



# VIDEO GAME RECOMMENDER

TRI NGUYEN



# GOAL

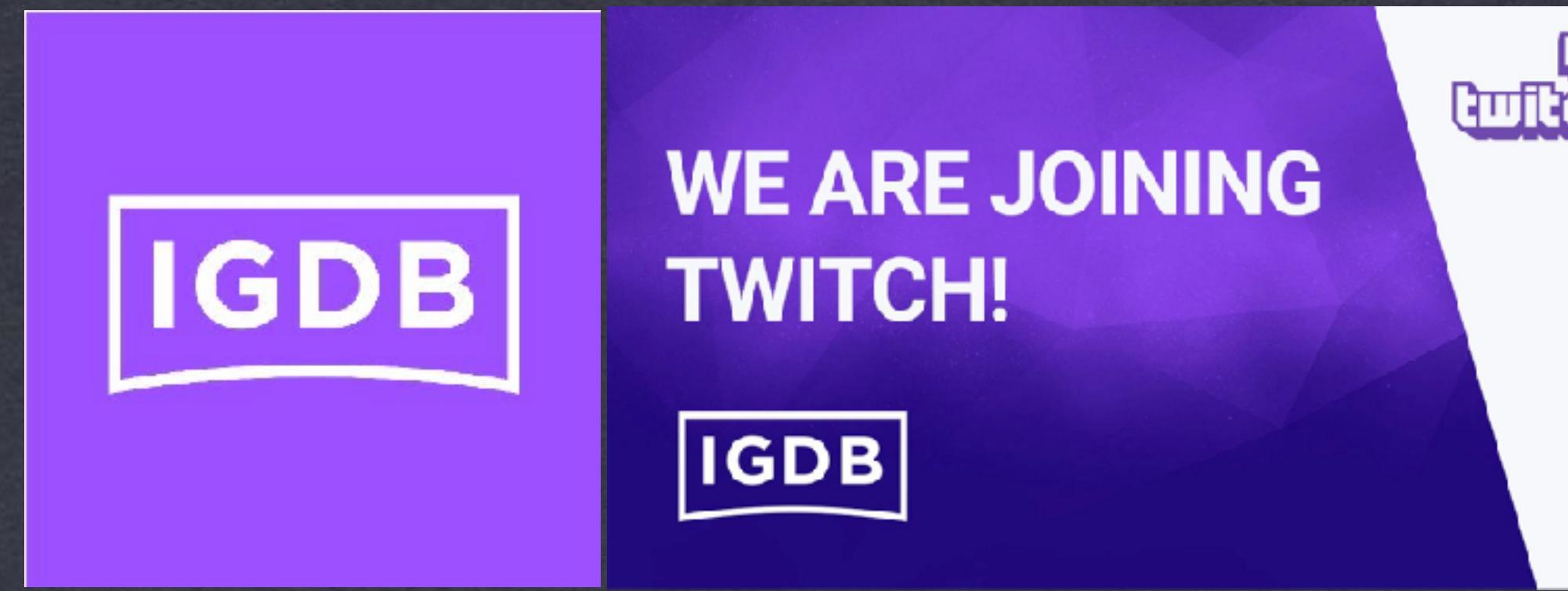
## RECOMMEND A VIDEO GAME BASED ON GAME ATTRIBUTES INCLUDING GENRE, GAME ENGINE, AND GAME MODE





“Our vision is to build a so-called one-stop info spot on video games where gamers can easily find information about a game, platform, gaming company or game developer”

*–Christian Frithiof, founder of Internet Game Database*



- COLLECT, STORE AND DISTRIBUTE KNOWLEDGE ABOUT GAMES
- GATHER GAMERS AND THE GAMING INDUSTRY TOGETHER
- FOCUS ON USERS AND ALLOW THEM TO DECIDE ON DESIGN AND FEATURES

IGDB Search Games Database Community Help

IGDB Search Games Database Community Help

SIGN UP LOGIN Personalize

Welcome to the guiding star in *your* world of gaming

POPULAR GAMES RIGHT NOW

|                |                          |                     |   |                             |
|----------------|--------------------------|---------------------|---|-----------------------------|
| GTFO Adventure | S.T.A.L.K.E.R. 2 Shooter | Hurtworld Adventure | Warcraft III: Reforged 57% Real Time Strategy (RTS) | PlanetSide Arena 0% Shooter |
|----------------|--------------------------|---------------------|---|-----------------------------|

RECENTLY REVIEWED >

|  |  |
|--|--|
|  |  |
|--|--|

RECENTLY RELEASED >

|  |  |
|--|--|
| Summon Masks March 6th, 2020 (16 hours ago)                  | Frontline: Panzer Blitzkrieg! March 6th, 2020 (16 hours ago) |
| Frontline: Panzer Blitzkrieg! March 6th, 2020 (16 hours ago) | Pizza Master VR March 6th, 2020 (16 hours ago)               |
| B.O.T.S. and the Robofriends March 6th, 2020 (16 hours ago)  | Summon Masks March 6th, 2020 (16 hours ago)                  |
| POLYGON March 6th, 2020 (16 hours ago)                       | POLYGON March 6th, 2020 (16 hours ago)                       |
| Deep Space Battle Simulator March 6th, 2020 (16 hours ago)   | Sono March 6th, 2020 (16 hours ago)                          |
| Pizza Master VR March 6th, 2020 (16 hours ago)               | Yes, Your Grace March 6th, 2020 (16 hours ago)               |
| Smart City Plan March 6th, 2020 (16 hours ago)               | Smart City Plan March 6th, 2020 (16 hours ago)               |
| Yes, Your Grace March 6th, 2020 (16 hours ago)               | Deep Space Battle Simulator March 6th, 2020 (16 hours ago)   |
| Sono March 6th, 2020 (16 hours ago)                          | B.O.T.S. and the Robofriends March 6th, 2020 (16 hours ago)  |
| Tiny Bunny March 6th, 2020 (16 hours ago)                    | Tiny Bunny March 6th, 2020 (16 hours ago)                    |

COMING SOON >

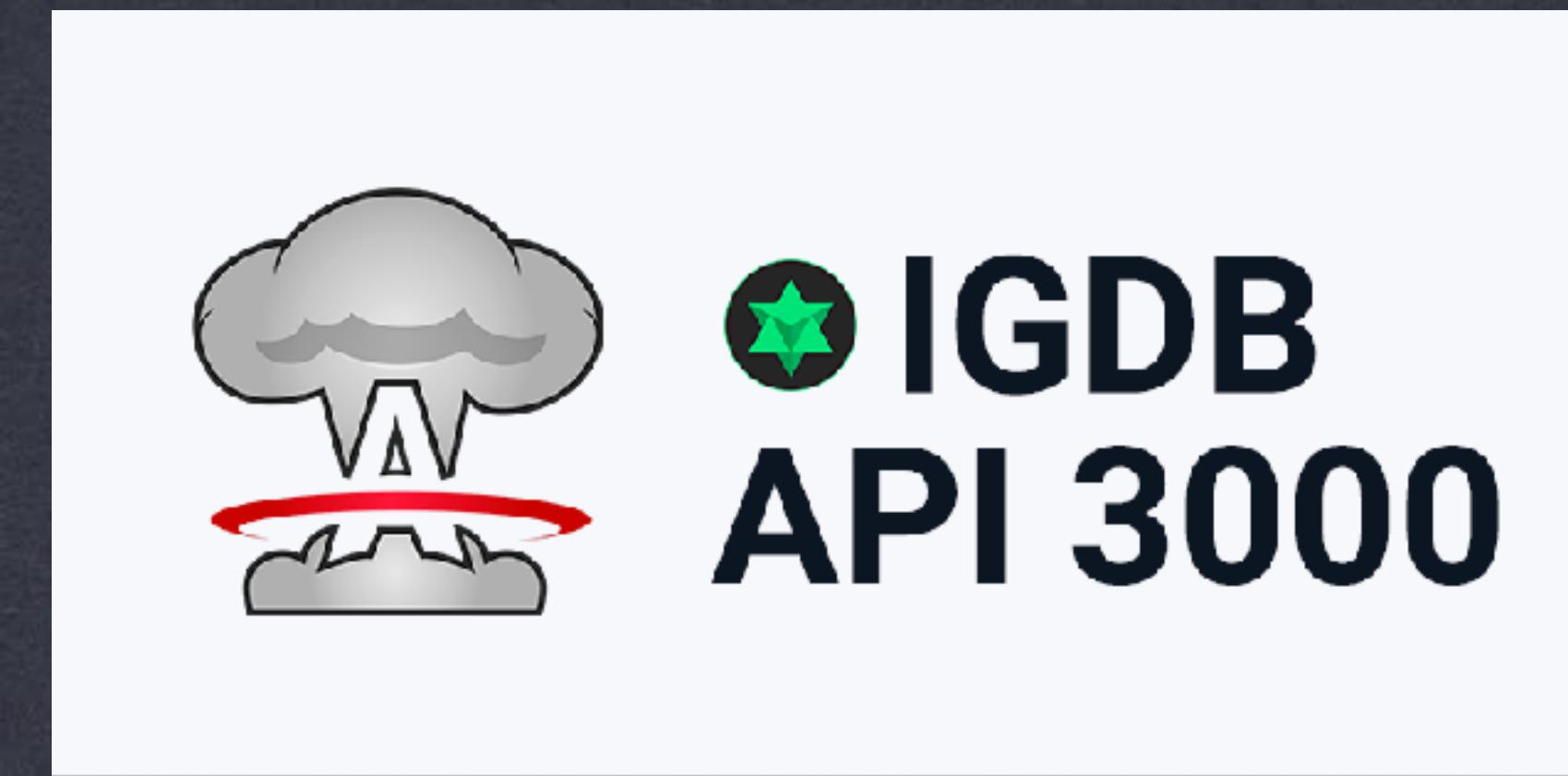
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| Tiny Bunny March 6th, 2020 (16 hours ago)                    | Tiny Bunny March 6th, 2020 (16 hours ago)                    |

