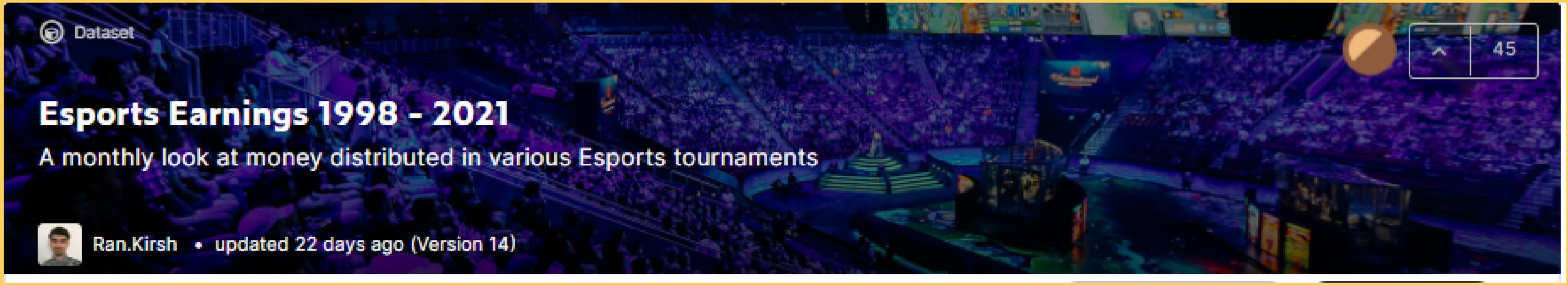
นำข้อมูลในวงการเกมส์ มาวิเคราะห์หา Insight และแบ่งกลุ่มของเกมส์ เพื่อนำไปใช้ในด้านผลประโยชน์ในภาคธุรกิจ และ อื่นๆ

PCA

เพื่อลดมิติของข้อมูลที่มี Relation ต่อกันสูง ให้เหลือตัวแปรที่น้อยลง ทำให้สามารถเข้า Model ได้ง่ายและประสิทธิภาพสูงขึ้น



DATASETS



Date	Game	Earnings	Players	Tournaments
Month	Game	Earnings	Players receiving earnings	Tournaments
1Jan98 – 1Oct21	StarCraft: Brood War 3% WarCraft III 3% Other (6599) 94%	0 – 36.7m	0 – 1699	1 – 172

Ref : kaggle.com/rankirsh/esports-earnings

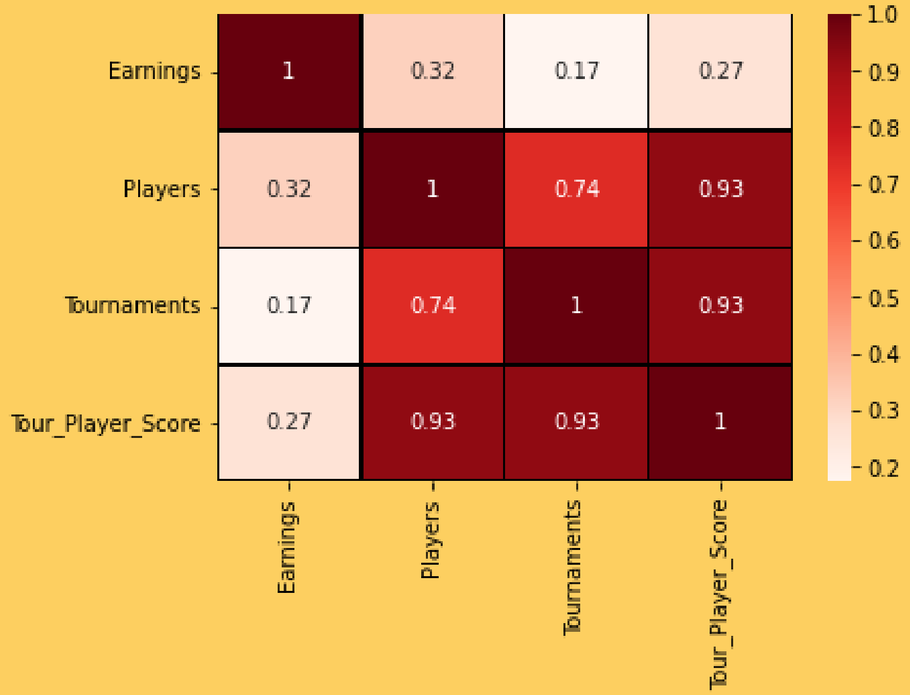
```
[6] from sklearn.decomposition import PCA
    pca = PCA(n_components=1)
    PCA = pca.fit_transform(tournament[['Players','Tournaments']])
    tournament['Tour_Player_Score'] = PCA
```

```
[38] (pca.components_[0][1])
```

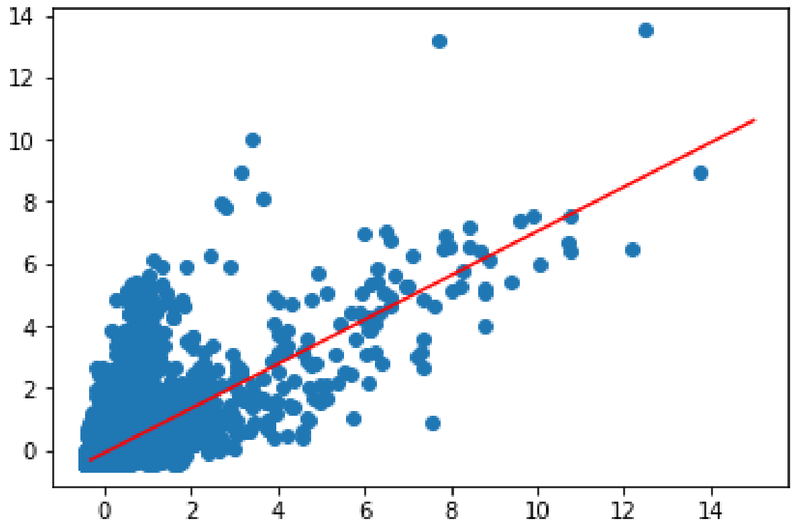
```
0.7071067811865477
```

```
[64] x = [(pca.components_[0][0]*min(tournament['Players'])),15]
     y = [(pca.components_[0][1]*min(tournament['Tournaments'])),(pca.components_[0][1]*15)]
     #(pca.components_[0][0]*min(tournament['Tournaments']))[0]
```

```
[65] a = list(tournament['Tournaments'])
     b = list(tournament['Players'])
```

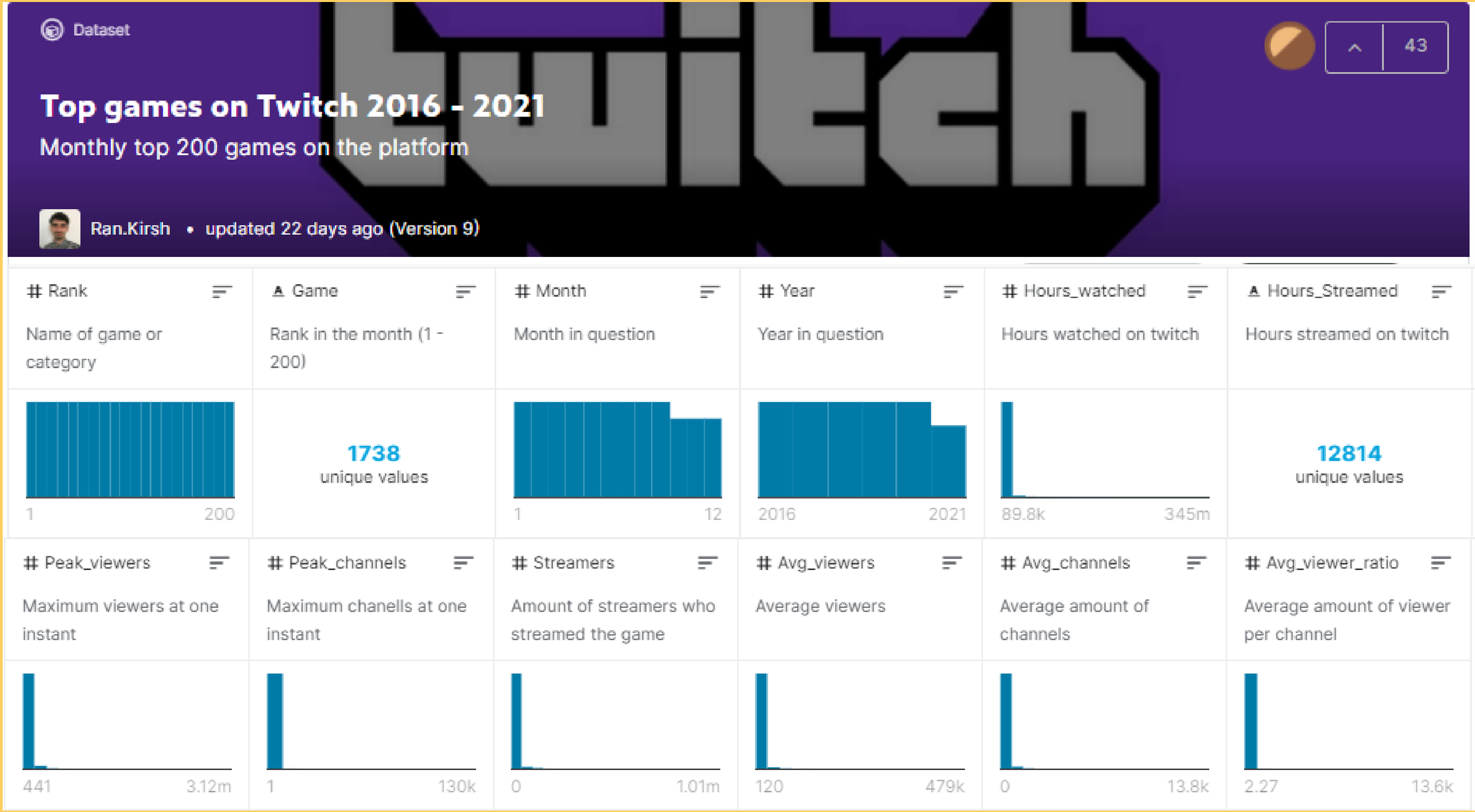



```
[66] import matplotlib.pyplot as plt


     plt.plot(x, y, 'r') # plotting t, a separately
     plt.scatter(b,a)
     plt.show()
```




```
pca.explained_variance_ratio_
```

```
array([0.86846764, 0.13153236])
```

