



STEAM

STEAMCODE

Steam Community DEtection

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Outline



01

Why?

02

What is data?

03

Dimension
Reduction

04

CD Algorithms

05

Insights and Demo



01 | Why?



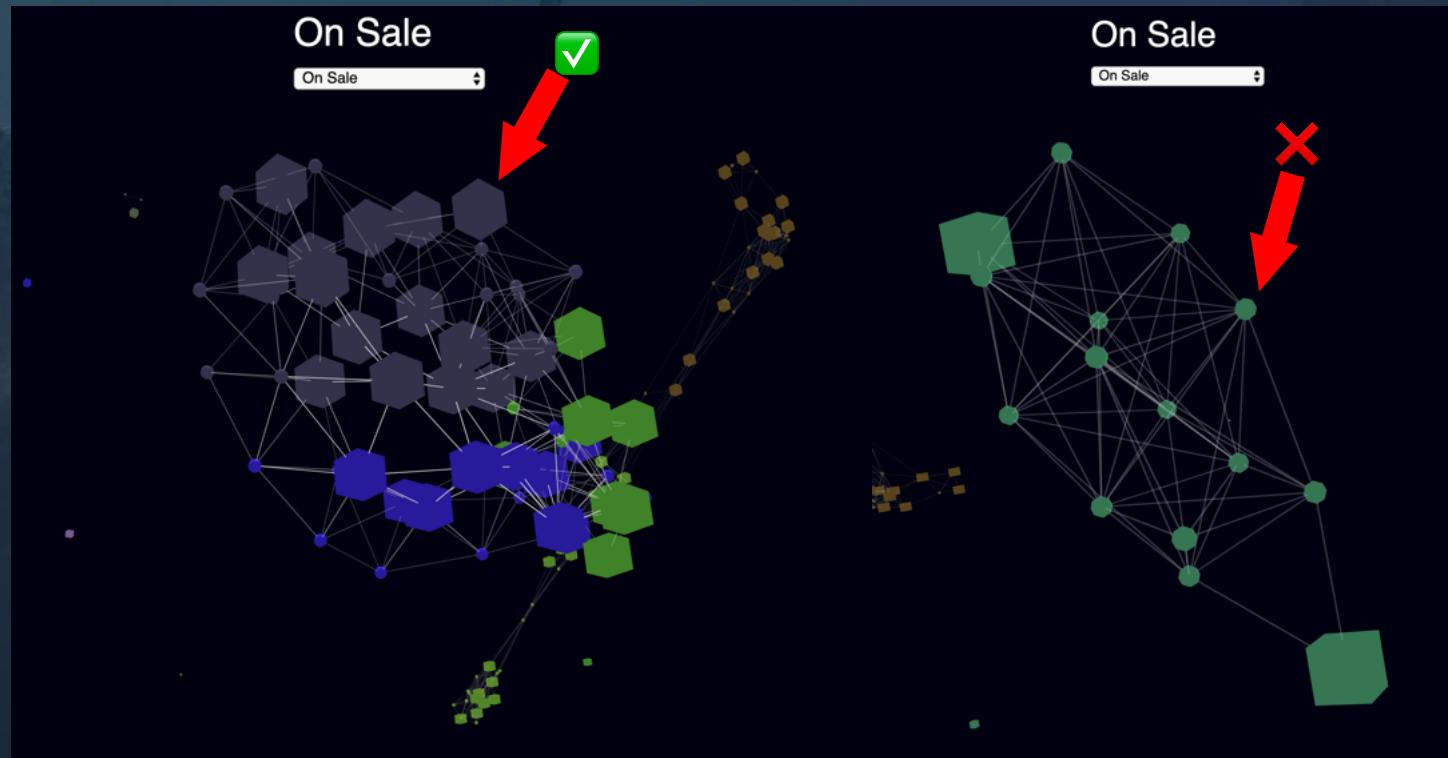
Are you a game player?

Why? SAVE MONEY



***This is
True
Summer***







**Do you want to become a senior
game player ?**

Do you know ...



Do you know ...

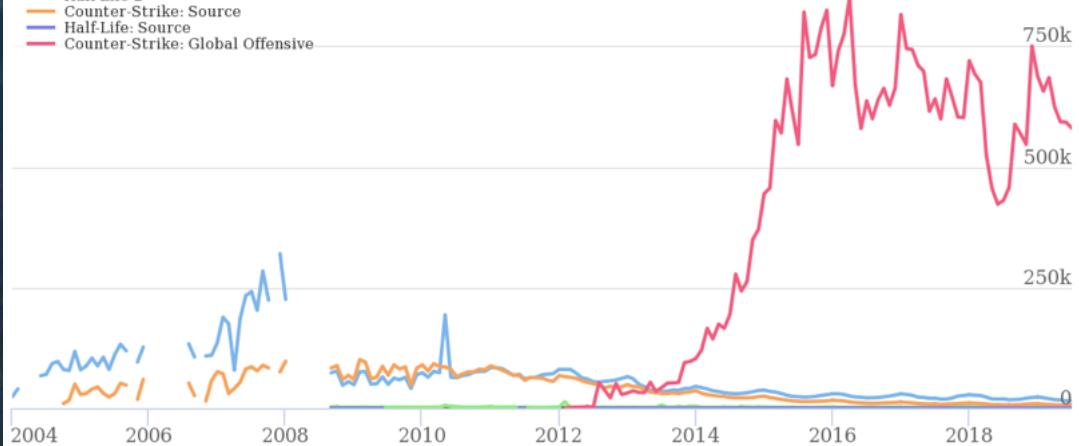


Do you know ...