MOST ANTICIPATED >

|  |
|--|
| Cyberpunk 2077 September 17th, 2020 (in 6 months)          |
| The Last of Us: Part II May 29th, 2020 (in 3 months)       |
| Final Fantasy VII Remake April 10th, 2020 (in a month)     |
| Marvel's Avengers September 4th, 2020 (in 6 months)        |
| Dying Light 2 June 30th, 2020 (in 4 months)                |
| Doom: Eternal March 20th, 2020 (in 13 days)                |
| Biomutant December 31st, 2020 (in 10 months)               |
| Ghost of Tsushima June 26th, 2020 (in 4 months)            |
| Ori and the Will of the Wisps March 11th, 2020 (in 4 days) |
| Watch Dogs: Legion December 31st, 2020 (in 10 months)      |

# APPLICATION PROGRAMMING INTERFACE (API)

- \* 50K REQUESTS
- \* 500 RESULTS PER-PAGE LIMIT
- \* 5000 OFFSET LIMIT
- \* GAME ACHIEVEMENTS
- \* EXTERNAL IDS
- \* MULTI-QUERYING
- \* NEED ACCESS TOKEN TO  
CHECK USER ID AND RATINGS



|                                    | IGDB.com   | GiantBomb              | thegamesdb.net |
|------------------------------------|------------|------------------------|----------------|
| Total unique games                 | +128,741   | -48,000                | +25,000        |
| Allowed to build competing product | ✓          |                        |                |
| SSL support                        | ✓          |                        | ✓              |
| Protocol / Formats                 | JSON, REST | JSON, JSONP, XML, REST | XML, REST      |



# INSOMNIA

- \* FREE & OPEN SOURCE
- \* MAC, WINDOWS, & LINUX
- \* CREATE HTTP RESULTS
- \* VIEW RESPONSE DETAILS
- \* GENERATE CODE SNIPPET
- \* INC. PYTHON & SWIFT

Tim Book

GET https://api-v3.igdb.com/platforms

Send 200 634 ms 54.2 KB 5 Minutes Ago

No Environment Cookies

JSON Auth Query Header 2 Docs

Preview Header 9 Cookie Timeline

Filter

GET IGDB Games Offset 4000

GET IGDB Games Offset 4500

GET IGDB Games Offset 5000

GET IGDB Games Nintendo Switch

GET IGDB Games Nintendo Switch ...

GET IGDB Games PS4

GET IGDB Games XBox One

GET IGDB Games Spider Man

GET IGDB Platform

GET IGDB Family

GET IGDB Screenshot

GET IGDB Player Perspective

GET IGDB Game Mode

GET IGDB Character

GET IGDB Character Offset 500

GET IGDB Character Offset 1000

GET IGDB Character Offset 1500

GET IGDB Title

GET IGDB Genres

GET IGDB Time to Beat

1 fields \*;  
2 limit 500;  
3 sort id;

1 [  
2 {  
3 "id": 3,  
4 "abbreviation": "Linux",  
5 "alternative\_name": "GNU/Linux",  
6 "category": 4,  
7 "created\_at": 1297555200,  
8 "name": "Linux",  
9 "platform\_logo": 33,  
10 "product\_family": 4,  
11 "slug": "linux",  
12 "summary": "Linux is a free and open-source  
(FOSS/FLOSS) Operating System. In a more precise and  
complex definition, Linux is an open-source OS kernel  
on which a large variety of Operating Systems (known as  
Linux distributions) are built.",  
13 "updated\_at": 1392940800,  
14 "url": "https://www.igdb.com/platforms/linux",  
15 "versions": [  
16 44  
17 ],  
18 "websites": [  
19 1  
20 ]  
21 },  
22 {  
23 "id": 4,  
24 "abbreviation": "N64",  
25 "alternative\_name": "N64",  
26 "category": 1,  
27 "created\_at": 1297555200,  
28 "generation": 5,  
29 "name": "Nintendo 64",  
30 "platform\_logo": 260,  
31 "product\_family": 5,

Beautify JSON \$.store.books[\*].author

# REQUEST

- INPUT API URL
  - ALSO API KEY IF NEEDED
  - “GET” REQUEST FROM API URL

GET ▾ https://api-v3.igdb.com/platforms Send

JSON ▾ Auth ▾ Query Header 2 Docs ✓

|                |                        |                                     |  |
|----------------|------------------------|-------------------------------------|--|
| ≡ user-key     | 3478fe97fbb6ea8c83bd8d | <input checked="" type="checkbox"/> | <span style="font-size: 2em;">×</span> |
| ≡ Content-Type | application/json       | <input checked="" type="checkbox"/> | <span style="font-size: 2em;">×</span> |
| ⚙ New header   | New value              |                                     |  |

GET ▾ https://api-v3.igdb.com/platforms

GET  
POST  
PUT  
PATCH  
DELETE  
OPTIONS  
HEAD  
Custom Method

# DESIRED OUTPUT

- SELECT JSON OUTPUT
- WRITE OUT QUERY
  - EX. FIELDS \*;
- HTTP STATUS REQUEST CODE IS 200

GET ▾ https://api-v3.igdb.com/platforms

JSON ▾ Auth ▾ Query Head

1 STRUCTURED

2 Multipart Form

3 Form URL Encoded

GraphQL Query

TEXT

✓ JSON

XML

YAML

EDN

Other

OTHER

Binary File

No Body

200 634 ms 54.2 KB 11 Minutes Ago ▾

Preview ▾ Header 9 Cookie Timeline

| NAME                      | VALUE   |
|---------------------------|---|
| date                      | Wed, 11 Mar 2020 18:18:28 GMT   |
| content-type              | application/json; charset=utf-8   |
| x-count                   | 163   |
| cf-cache-status           | DYNAMIC   |
| expect-ct                 | max-age=604800, report-uri="https://report-uri.cloudflare.com/cdn-cgi/beacon/expect-ct" |
| strict-transport-security | max-age=15552000; includeSubDomains; preload  |
| x-content-type-options    | nosniff   |
| server                    | cloudflare  |
| cf-ray                    | 57274733df34f009-EWR  |