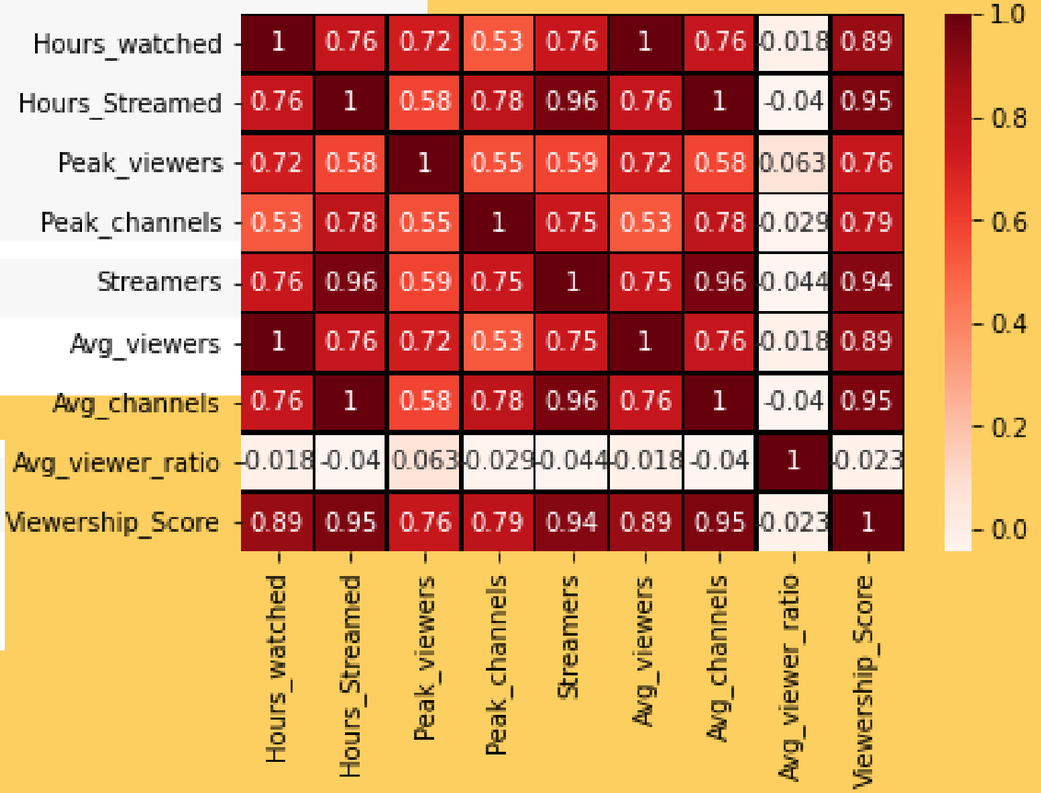


Ref : kaggle.com/rankirsh/evolution-of-top-games-on-twitch

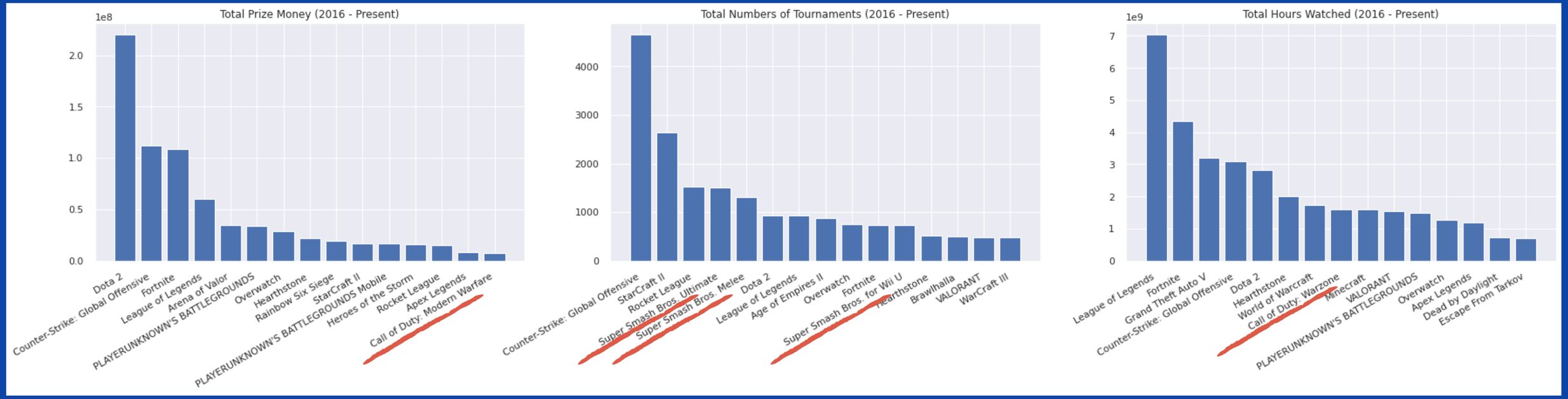
```
[67] import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
     twitch = pd.read_csv('https://github.com/markerxz/games-popularity-analysis/raw/master/Twitch_game_data.csv', encoding='cp1252')
     features = ['Hours_watched','Hours_Streamed','Peak_viewers','Peak_channels','Streamers','Avg_viewers','Avg_channels']

     from sklearn.preprocessing import StandardScaler
     hey = twitch.loc[:,'Hours_Streamed'].values
     for i in range(len(hey)):
       data = hey[i]
       val = int(data.split()[0])
       hey[i] = val
     scaler = StandardScaler()
     twitch[features] = scaler.fit_transform(twitch[features])
     from sklearn.decomposition import PCA
     pca = PCA(n_components=1)
     PCA = pca.fit_transform(twitch[features])
     twitch['Viewership_Score'] = PCA
```