Source: <https://steamdb.info/graphs/>

- Counter-Strike
- Half-Life
- Half-Life 2
- Counter-Strike: Source
- Half-Life: Source
- Counter-Strike: Global Offensive

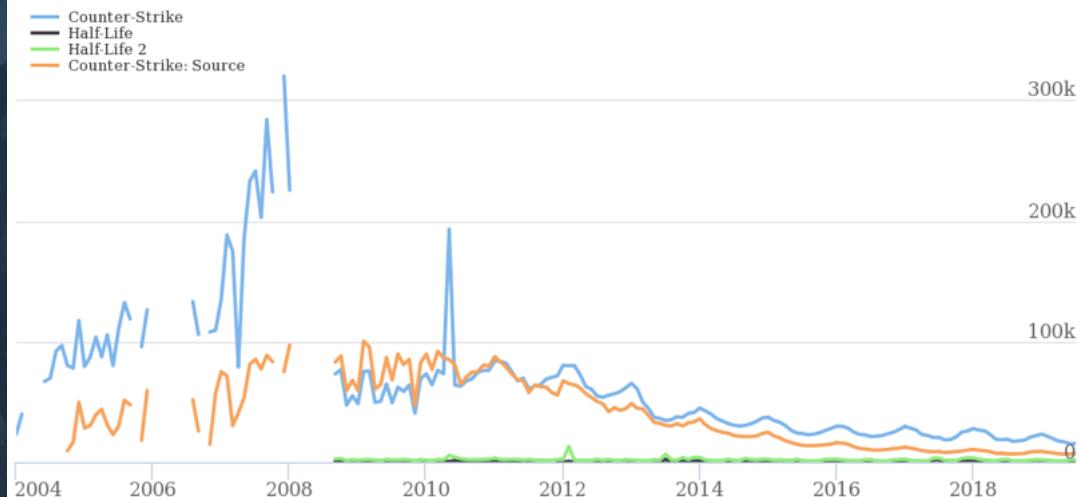




Do you know ...



Source: <https://steamdb.info/graphs/>



Do you know ...



Counter Strike comes from Half-Life

Do you know ...



Counter Strike comes from Half-Life



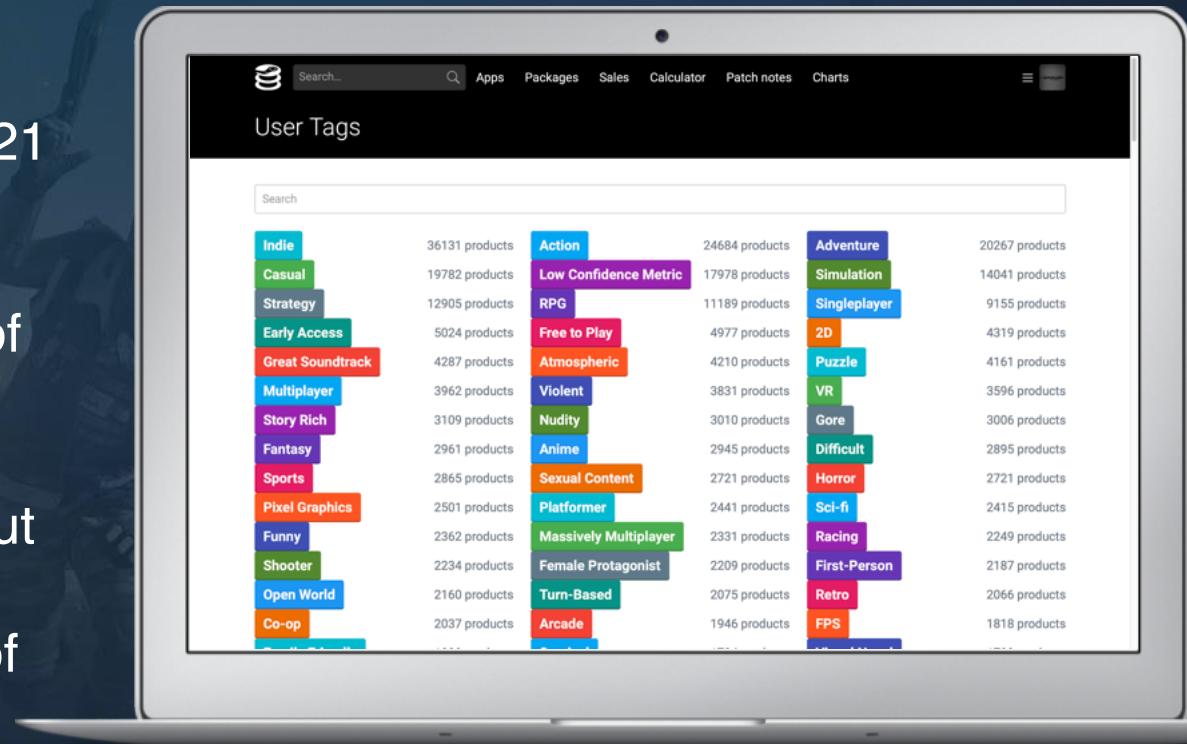
02 | What is the data?