Copy to Clipboard

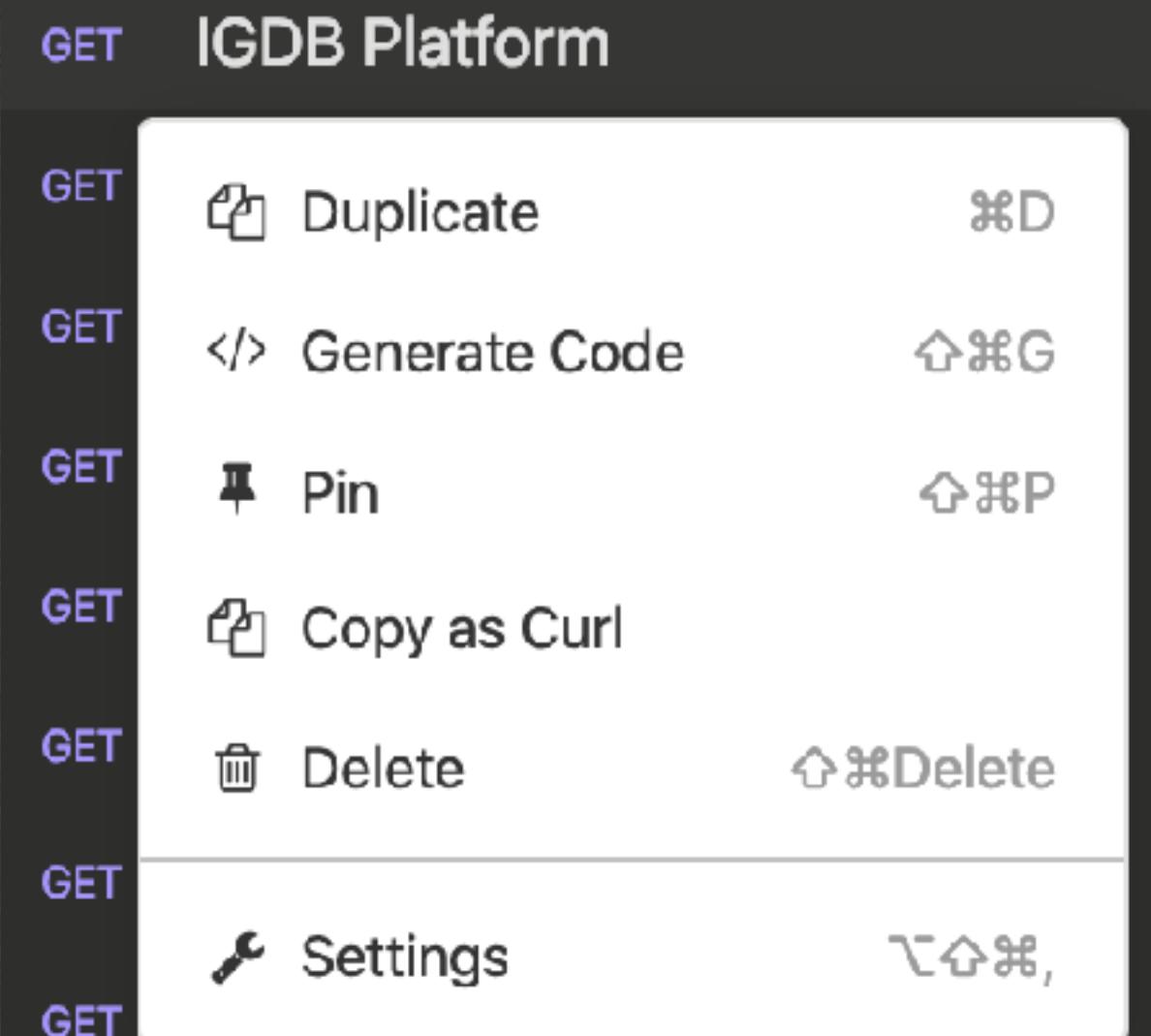
# PREVIEW

- HIT SEND
- CHECK PREVIEW
- SEE IF DESIRED INFO IS OUTPUTTED
- GENERATE CODE

200 634 ms 54.2 KB An Hour Ago ▾

Preview Header 9 Cookie Timeline

```
1 [  
2 {  
3   "id": 3,  
4   "abbreviation": "Linux",  
5   "alternative_name": "GNU/Linux",  
6   "category": 4,  
7   "created_at": 1297555200,  
8   "name": "Linux",  
9   "platform_logo": 33,  
10  "product_family": 4,  
11  "slug": "linux",  
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14 complex definition, Linux is an open-source OS kernel  
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16 Linux distributions) are built.",  
17  "updated_at": 1392940800,  
18  "url": "https://www.igdb.com/platforms/linux",  
19  "versions": [  
20    44  
21  ],  
22  "websites": [  
23    1  
24  ],  
25  },  
26  {  
27    "id": 4,  
28    "abbreviation": "N64",  
29    "alternative_name": "N64",  
30    "category": 1,  
31    "created_at": 1297555200,  
32    "generation": 5,  
33    "name": "Nintendo 64",  
34    "platform_logo": 260,  
35    "product_family": 5,
```



- # PYTHON CODE
- PYTHON
  - REQUESTS
  - COPY AND PASTE INTO NOTEBOOK

Generate Client Code X

Python ▾ Requests ▾ Copy to Clipboard

```
1 import requests
2
3 url = "https://api-v3.igdb.com/platforms"
4
5 payload = "fields *;\nlimit 500;\nsort id;"
6 headers = {
7     'cookie': "__cfduid=d90176446fc57ac62790618a36aff52581583171630",
8     'user-key': "3478fe97fbb6ea8c83bd8d68d22b1770",
9     'content-type': "application/json"
10    }
11
12 response = requests.request("GET", url, data=payload, headers=headers)
13
14 print(response.text)
```

# GAME DATA

- 3 CURRENT GENERATION
- 5587 GAME ID & TITLE
  - TOTAL RATING
  - POPULARITY
- 21 GENRES
- 32 GAME ENGINES
- 5 GAME MODES





“I recently learned something quite interesting about video games. Many young people have developed incredible hand, eye, and brain coordination in playing these games. The air force believes these kids will be our outstanding pilots should they fly our jets.”

*–RONALD REAGAN, speech, August 8, 1983*

# EXPLORATORY DATA ANALYSIS (EDA)

- DROP COLUMNS
- CLEAN DATA
- MAP & LAMBDA FUNCTION
- DUMMY VARIABLES
- CONCATENATE DATAFRAME & DUMMY VARIABLES



# IMPORTS

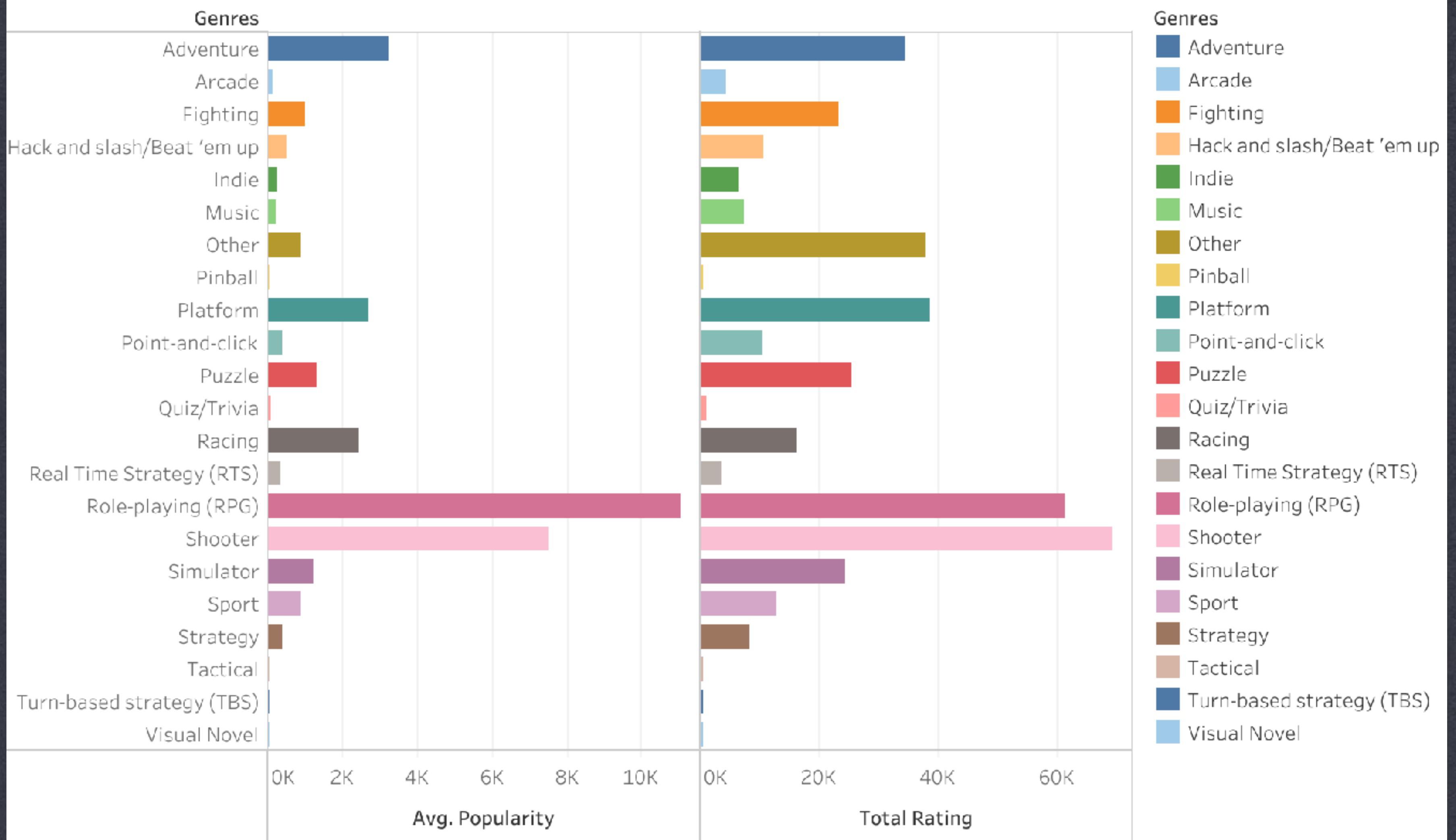
- JSON & REQUEST  
(FORMAT API REQUEST  
CODE)
- PANDAS (EXCEL)
- SCIKIT LEARN (STAT  
MODELS)