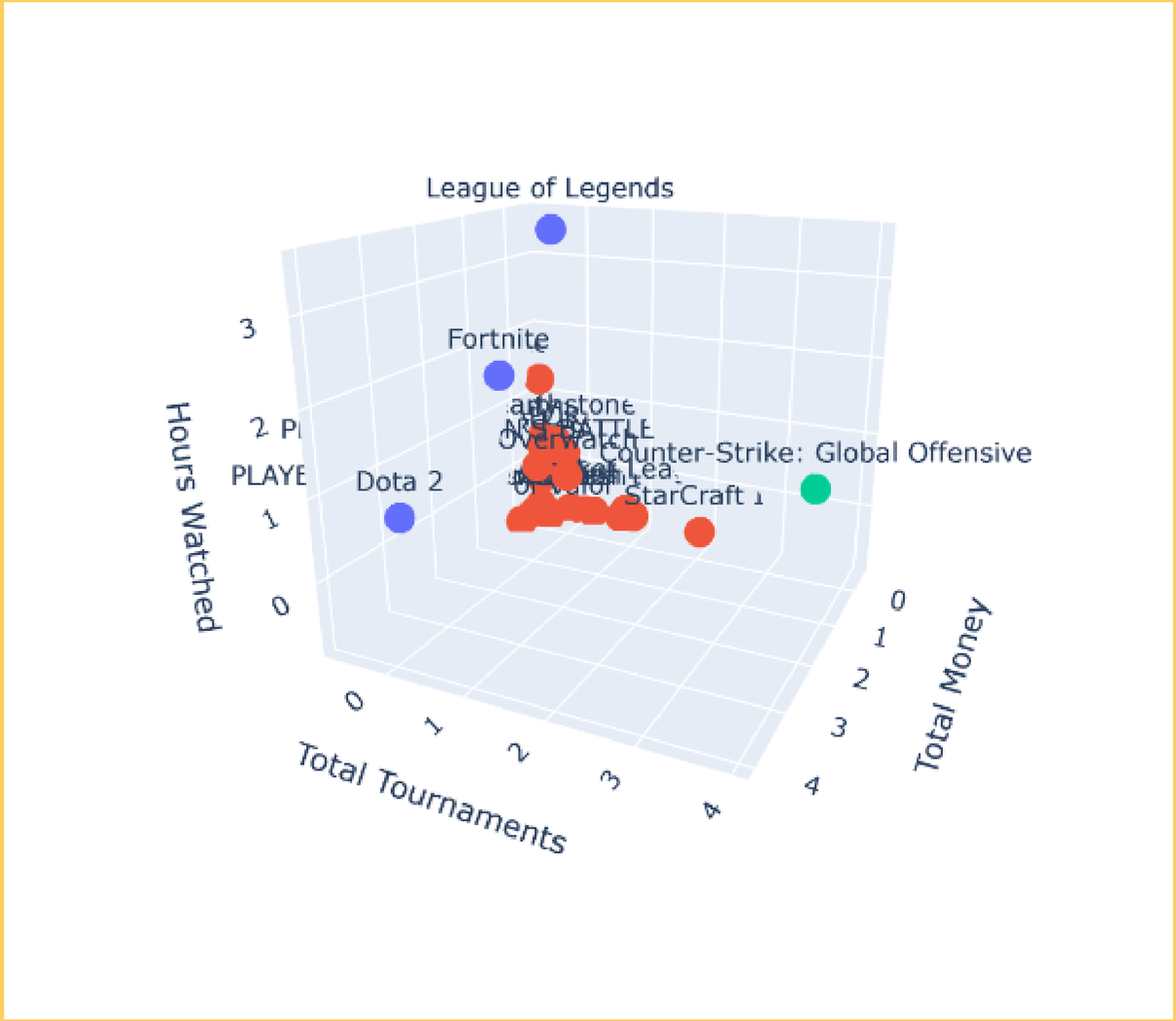
```
[68] pca.components_

     array([[0.38182488, 0.40624682, 0.32232261, 0.33770615, 0.40050088,
             0.38174096, 0.40633589]])
```

```
[13] pca.explained_variance_ratio_

     array([7.84502464e-01, 1.14329373e-01, 6.61829394e-02, 2.79989884e-02,
            6.86970156e-03, 1.04057899e-04, 1.24756729e-05])
```



Top 15 Games in Each Categories





Cluster : 0
Super Smash Bros. Ultimate
Hearthstone
Call of Duty: Modern Warfare
PLAYERUNKNOWN'S BATTLEGROUNDS
Heroes of the Storm
Grand Theft Auto V
Arena of Valor
Age of Empires II
Brawlhalla
StarCraft II
World of Warcraft
Minecraft
Overwatch
Apex Legends
Super Smash Bros. for Wii U
Call of Duty: Warzone
VALORANT
Escape From Tarkov
Dead by Daylight
Rocket League
WarCraft III
PLAYERUNKNOWN'S BATTLEGROUNDS Mobile
Rainbow Six Siege
Super Smash Bros. Melee

```
!pip install fuzzywuzzy
from fuzzywuzzy import fuzz

def difscore(string1,string2):
    temp1 = ""
    for s in string1.lower():
        if ord('a')<=ord(s)<=ord('z'):
            temp1 += s
    temp2 = ""
    for s in string2.lower():
        if ord('a')<=ord(s)<=ord('z'):
            temp2 += s
    return max(fuzz.token_set_ratio(temp1,temp2),fuzz.partial_ratio(string1,string2))
```

```
print(difscore('Ultra Street Fighter IV','Street Fighter V'))
print(difscore('Animal Crossing: New Horizons','Animal Crossing: New Leaf'))
print(difscore('FIFA 07','FIFA 21'))
print(difscore('Counter-Strike: Global Offensive','Counter-Strike: Condition Zero'))
```

```
94
84
100
63
```

```python
game_cluster = []
thereshould = 88
cc = 0
for g in sorted(tour.keys()):
    cc += 1
    if cc%500 == 0:
        print('i = ',cc)
    clusterno = 0
    if not game_cluster:
        game_cluster.append([g])
    else:
        is_clustered = False
        for i in range(len(game_cluster)):
            gc = game_cluster[i]

            score = 0
            for each in gc:
                score = max(difscore(g,each),score)
            if score>=thereshould:
                is_clustered = True
                gc.append(g)
                clusterno = i
                break
        if not is_clustered:
            game_cluster.append([g])
            clusterno = len(game_cluster)-1
    tour[g]['cluster no.'] = clusterno
```

```
['Counter-Strike',
 'Counter-Strike Online',
 'Counter-Strike: Condition Zero',
 'Counter-Strike: Global Offensive',
 'Counter-Strike: Source'],
```

```
['Call Of Duty: Modern Warfare',
 'Call of Duty',
 'Call of Duty 2',
 'Call of Duty 4: Modern Warfare',
 'Call of Duty: Advanced Warfare',
 'Call of Duty: Black Ops',
 'Call of Duty: Black Ops 2',
 'Call of Duty: Black Ops 4',
 'Call of Duty: Black Ops Cold War',
 'Call of Duty: Black Ops II',
 'Call of Duty: Black Ops III',
 'Call of Duty: Blackout',
 'Call of Duty: Ghosts',
 'Call of Duty: Infinite Warfare',
 'Call of Duty: Mobile',
 'Call of Duty: Modern Warfare',
 'Call of Duty: Modern Warfare 2',
 'Call of Duty: Modern Warfare 3',
 'Call of Duty: Modern Warfare Remastered',
 'Call of Duty: Vanguard',
 'Call of Duty: WWII',
 'Call of Duty: Warzone',
 'Call of Duty: World War II',
 'World War 3',
 'World War Z',
 'World War Z: Aftermath'],
```

```
['FIFA 03',
 'FIFA 04',
 'FIFA 05',
 'FIFA 06',
 'FIFA 07',
 'FIFA 08',
 'FIFA 09',
 'FIFA 10',
 'FIFA 11',
 'FIFA 12',
 'FIFA 13',
 'FIFA 14',
 'FIFA 15',
 'FIFA 16',
 'FIFA 17',
 'FIFA 18',
 'FIFA 19',
 'FIFA 20',
 'FIFA 2000',
 'FIFA 2001',
 'FIFA 2002 World Cup',
 'FIFA 21',
 'FIFA 22'],
['FIFA Online 3', 'FIFA Online 4'],
```

```
['Hyper Street Fighter II',
 'Street Fighter IV',
 'Street Fighter V',
 'Street Fighter V: Arcade Edition',
 'Street Fighter V: Champion Edition',
 'Street Fighter X Tekken',
 'Super Street Fighter II Turbo',
 'Super Street Fighter II Turbo HD Remix',
 'Super Street Fighter IV',
 'Super Street Fighter IV Arcade Edition',
 'Ultra Street Fighter IV'],
```

```python
game_cluster_name = []
cc = 0
import re
for cluster in (game_cluster):
    #print(cluster)
    if len(cluster) == 1:
        game_cluster_name.append(cluster[0])
    else:
        arr_of_dict = []

        for g in cluster:
            gsplit = re.split(" |'|,|:", g)

            #print(gsplit)
            for i in range(len(gsplit)):
                gsplit[i] = gsplit[i].upper()
                if len(arr_of_dict)<=i:
                    arr_of_dict.append({'sumword':0})
                if gsplit[i] not in arr_of_dict[i]:
                    arr_of_dict[i][gsplit[i]] = 1
                    arr_of_dict[i]['sumword'] += 1
                else:
                    arr_of_dict[i][gsplit[i]] += 1
                    arr_of_dict[i]['sumword'] += 1
        seriesname = ""
        for i in range(len(arr_of_dict)):
            d = arr_of_dict[i]
            templ = sorted([[dk,d[dk]]for dk in d.keys() if dk!='sumword'],key = lambda x:(x[1]))[::-1]
            if templ[0][1]/d['sumword']>0.5 and d['sumword'] != 1:

                seriesname += templ[0][0]+' '
            else:
                if seriesname == '':

                    seriesname = min(cluster, key=len) + ' '
                break
        game_cluster_name.append(seriesname+"Series")
        if seriesname == '':
            print(arr_of_dict)
    cc += 1
```