Dataset & Subclasses

- *Kind of data:* .jpg format
- *Source:* -



- At manually selection stage, we choose about 21 tags out of all those tags.
(According to number of games and uniqueness of style)
- We manually select about 10 images in each tag according to the quality of header images.





What is the data?

Dataset & Subclasses

group	price	company	date	tag	ser_id	discount	Name	Positive	Negative	Rating	Current	24h Peak	All-Time Peak	
id														
10	73	9.99	Valve	2000	1774	0	1.0	Counter-Strike	133,134	3,541	0.9606	6,299	14,655	319,586
50	48	4.99	Valve	1999	4667	6	1.0	Half-Life: Opposing Force	5,670	314	0.9149	85	171	254
70	35	9.99	Valve	1998	4667	6	1.0	Half-Life	30,813	1,167	0.9431	461	933	2,167
130	59	4.99	Valve	2001	4667	6	1.0	Half-Life: Blue Shift	4,168	461	0.8689	44	113	174
220	59	9.99	Valve	2004	4667	6	1.0	Half-Life 2	72,913	2,488	0.9511	790	1,502	12,953
240	59	9.99	Valve	2004	1774	0	1.0	Counter-Strike: Source	85,237	3,742	0.9431	2,710	6,138	100,056
280	35	9.99	Valve	2004	4667	6	1.0	Half-Life: Source	4,135	1,120	0.7651	75	153	452
320	2	4.99	Valve	2004	4667	6	1.0	Half-Life 2: Deathmatch	6,361	809	0.8604	113	255	2,702
340	12	0.00	Valve	2005	4667	6	0.0	Half-Life 2: Lost Coast	6,035	1,045	0.8280	14	38	180
360	36	9.99	Valve	2006	4667	6	1.0	Half-Life Deathmatch: Source	1,476	489	0.7255	13	27	79
380	35	7.99	Valve	2006	4667	6	1.0	Half-Life 2: Episode One	8,403	536	0.9116	119	245	792
420	59	7.99	Valve	2007	4667	6	1.0	Half-Life 2: Episode Two	14,571	703	0.9290	147	301	1,308
550	70	9.99	Valve	2009	3978	0	1.0	Left 4 Dead 2	273,711	8,878	0.9579	10,171	17,645	162,399
630	63	0.00	Valve	2010	1755	0	0.0	Alien Swarm	17,745	967	0.9251	35	76	60,467
730	15	0.00	Valve	2012	1774	0	0.0	Counter-Strike: Global Offensive	2,829,388	424,485	0.8655	339,976	557,663	854,801
730	15	0.00	Valve	2012	1678	0	0.0	Counter-Strike: Global Offensive	2,829,388	424,485	0.8655	339,976	557,663	854,801



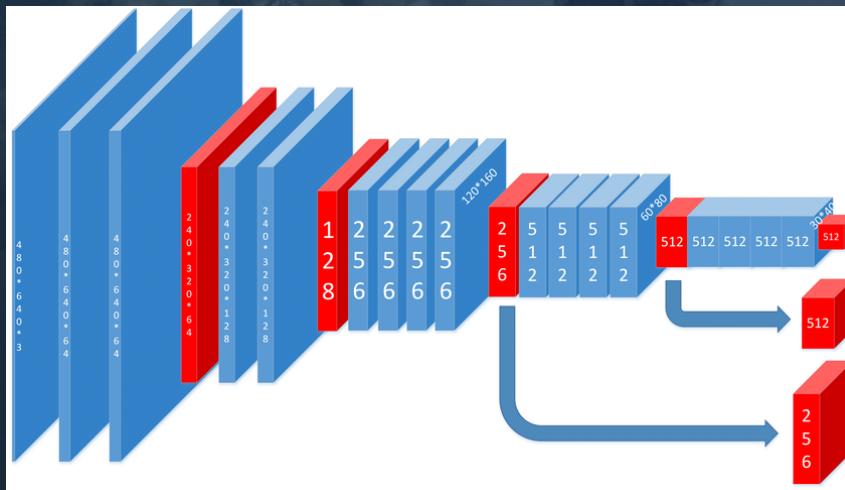
03 | Dimension Reduction

Dimension Reduction

Preprocessing

Two ways:

1. Vgg19



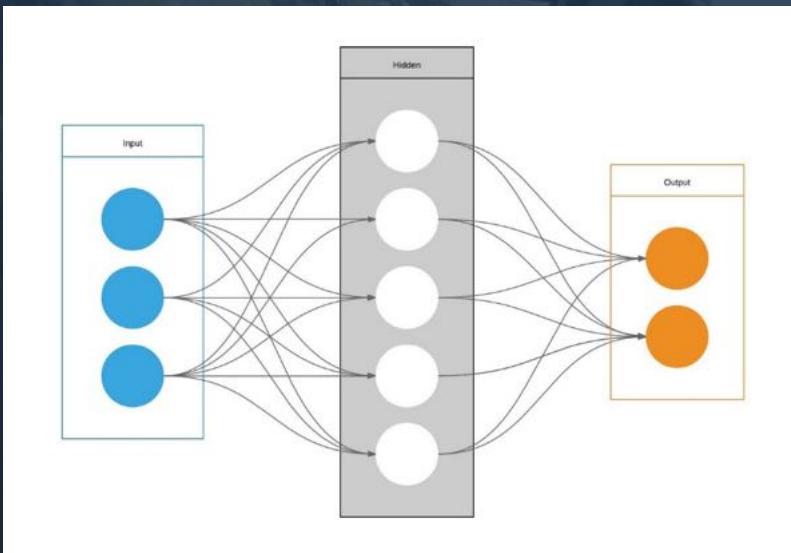
ConvNet Configuration					
A	A-LRN	B	C	D	E
11 weight layers	11 weight layers	13 weight layers	16 weight layers	16 weight layers	19 weight layers
conv3-64	conv3-64 LRN	conv3-64 conv3-64	conv3-64 conv3-64	conv3-64 conv3-64	conv3-64 conv3-64
maxpool					
conv3-128	conv3-128	conv3-128 conv3-128	conv3-128 conv3-128	conv3-128 conv3-128	conv3-128 conv3-128
maxpool					
conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256	conv3-256 conv3-256 conv1-256	conv3-256 conv3-256 conv3-256 conv3-256	conv3-256 conv3-256 conv3-256 conv3-256 conv3-256
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 conv1-512	conv3-512 conv3-512 conv3-512 conv3-512	conv3-512 conv3-512 conv3-512 conv3-512 conv3-512
maxpool					
conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512	conv3-512 conv3-512 conv1-512	conv3-512 conv3-512 conv3-512 conv3-512	conv3-512 conv3-512 conv3-512 conv3-512 conv3-512
maxpool					
FC-4096					
FC-4096					
FC-1000					
soft-max					

Dimension Reduction

Preprocessing

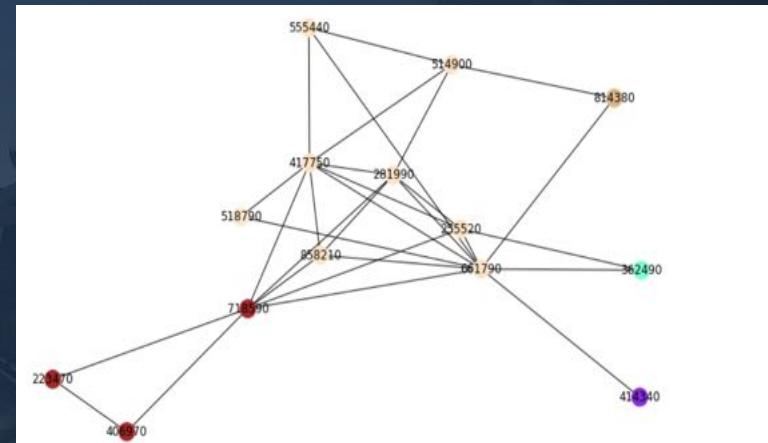
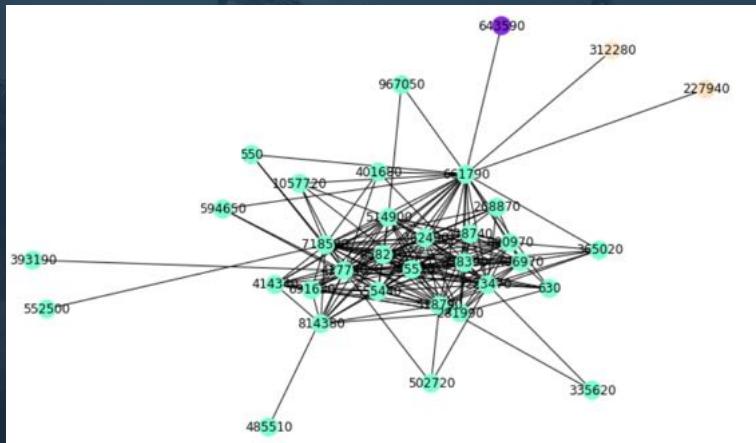
Two ways:

2. Simple AutoEncoder



Dimension Reduction

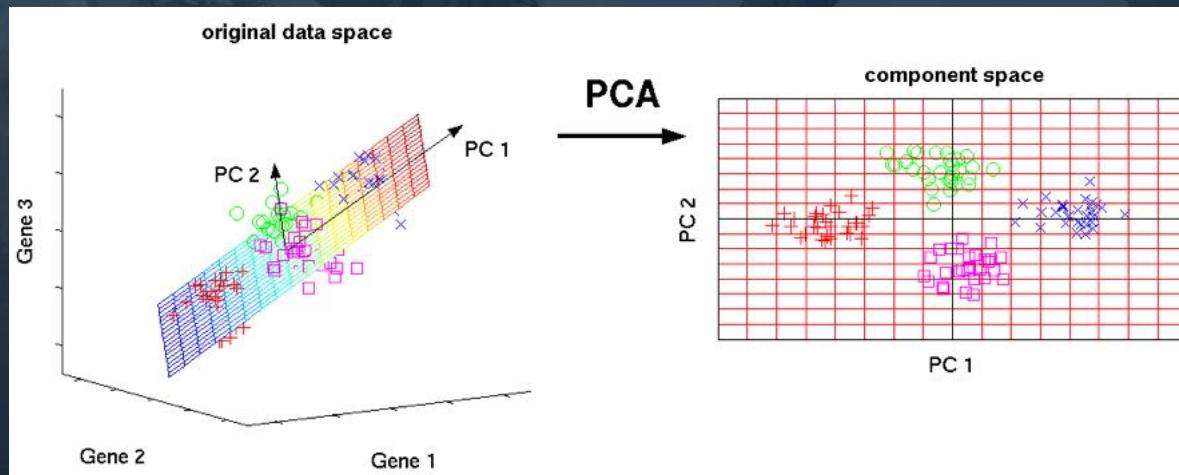
At the beginning



Dimension Reduction

Details

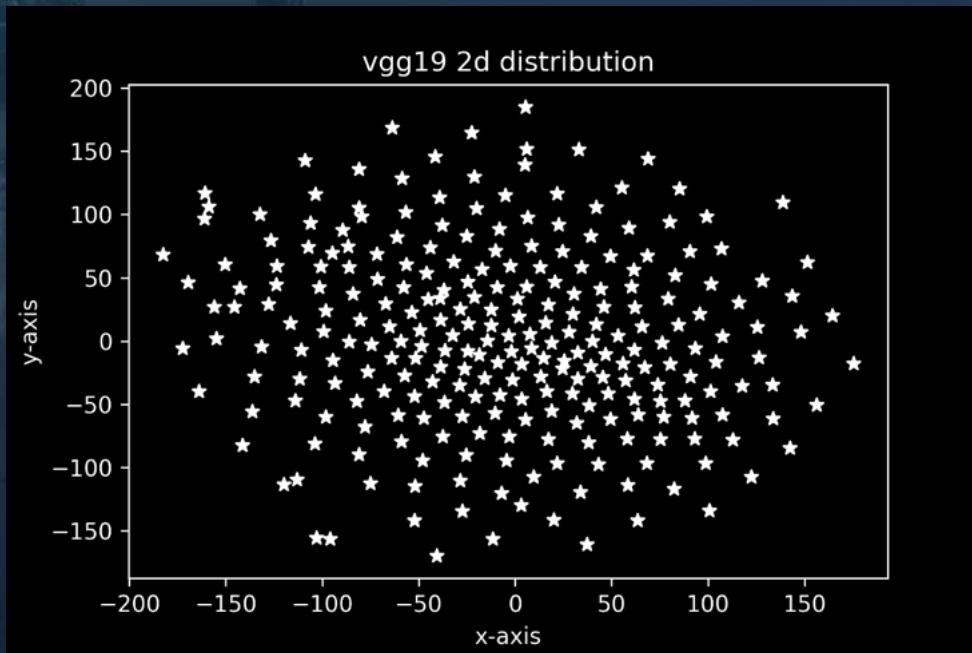
t-SNE with *PCA* for dimension reduction