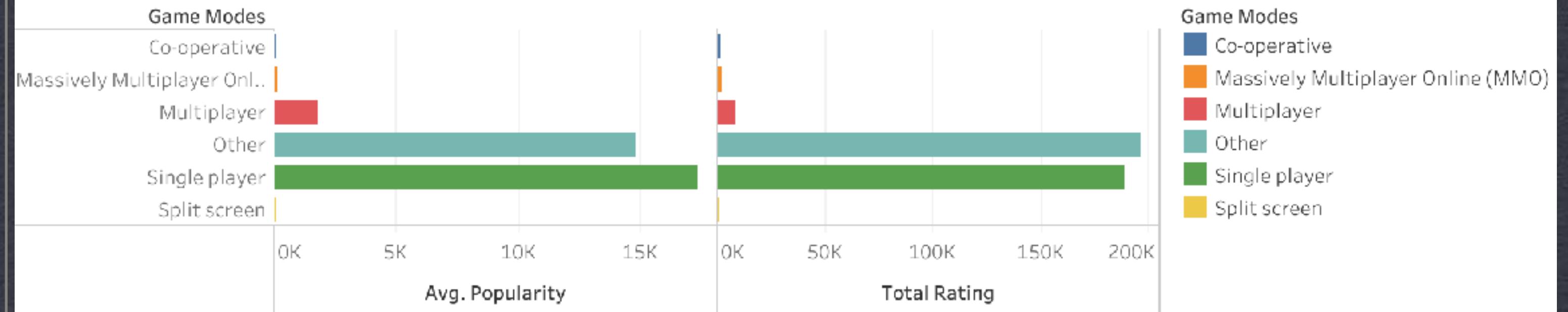
# GENRES

- TOP 5 GENRES ARE:**
- RPG
  - SHOOTER
  - PLATFORM
  - ADVENTURE
  - FIGHTING

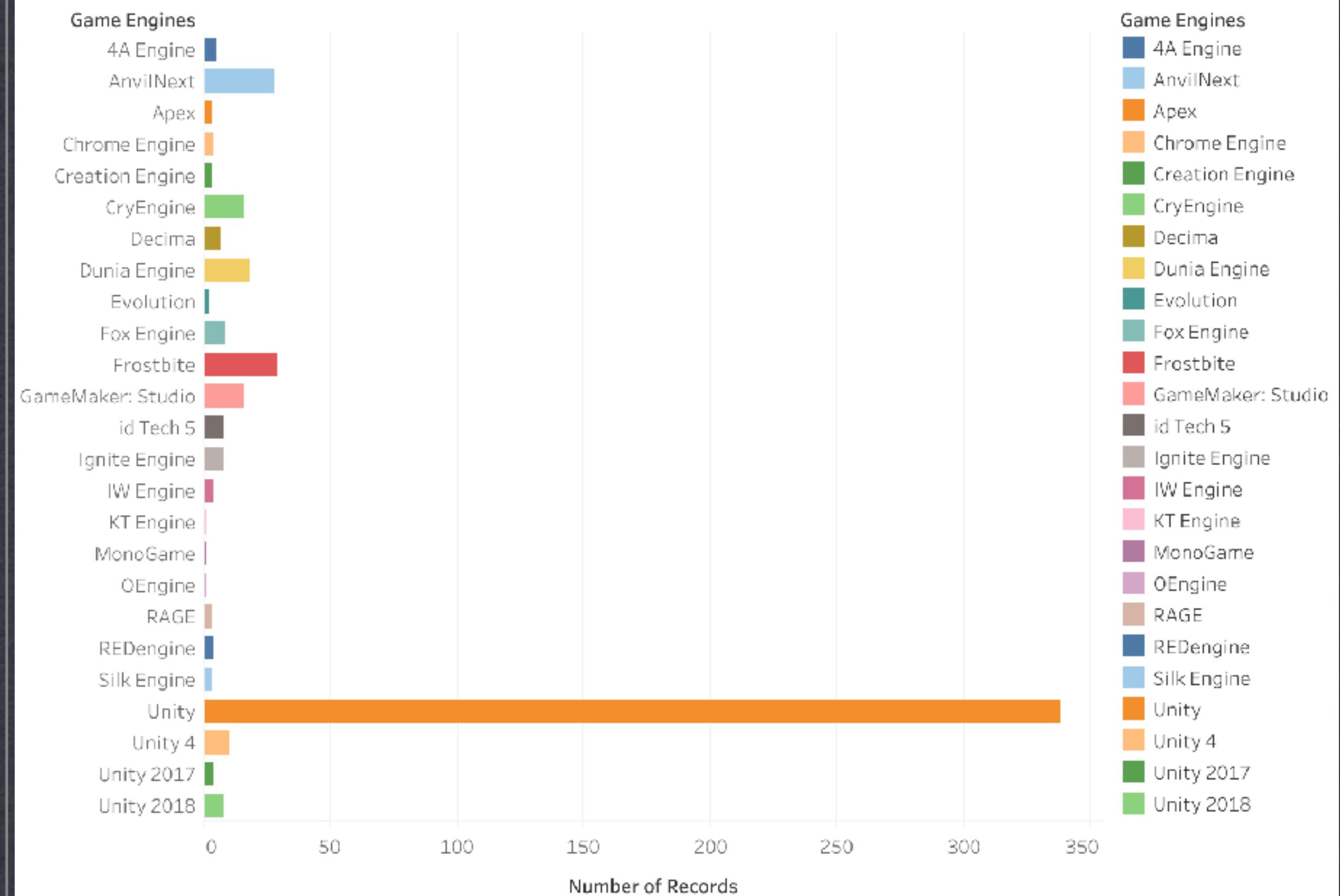
Genres Popularity vs. Total Rating February 2020