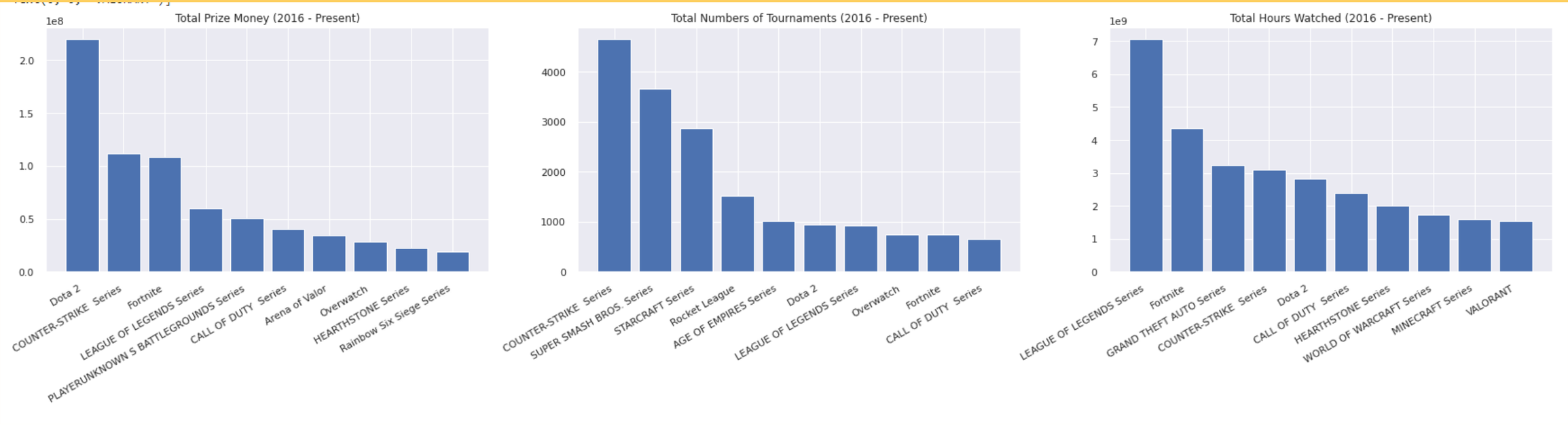
```
'BORDERLANDS Series',
'Batman: The Telltale Series',
'CALL OF DUTY  Series',
'CAPCOM VS. SNK Series',
'CAR MECHANIC SIMULATOR Series',
'CASTLEVANIA  Series',
'CATHERINE Series',
'COMMAND & CONQUER Series',
'COUNTER-STRIKE  Series',
'CRASH BANDICOOT Series',
'CRUSADER KINGS Series',
'Casino Series',
'Chess Series',
'Crea Series',
'DARK SOULS II Series',
'DARKSIDERS Series',
'DAY OF DEFEAT Series',
'DEAD BY DAYLIGHT Series',
'DEAD OR ALIVE Series',
'DEAD RISING Series',
'DEAD SPACE Series',
```

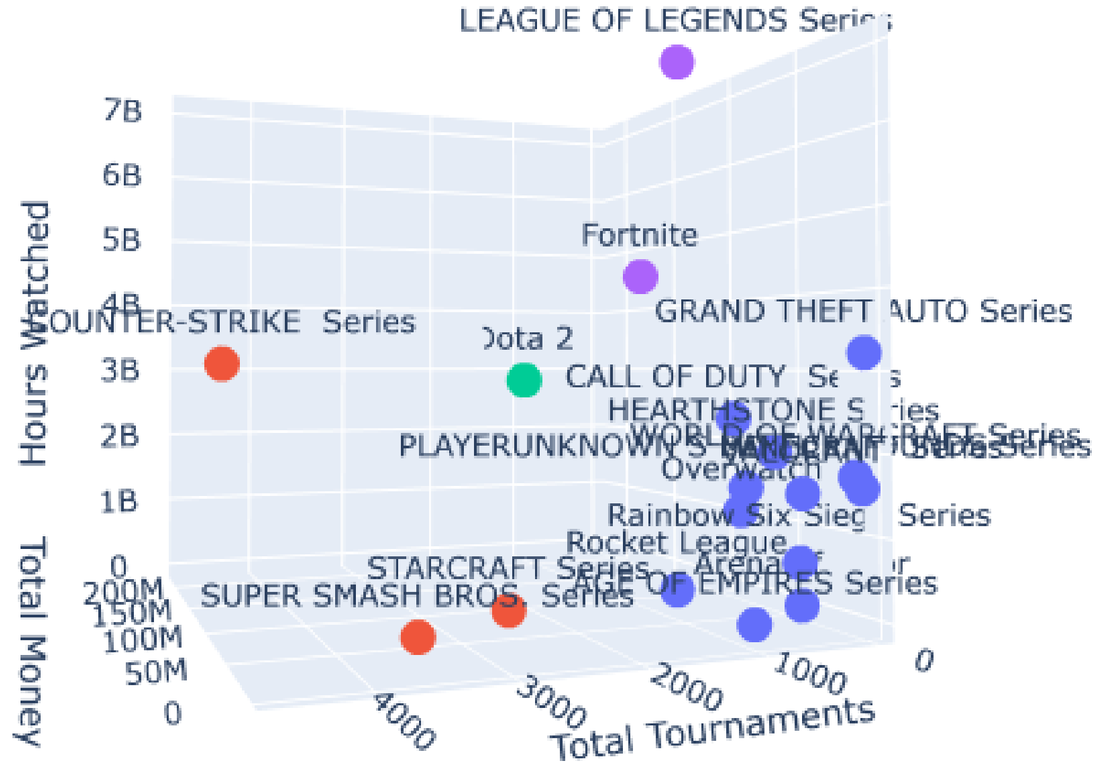
```
'MONSTER HUNTER Series',
'MORDHAU Series',
'MORTAL KOMBAT Series',
'MOUNT YOUR FRIENDS Series',
'Mario Party 10 Series',
'NARAKA  BLADEPOINT Series',
'NARUTO SHIPPUDEN  ULTIMATE NINJA STORM Series',
'NASCAR HEAT Series',
'NASCAR THUNDER Series',
'NBA Series',
'NEED FOR SPEED  Series',
'NHL Series',
```

```
[ ]  tour['Counter-Strike: Global Offensive']
```

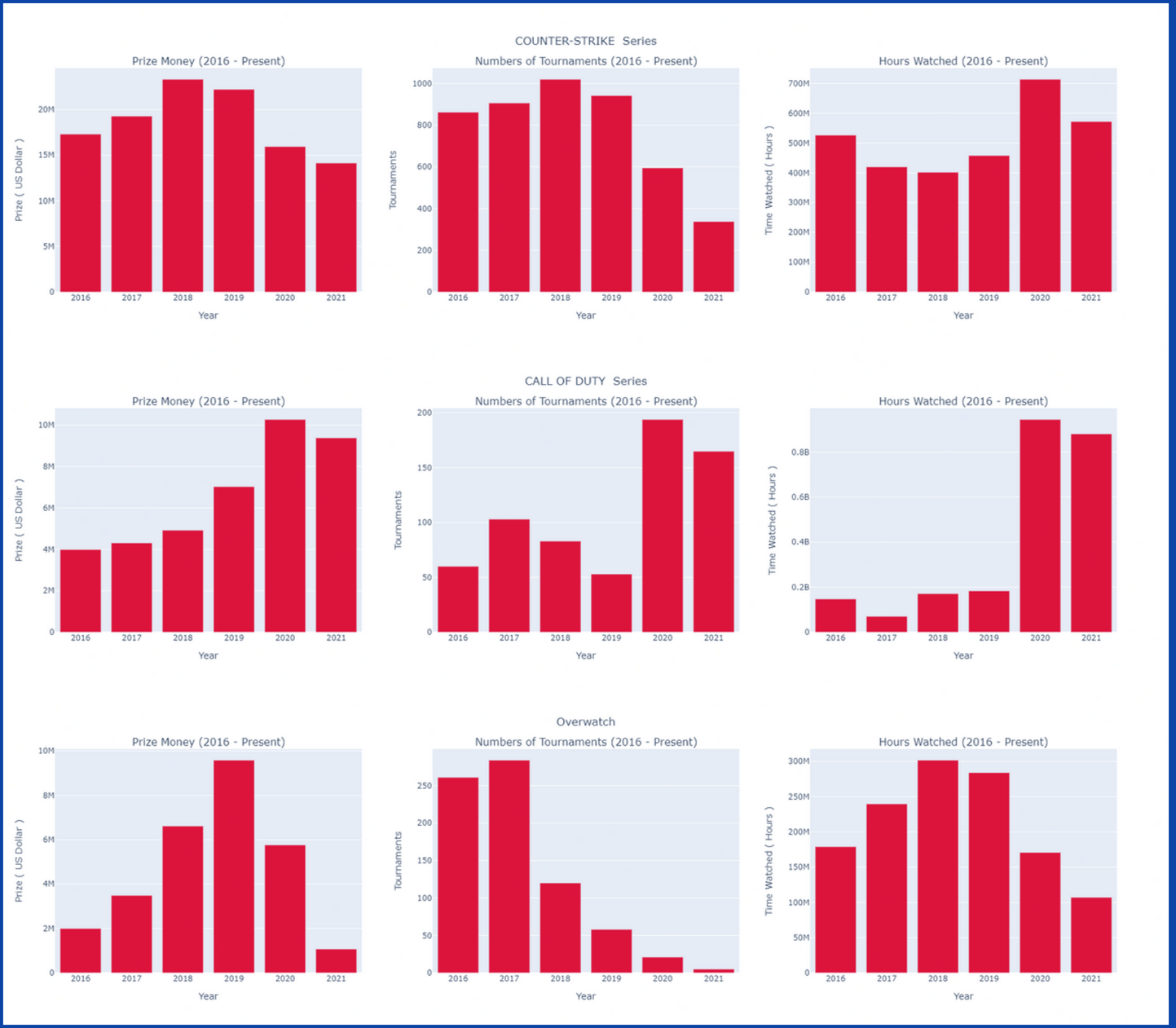
```
{'cluster no.': 211,
 'cluster_name': 'COUNTER-STRIKE  Series',
 'hw': {2016: 526391918,
  2017: 419802259,
  2018: 401775324,
  2019: 457874735,
  2020: 713749581,
  2021: 571944429,
  'total': 3091538246,
  'total2016+': 3091538246},
 'money': {2012: 222538.77000000002,
  2013: 1211869.54,
  2014: 1962515.01,
  2015: 6284970.140000001,
  2016: 17266132.499999996,
  2017: 19279544.51,
  2018: 23320449.03,
  2019: 22214116.83,
  2020: 15943485.719999999,
  2021: 14140226.34,
  'total': 121845848.38999996,
  'total2016+': 112163954.92999995},
 'ntour': {2012: 48,
  2013: 199,
  2014: 279,
  2015: 707,
  2016: 861,
  2017: 906,
  2018: 1020,
  2019: 941,
  2020: 595,
  2021: 338,
  'total': 5894,
  'total2016+': 4661}}
```