Dimension Reduction

Some two-dimensional results

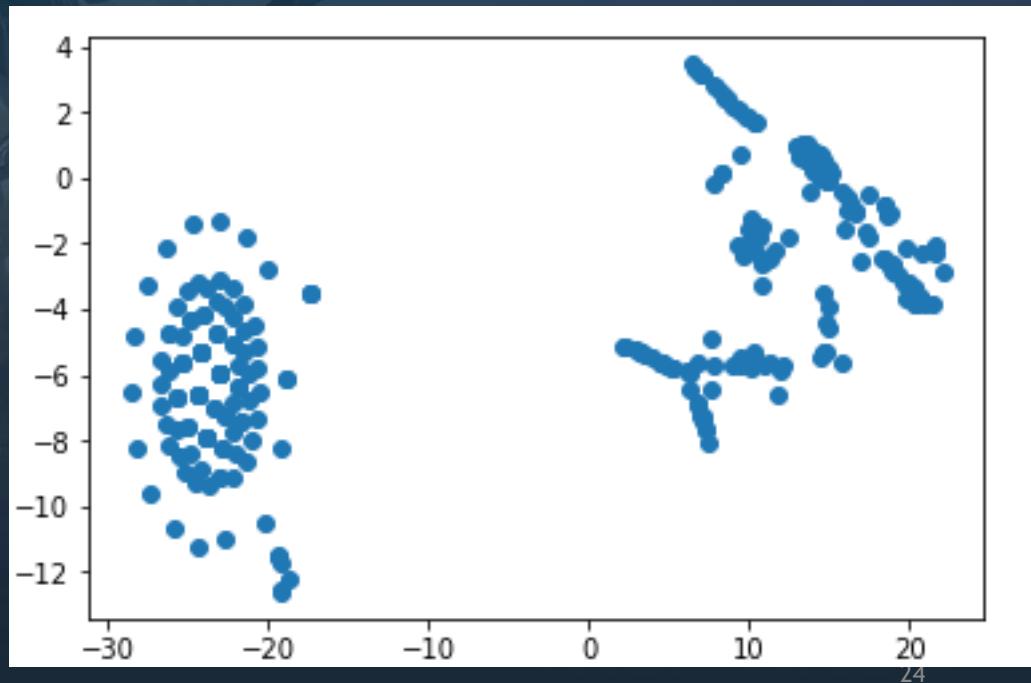
For Vgg19:



Dimension Reduction

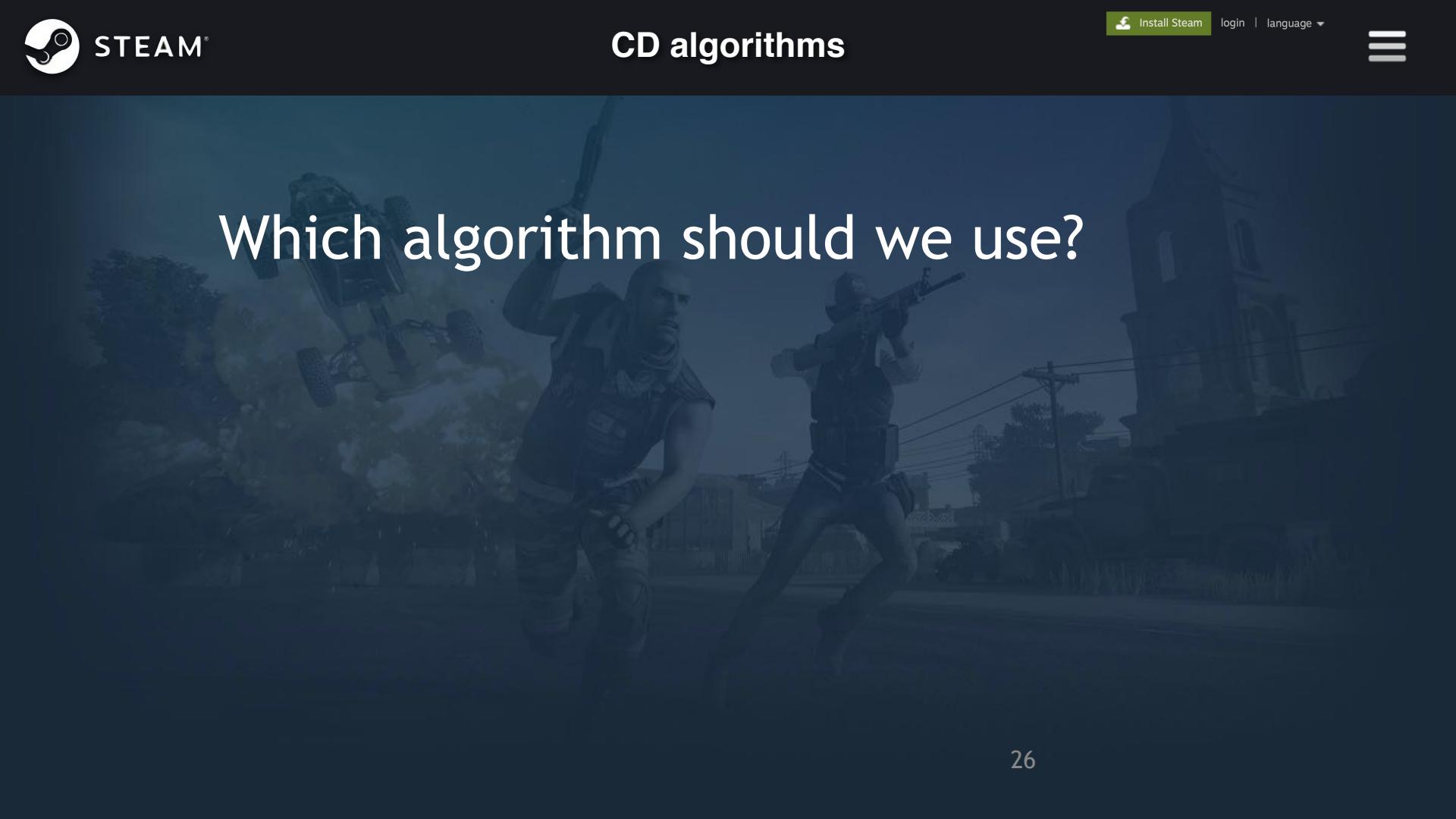
Some two-dimensional results

For Simple AutoEncoder:



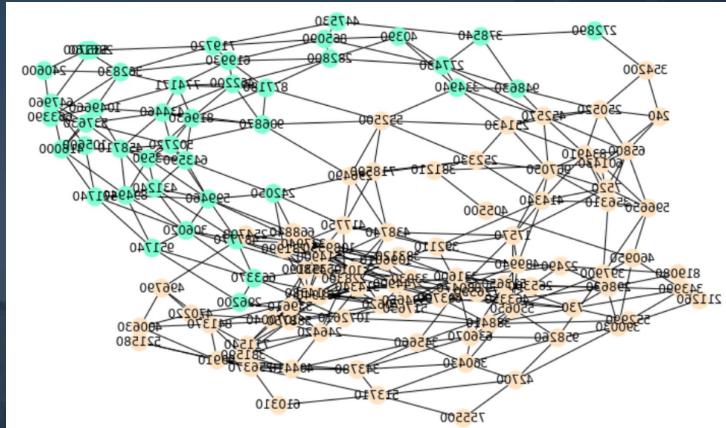
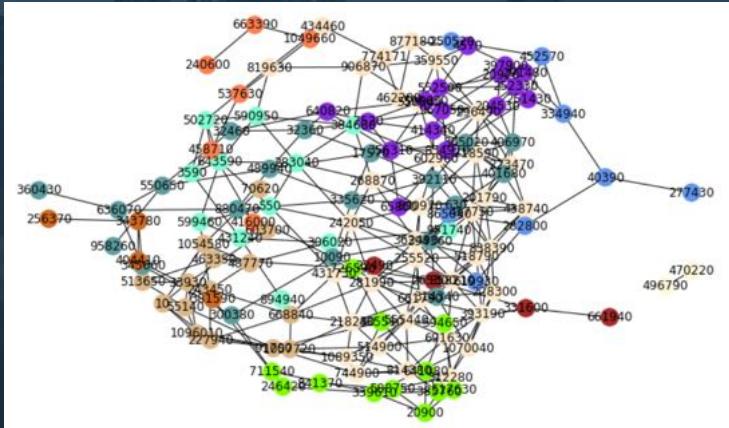


04 | CD algorithms



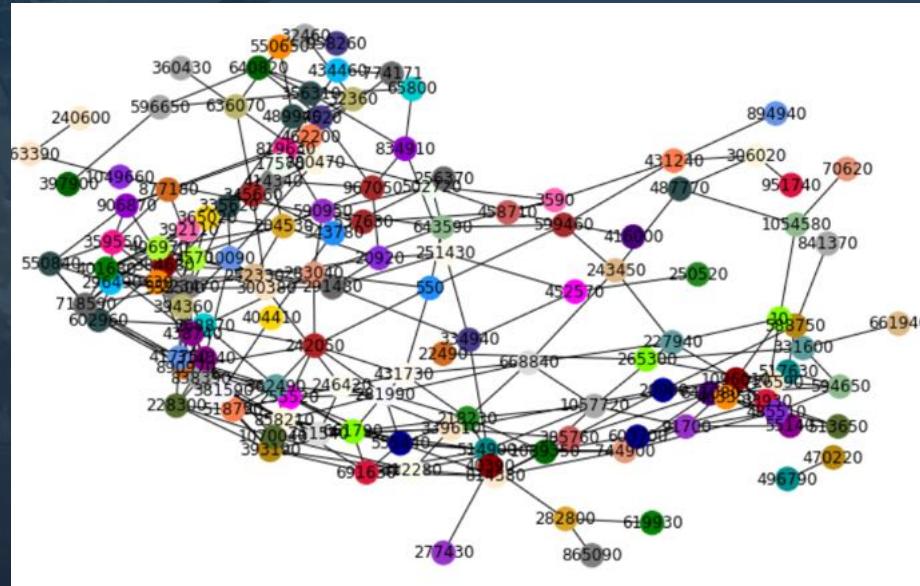
Which algorithm should we use?