## Game Modes Popularity vs. Total Rating Scores February 2020



## Game Engines



# GAME MODES & GAME ENGINES

- SINGLE PLAYER AND MIX SINGLE/MULTIPLAYER DOMINATE GAME MODES
- UNITY (UNREAL ENGINE) RUN IN MOST GAMES



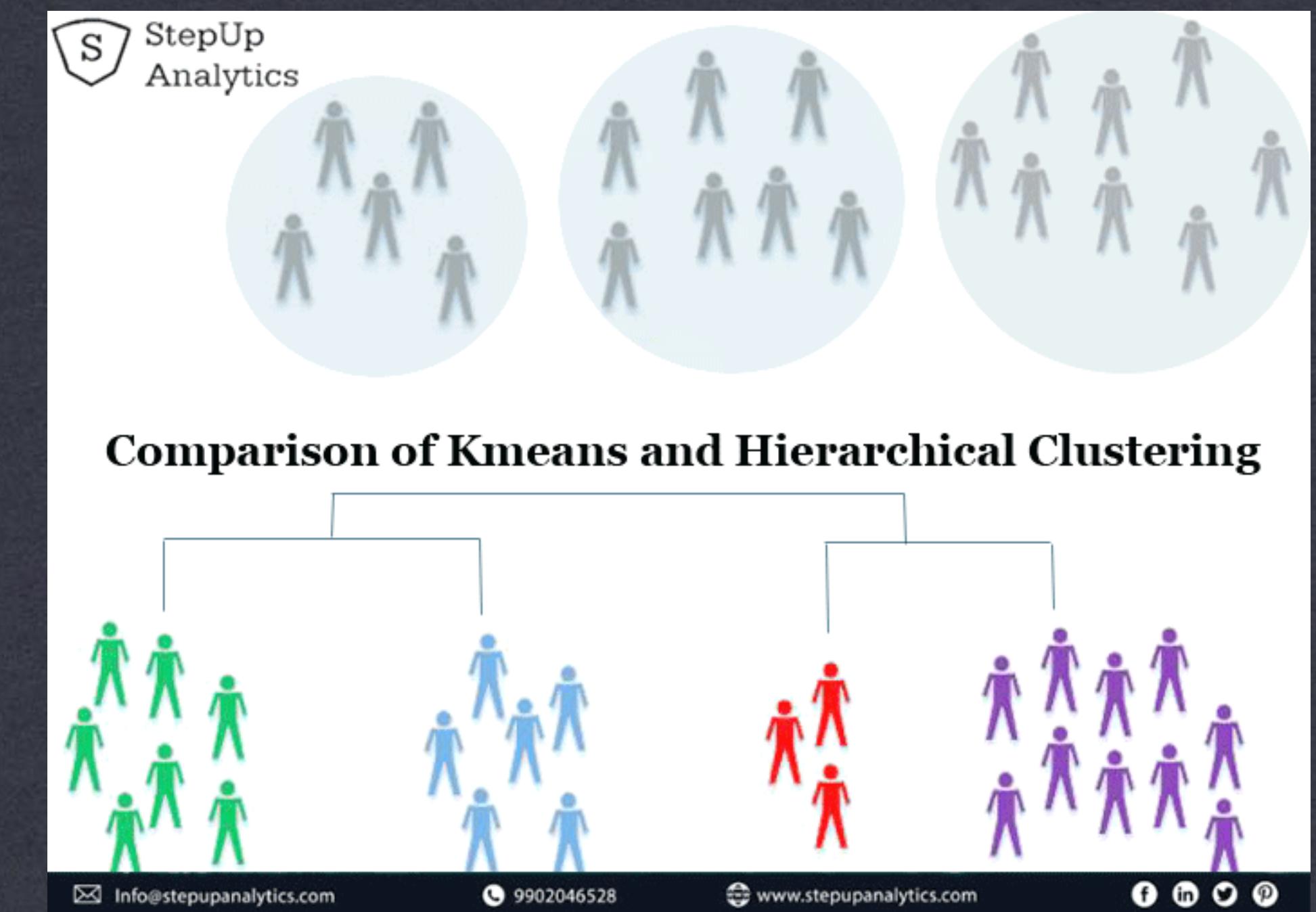
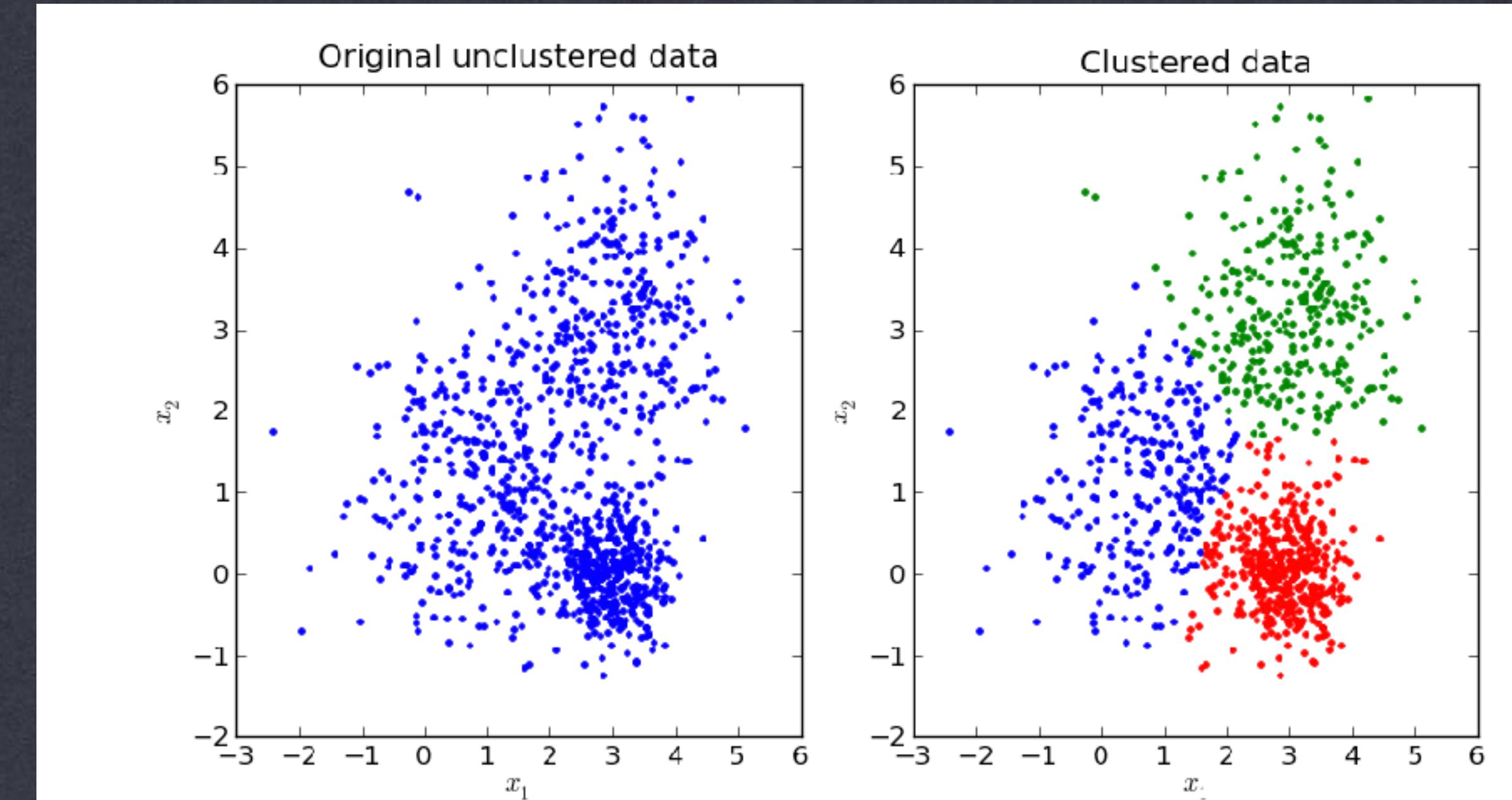
“I think good game writing is a process of getting out of the player's way. You give him or her just enough to work with narratively, but ultimately you let the player tell his or her own story.”

– *TOM BISSELL, "On Video Games and Storytelling: An Interview with Tom Bissell"*,