Top 10 Series in Each Categories






```
Cluster :  0
CALL OF DUTY  Series
PLAYERUNKNOWN S BATTLEGROUNDS Series
Rainbow Six Siege Series
Rocket League
WORLD OF WARCRAFT Series
VALORANT
Arena of Valor
GRAND THEFT AUTO Series
AGE OF EMPIRES Series
MINECRAFT Series
Overwatch
HEARTHSTONE Series

Cluster :  1
SUPER SMASH BROS. Series
COUNTER-STRIKE  Series
STARCRAFT Series

Cluster :  2
Dota 2

Cluster :  3
Fortnite
LEAGUE OF LEGENDS Series
```

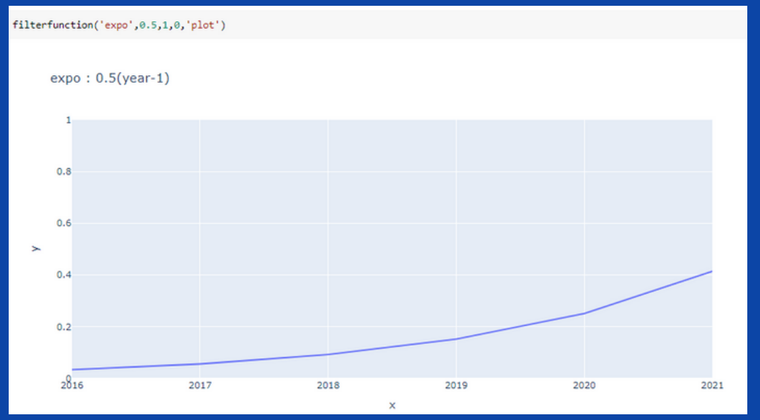


Same weight for every year.

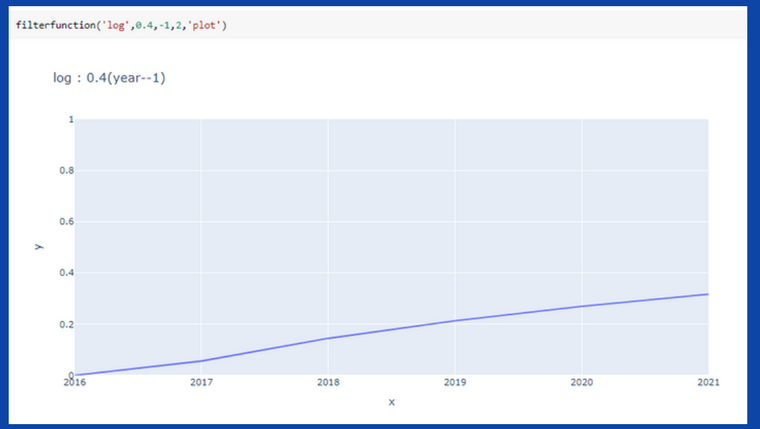
Is it fair ?

```python
def filterfunction(type,m,k,base,plot):
    import numpy as np
    import math
    import pandas as pd
    import plotly.express as px


    if type == 'expo':
      xd = [i for i in range(1,7)]
      yx = [math.exp(m*(i-k)) for i in xd]
      sumy = sum(yx)
      y = [i/sumy for i in yx]
    elif type == 'log':
      xd = [i-k for i in range(1,7)]
      yx = []
      for i in xd:
        if m*i<1:
          yx.append(math.log(1,base))
        else:
          yx.append(math.log(m*i,base))
      sumy = sum(yx)
      y = [i/sumy for i in yx]
    z = [i+2015 for i in range(1,7)]
    df = pd.DataFrame(dict(
        x = xd,
        y = y,
        z = z
    ))
    if plot.lower() == 'plot':
      fig = px.line(df, x="x", y="y", title=type+" : "+str(m)+"(year-"+str(k)+")")

      #fig.update_yaxes(range = [0,5])
      fig.update_layout(
      xaxis = dict(
          tickmode = 'array',
          tickvals = df['x'],
          ticktext = df['z']
      )
      )
      fig.update_yaxes(range=list([0,1]))
      fig.show(render = 'colab')

    return {z[i]:y[i] for i in range(len(y))}
```

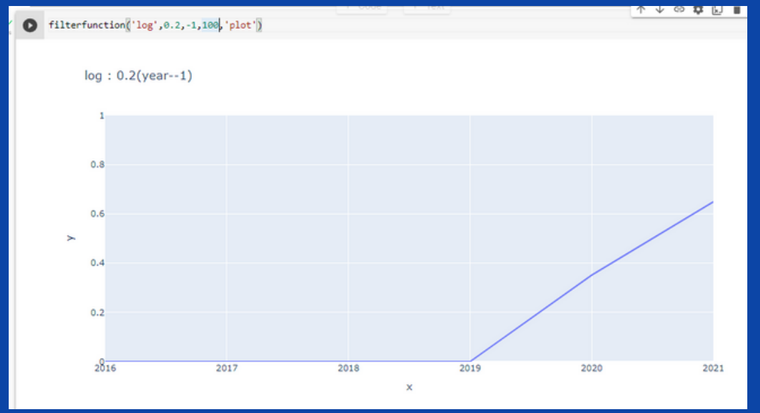
```
filterfunction('expo',0.5,1,0,'plot')
```



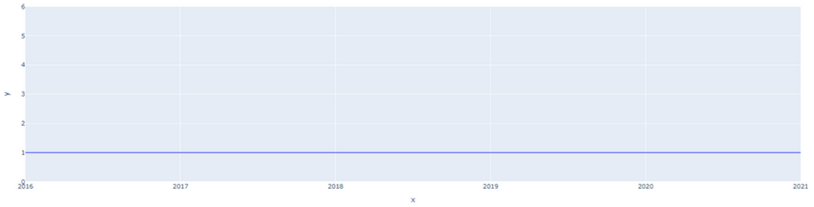

```
filterfunction('log',0.4,-1,2,'plot')
```

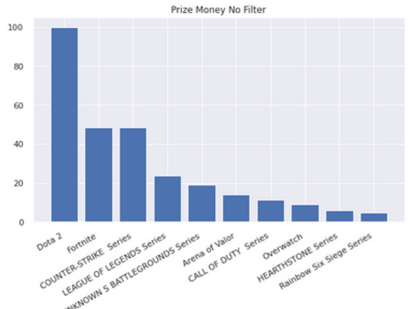


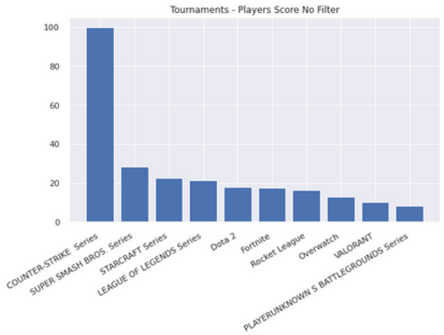

```
filterfunction('log',0.2,-1,100,'plot')
```

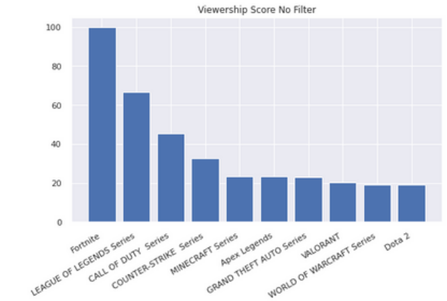


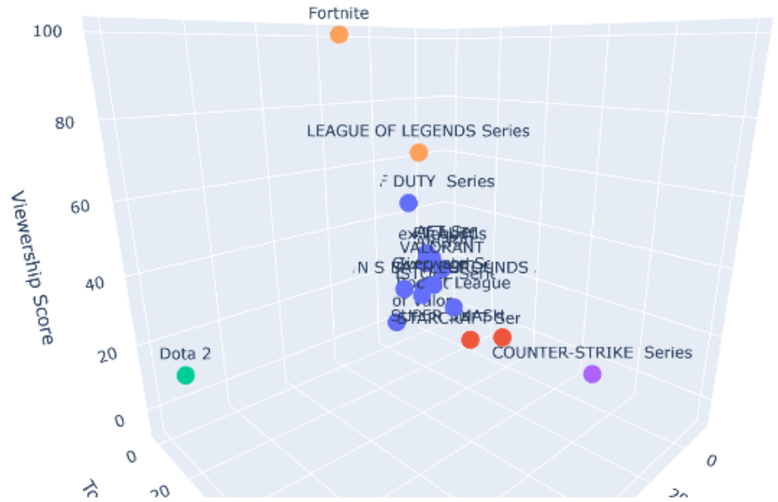
NO FILTER











Cluster : 0
STARCRAFT Series
SUPER SMASH BROS. Series

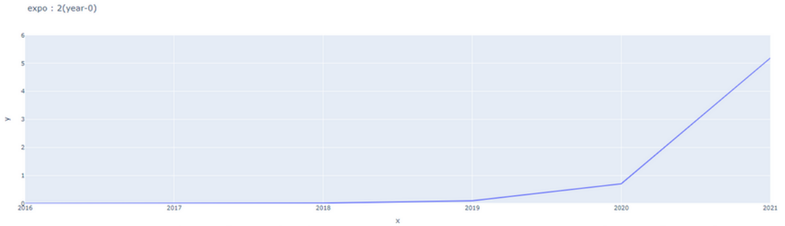
Cluster : 1
Arena of Valor
Rocket League
Apex Legends
CALL OF DUTY Series
PLAYERUNKNOWN S BATTLEGROUNDS Series
GRAND THEFT AUTO Series
Overwatch
WORLD OF WARCRAFT Series
Rainbow Six Siege Series
MINECRAFT Series
HEARTHSTONE Series
VALORANT

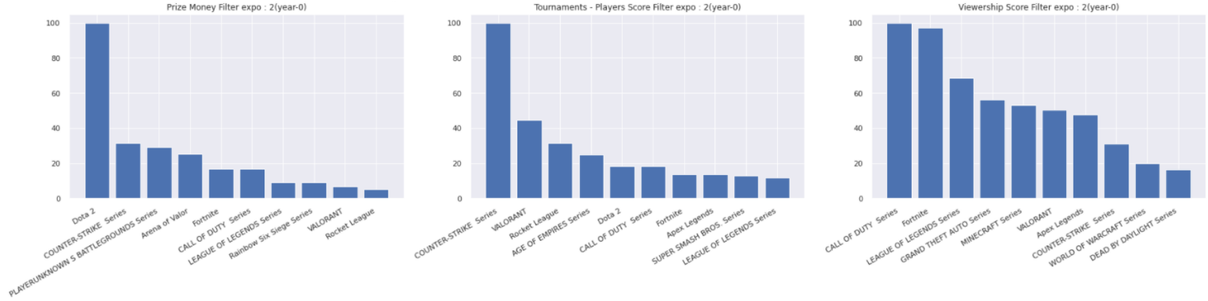
Cluster : 2
COUNTER-STRIKE Series

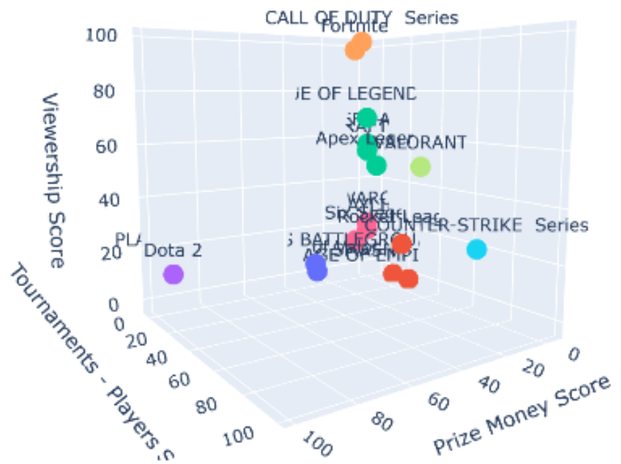
Cluster : 3
LEAGUE OF LEGENDS Series
Fortnite

Cluster : 4
Dota 2

EXPO : e^(2X)







Cluster : 0
Rocket League
SUPER SMASH BROS. Series
AGE OF EMPIRES Series

Cluster : 1
CALL OF DUTY Series
Fortnite

Cluster : 2
Arena of Valor
PLAYERUNKNOWN S BATTLEGROUNDS Series

Cluster : 3
Dota 2

Cluster : 4
COUNTER-STRIKE Series

Cluster : 5
Apex Legends
GRAND THEFT AUTO Series
LEAGUE OF LEGENDS Series
MINECRAFT Series

Cluster : 6
VALORANT

Cluster : 7
DEAD BY DAYLIGHT Series
WORLD OF WARCRAFT Series
Rainbow Six Siege Series

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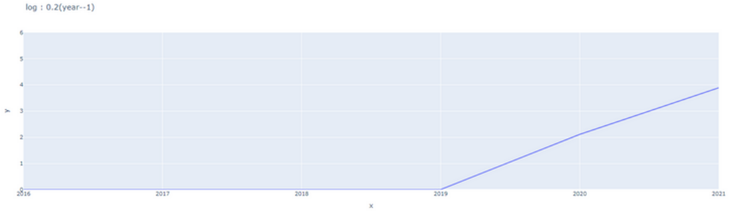
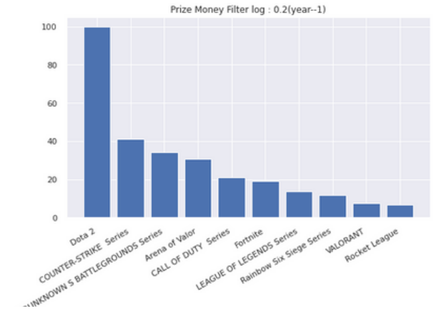
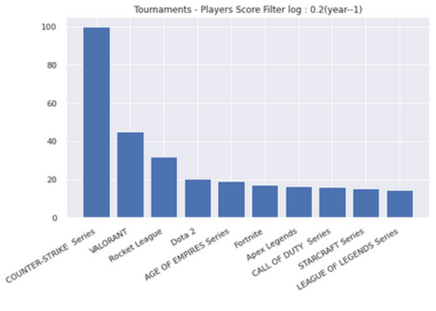
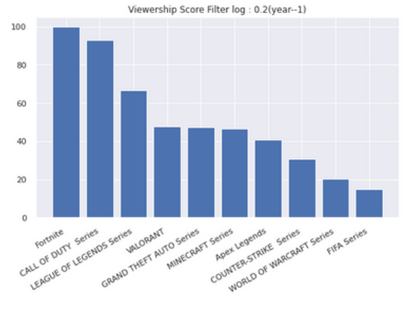
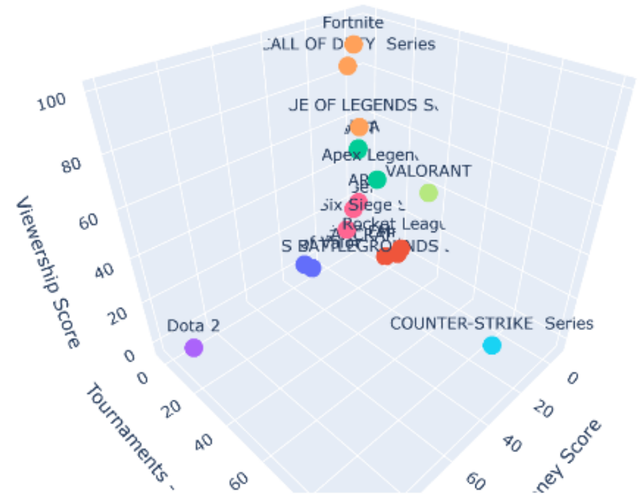