*New Yorker, March 19, 2013*

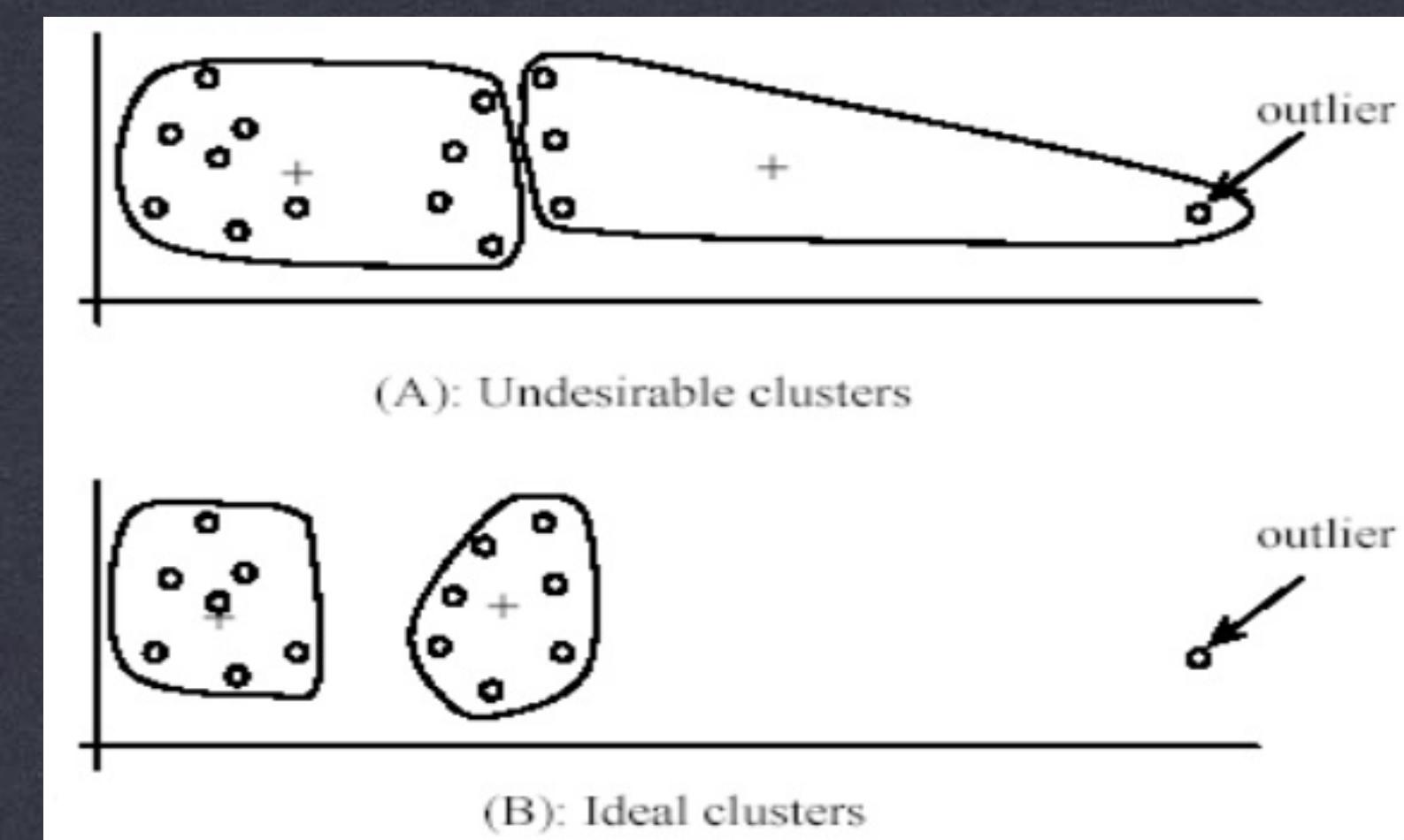
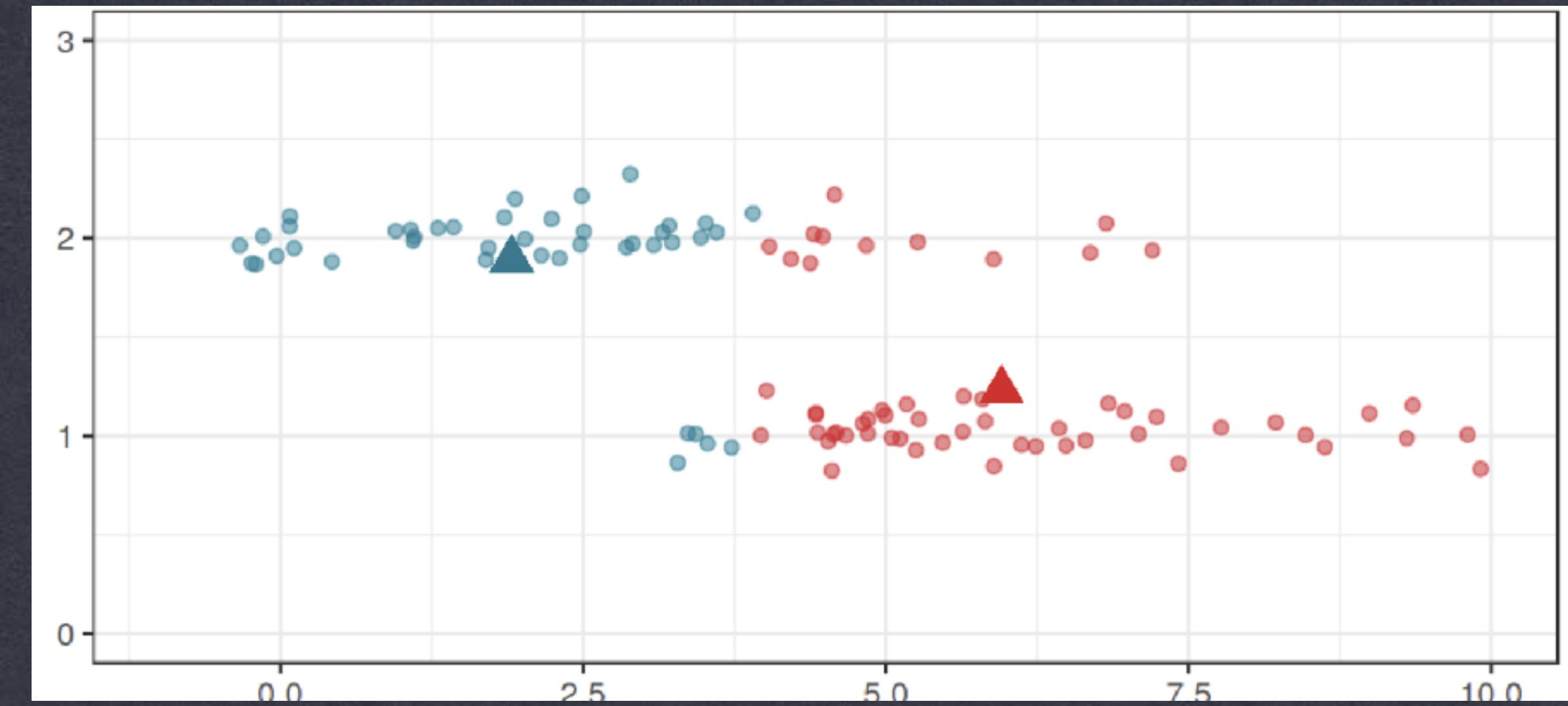
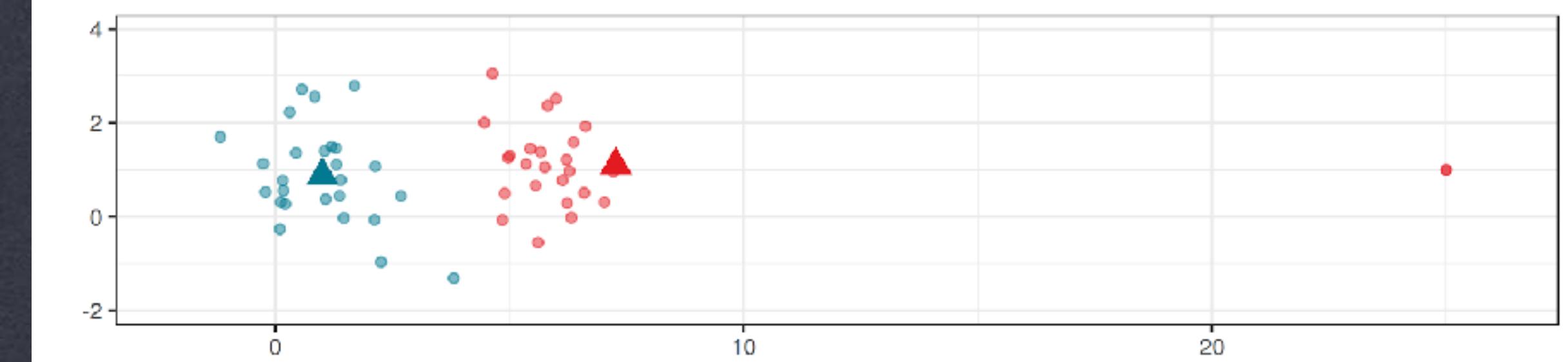
# K-MEANS CLUSTERING

- UNSUPERVISED LEARNING
- GOAL: FIND GROUPS IN DATA
  - K: NUMBER OF CLUSTERS
  - MEANS: MEAN POINTS OF CLUSTERS
  - CENTROIDS: CENTER POINTS