Cluster : 0
VALORANT

Cluster : 1
FIFA Series
WORLD OF WARCRAFT Series
Rainbow Six Siege Series

Cluster : 2
COUNTER-STRIKE Series

Cluster : 3
Dota 2

Cluster : 4
CALL OF DUTY Series
LEAGUE OF LEGENDS Series
Fortnite

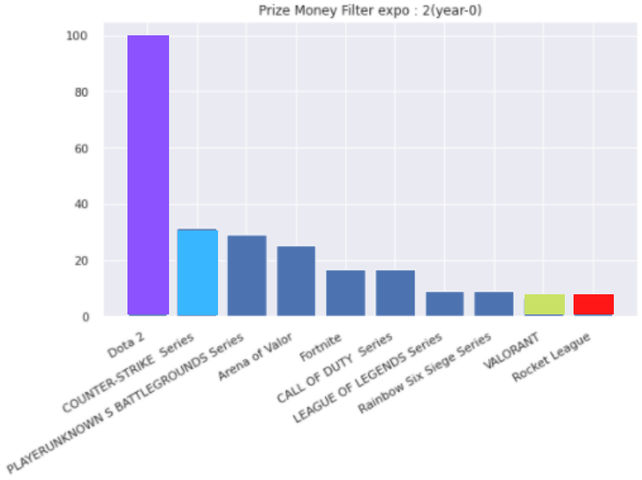
Cluster : 5
STARCRAFT Series
Rocket League
AGE OF EMPIRES Series

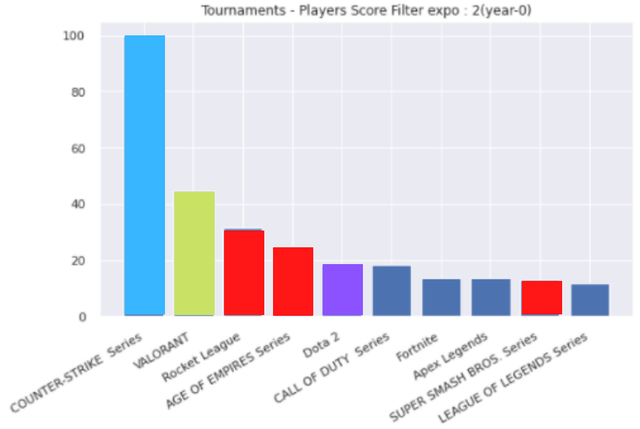
Cluster : 6
Apex Legends
GRAND THEFT AUTO Series
MINECRAFT Series

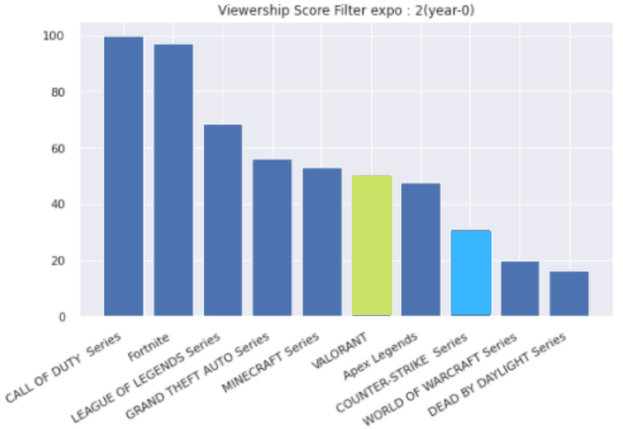
Cluster : 7
Arena of Valor
PLAYERUNKNOWN S BATTLEGROUNDS Series

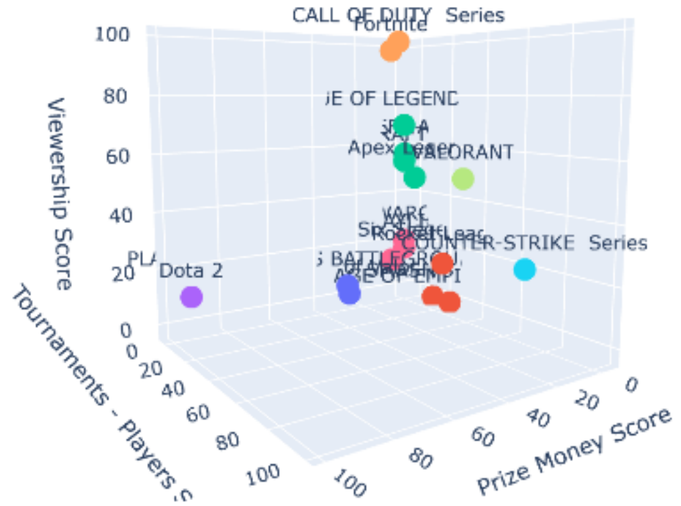
INSIGHT AND ACTION PLANS

HIGH TOUR-PLAYER, PRIZE CLUSTERS









Cluster : 0
Rocket League
SUPER SMASH BROS. Series
AGE OF EMPIRES Series

Cluster : 3
Dota 2

Cluster : 4
COUNTER-STRIKE Series

Cluster : 6
VALORANT

EXPO : e^(2X)

MiTH เปิดตัว Line-up ทีม Valorant แบบยกชุดที่นำทัพโดยอดีต IGL ฝีมือดีของวงการ CS:GO อย่าง TOR พร้อมผู้เล่นตัวท็อปอีกเพียบ !!

> ไลน์อัพนี้บอกเลยว่าเข้ม !!
> 2021-04-09 22:32 By 9hos7y

หลังจากเมื่อไม่กี่วันก่อนทาง **MiTH** ได้ประกาศปล่อยผู้เล่นภายในสังกัดแบบยกชุด ไปเมื่อไม่นาน ซึ่งพวกเค้าได้ออกมาประกาศว่าได้มีทีมที่เตรียมจะตบเท้าเข้าสู่สังกัดเป็นที่เรียบร้อยแล้ว และล่าสุดพวกเค้าก็ได้ประกาศเปิดตัวผู้เล่นยกทีมแบบเป็นทางการที่นำทัพโดย **Tor** อดีต **IGL** ตัวท็อปของวงการ **CS:GO**

รู้จักกับทีม OG จากทีมแห่งมิตรภาพสู่ราชาแห่งโลก DOTA2

ลงวันที่ 04/09/2019

Dota 2 [แก้]

ID	ชื่อ	สัญชาติ
Sumail	Sumail	ปากีสถาน
Topson	Topias Taavitsainen	ฟินแลนด์
Ceb	Sébastien Debs	ฝรั่งเศส
Saksa		ฟินแลนด์
N0tail	Johan Sundstein	เดนมาร์ก

Counter-Strike: Global Offensive [แก้]

ID	ชื่อ	สัญชาติ
NBK-	Nathan Schmitt	ฝรั่งเศส
valde	Valdemar Bjørn	เดนมาร์ก
ISSAA	Issa Murad	จอร์แดน
mantuu	Mateusz Wilczewski	โปแลนด์
Aleksib	Aleksi Virolainen	ฟินแลนด์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SNK PLAYMORE
twitch
UDON
XBOX
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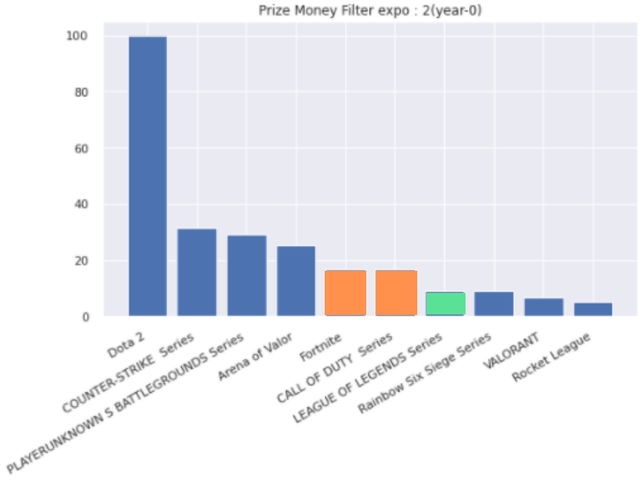
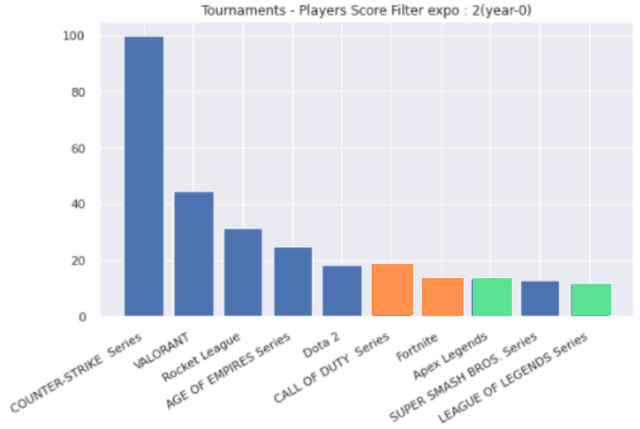
PGL
MAJOR
STOCKHOLM 2021
OFFICIAL MONITOR PARTNER
ZOWIE
a brand by BenQ
PGL | IN STOCKHOLM
AVICII ARENA
MAJOR 2021
FIRST MAJOR IN 4K
Bitget
GGBET
SECRET LAB