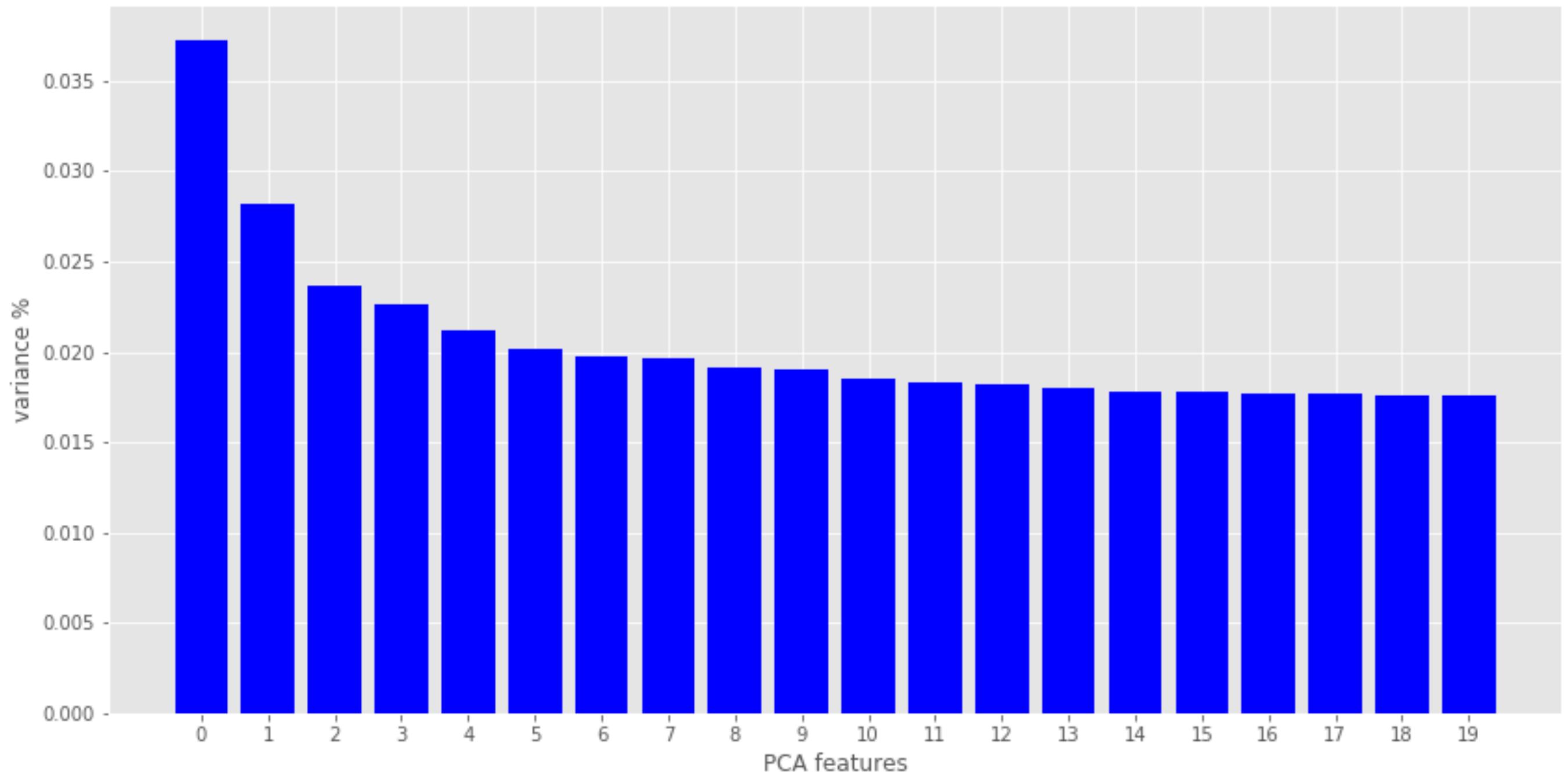
# K-MEANS DRAWBACKS

- HIGHLY SCALE DEPENDENT
- NOT GREAT FOR VARYING SHAPES AND DENSITIES
- EVALUATING RESULTS IS MORE SUBJECTIVE

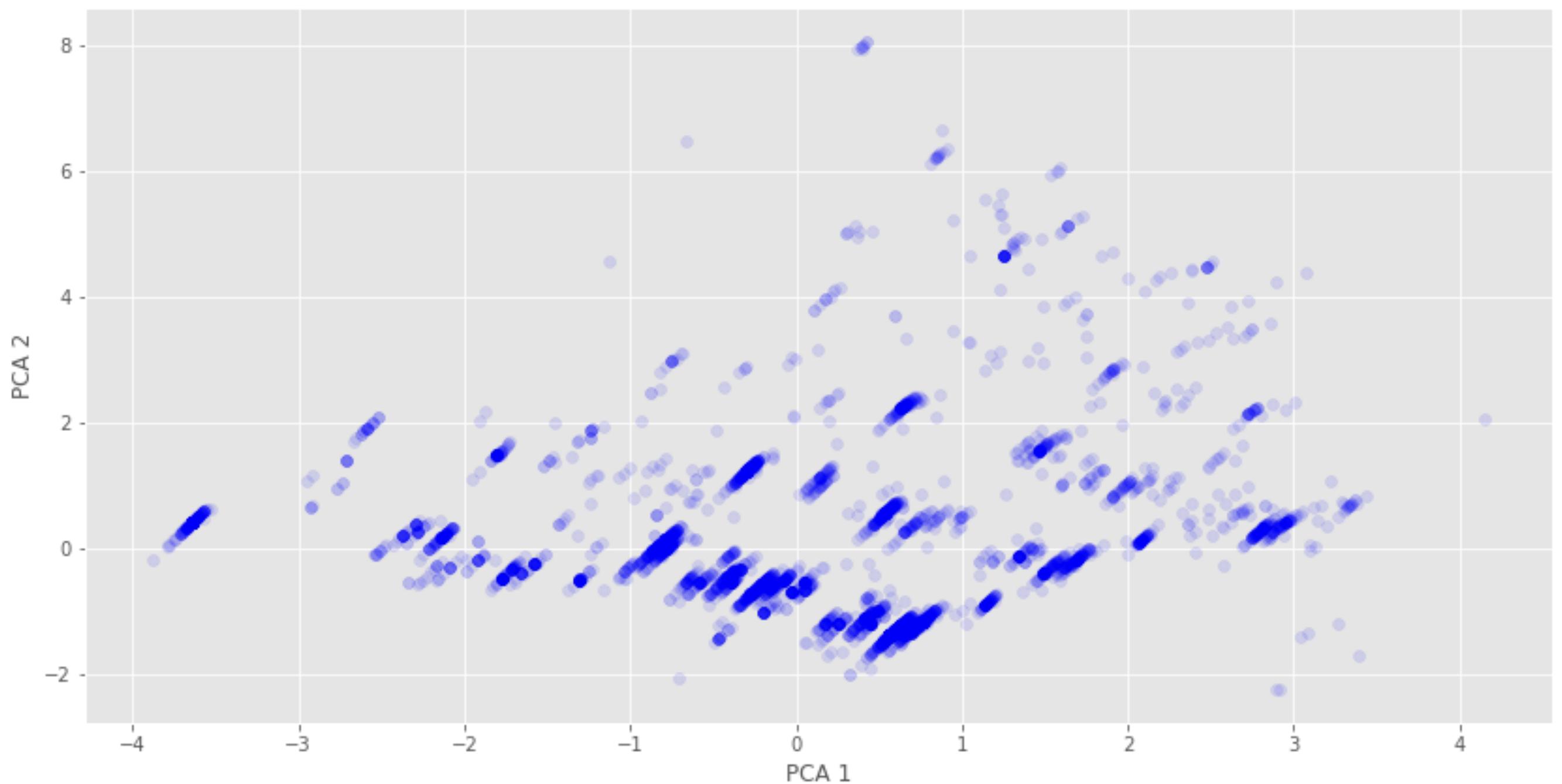


# PCA

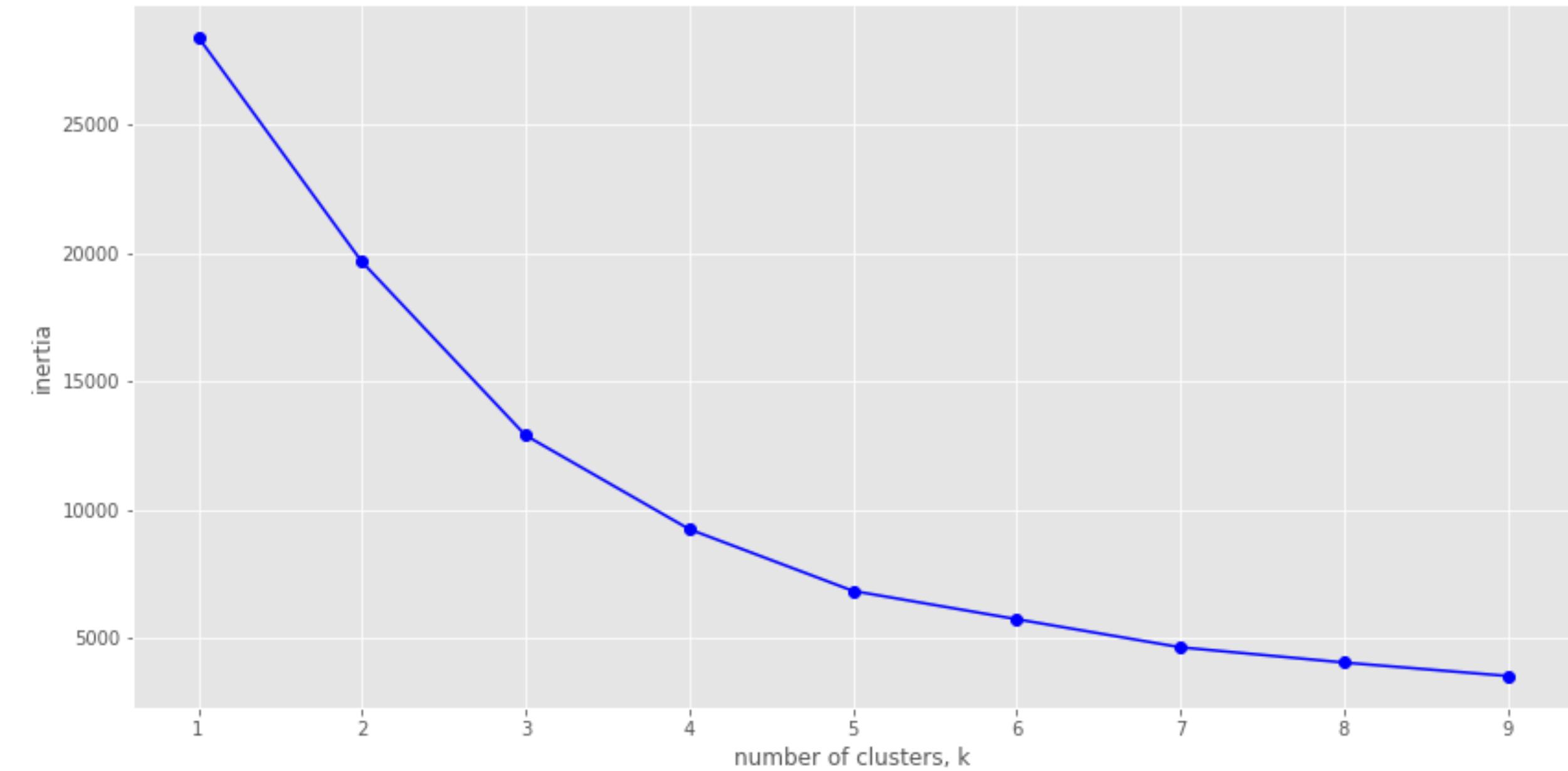
- FIRST TWO COMPONENTS EXPLAIN MAJORITY OF VARIANCE
- BIGGEST VARIANCE DROP OFF POINT BETWEEN 0 AND 1 PCA FEATURES



# SCATTER



- SCATTER PLOT OF FIRST TWO COMPONENTS OF PCA MODEL
- HARD TO DISTINGUISH CLUSTERS

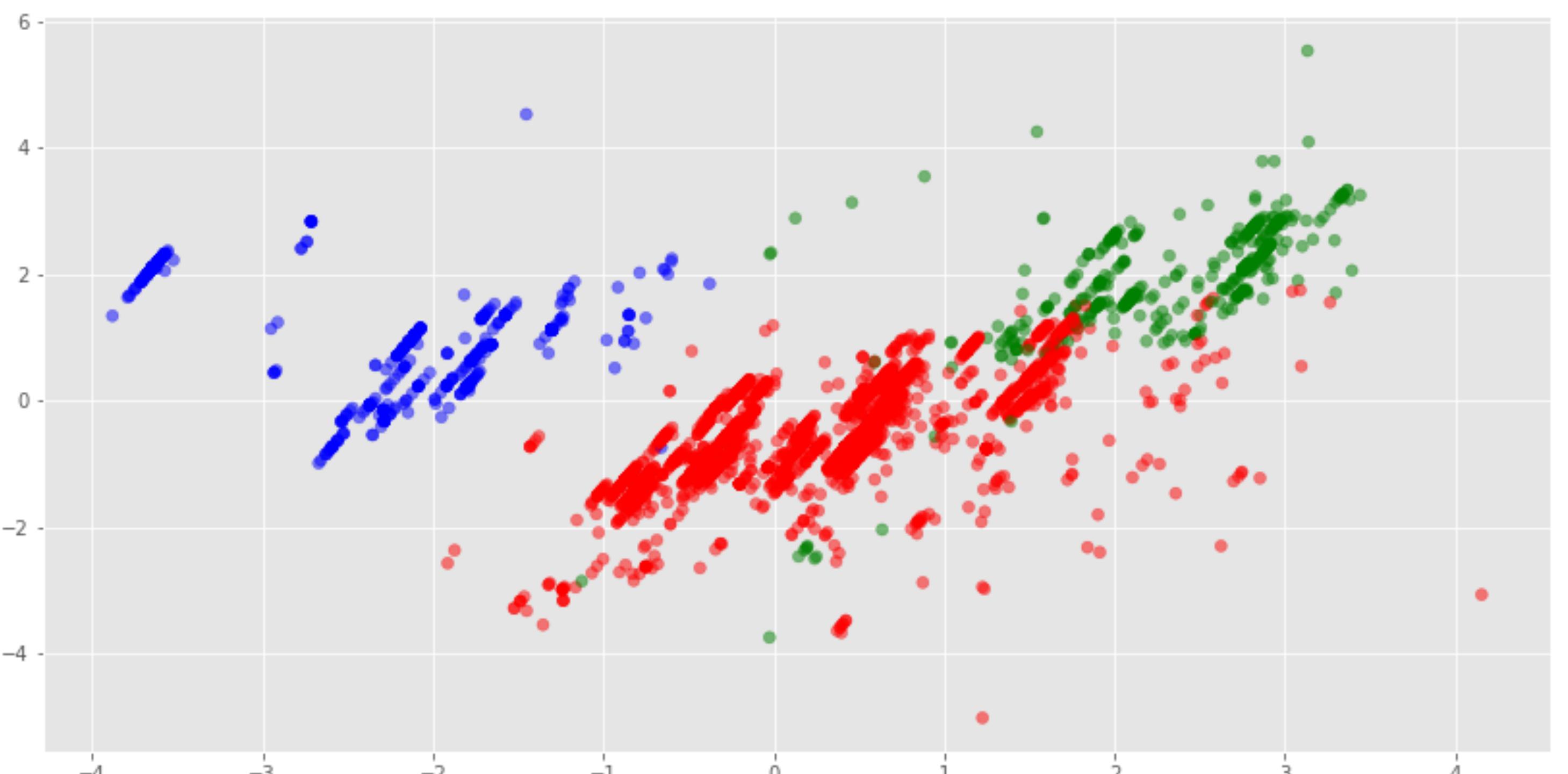


# FIND THE CLUSTERS

- AFTER 4 CLUSTERS, THE CHANGE IN VALUE OF INERTIA IS NO LONGER SIGNIFICANT
- MOST LIKELY, NEITHER IS THE VARIANCE

# METRICS

SILHOUETTE SCORE:  
0.15



| k | inertia | silhouette    |
|---|---------|---------------|
| 0 | 2       | 122006.210330 |
| 1 | 3       | 115040.501795 |
| 2 | 4       | 111603.278123 |
| 3 | 5       | 107664.251624 |
| 4 | 6       | 102841.677147 |

# CONCLUSION

- PCA IS GREAT REDUCING SHAPE AND SIZE OF DATA FRAME
- MORE DATA MAY BE NEEDED TO HELP BETTER GROUP DATA
- OTHER CLUSTERING MODEL MAY BE BETTER SUCH AS DBSCAN





“Video games are no substitute for real world pleasures (marriage, the birth of a child, spiritual enlightenment, what have you), but they do provide a nice reprieve from real world woes.”

– BRETT WEISS, *Classic Home Video Games, 1972-1984: A Complete Reference Guide*

# NEXT STEPS

- \* REWORK DATASET AND MODELING
- \* CREATE RECOMMENDER SYSTEM
- \* HOST AS A WEB APP USING FLASK