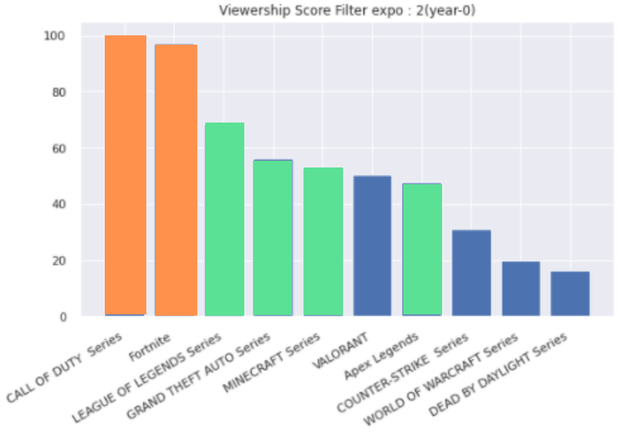

RedBull
OG
WINTERMUTE
FUN88
IC Markets
steelseries
SECRET LAB

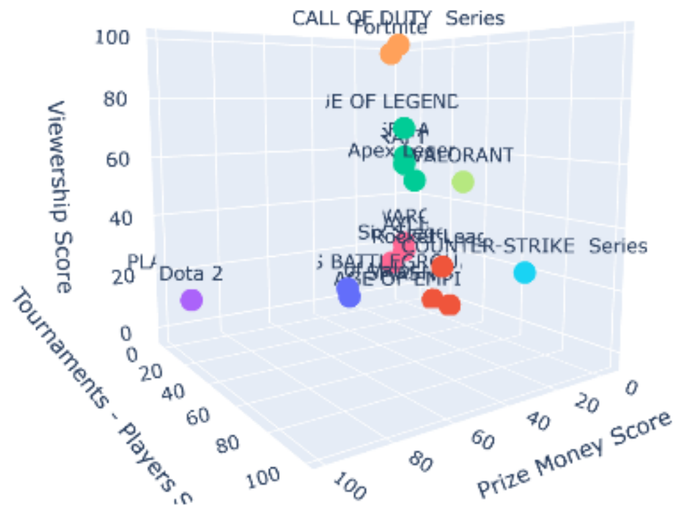

TEAM SECRET
CORSAIR
UNISWAP
SECRET LAB
TUMI

HIGH VIEWERSHIP CLUSTERS







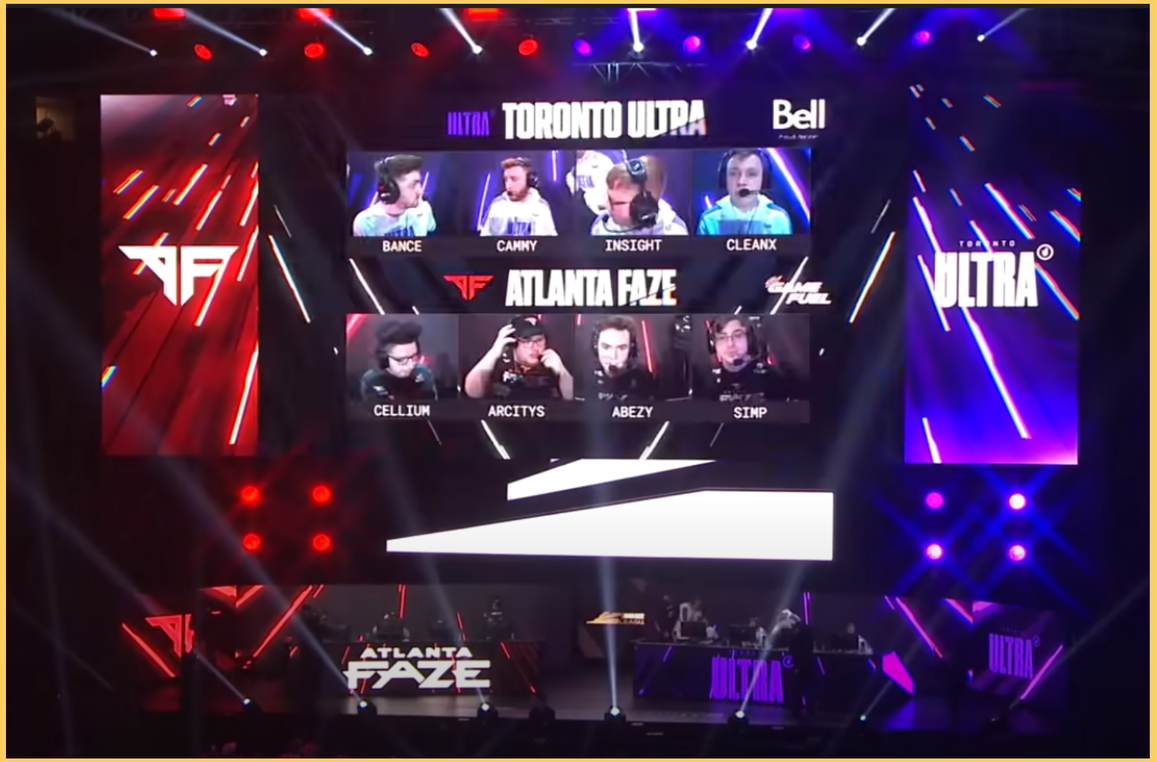


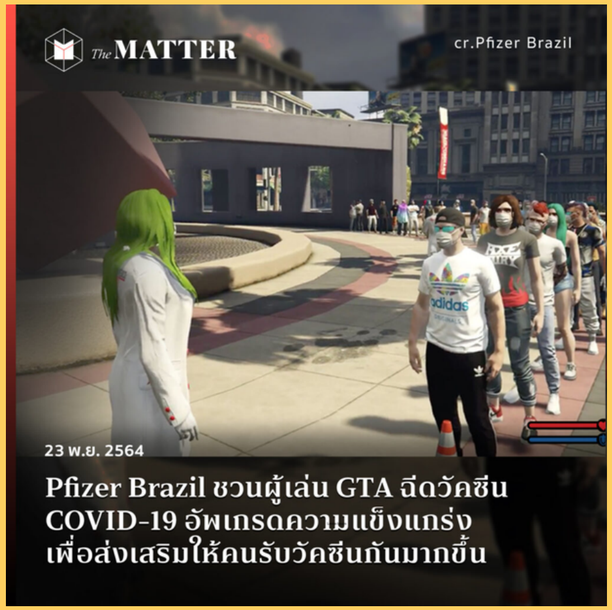
Cluster : 1
CALL OF DUTY Series
Fortnite

Cluster : 5
Apex Legends
GRAND THEFT AUTO Series
LEAGUE OF LEGENDS Series
MINECRAFT Series

EXPO : e^(2X)


FORTNITE


TORONTO ULTRA
Bell
BANCE
CAMMY
INSIGHT
CLEANX
ATLANTA FAZE
CELLIUM
ARCITYS
ABEZY
SIMP
ATLANTA FAZE


The MATTER
cr.Pfizer Brazil
23 พ.ย. 2564
Pfizer Brazil ชวนผู้เล่น GTA ฉีดวัคซีน
COVID-19 อัพเกรดความแข็งแกร่ง
เพื่อส่งเสริมให้คนรับวัคซีนกันมากขึ้น


FORTNITE
THE CROSSOVER
TIPS OFF 05.19
NBA PLAYOFFS BEGIN 05.22


LEAGUE OF LEGENDS
CHAMPIONSHIP
SERIES


HYPERX
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AT&T
Microsoft
PUMA
Red Bull
SECRET LAB
twitch
KAISER PERMANENTE
EPOS


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oppo
PUMA
虎牙直播
huya.com
上好佳
尖叫
HermanMiller
鱻酷 活鱼烤鱼
KFC
FPX


MONSTER ENERGY
ALIENWARE
SAP
HONDA
twitch
SECRET LAB
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AT&T
JBL
DOLLAR SHAVE CLUB
TRULY HARD SELTZER
TWISTED TEA
CHIPOTLE
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GRUBHUB
OMEN
ROCKET Mortgage
StockX
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ร่วมเชียร์ทีมไทยชิงแชมป์โลก
dtac x TALON
Arena Of Valor World Cup 2021

ご静聴ありがとうございました。

THANK YOU FOR YOUR LISTENING.

終わり

THE END