Girvan-Newman



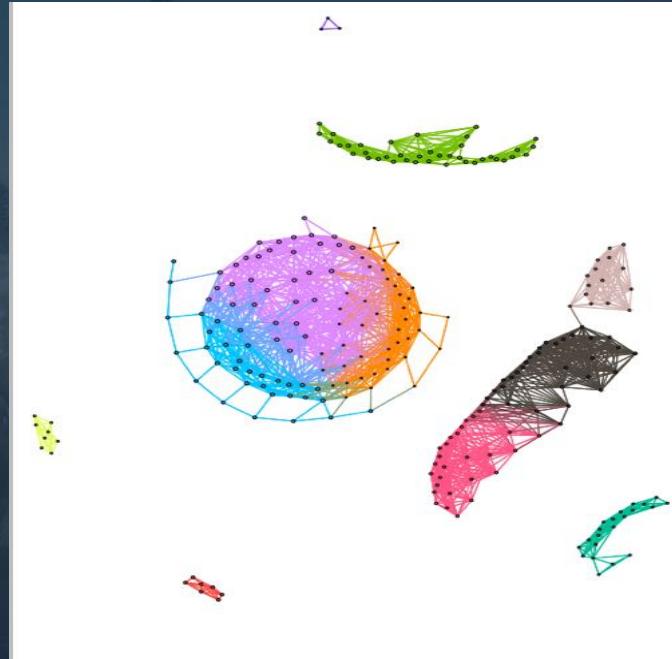
CD algorithms

Greedy_modularity



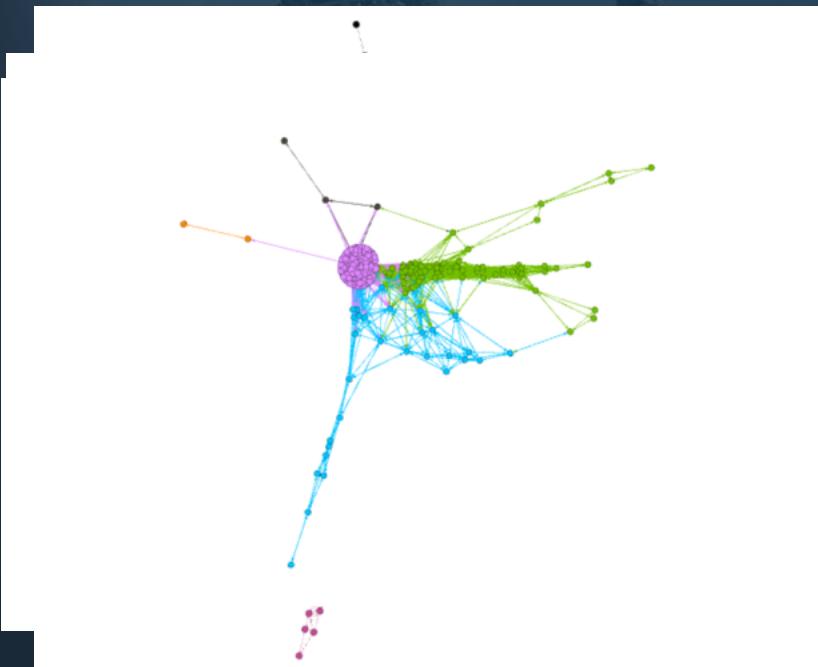
CD algorithms

FastUnfolding

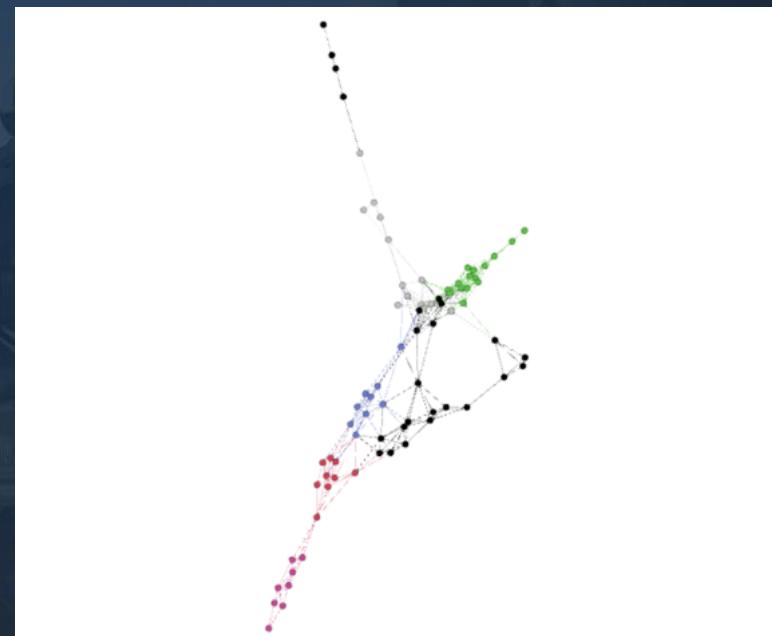


CD algorithms

Then, Do the filtering to get better graph.



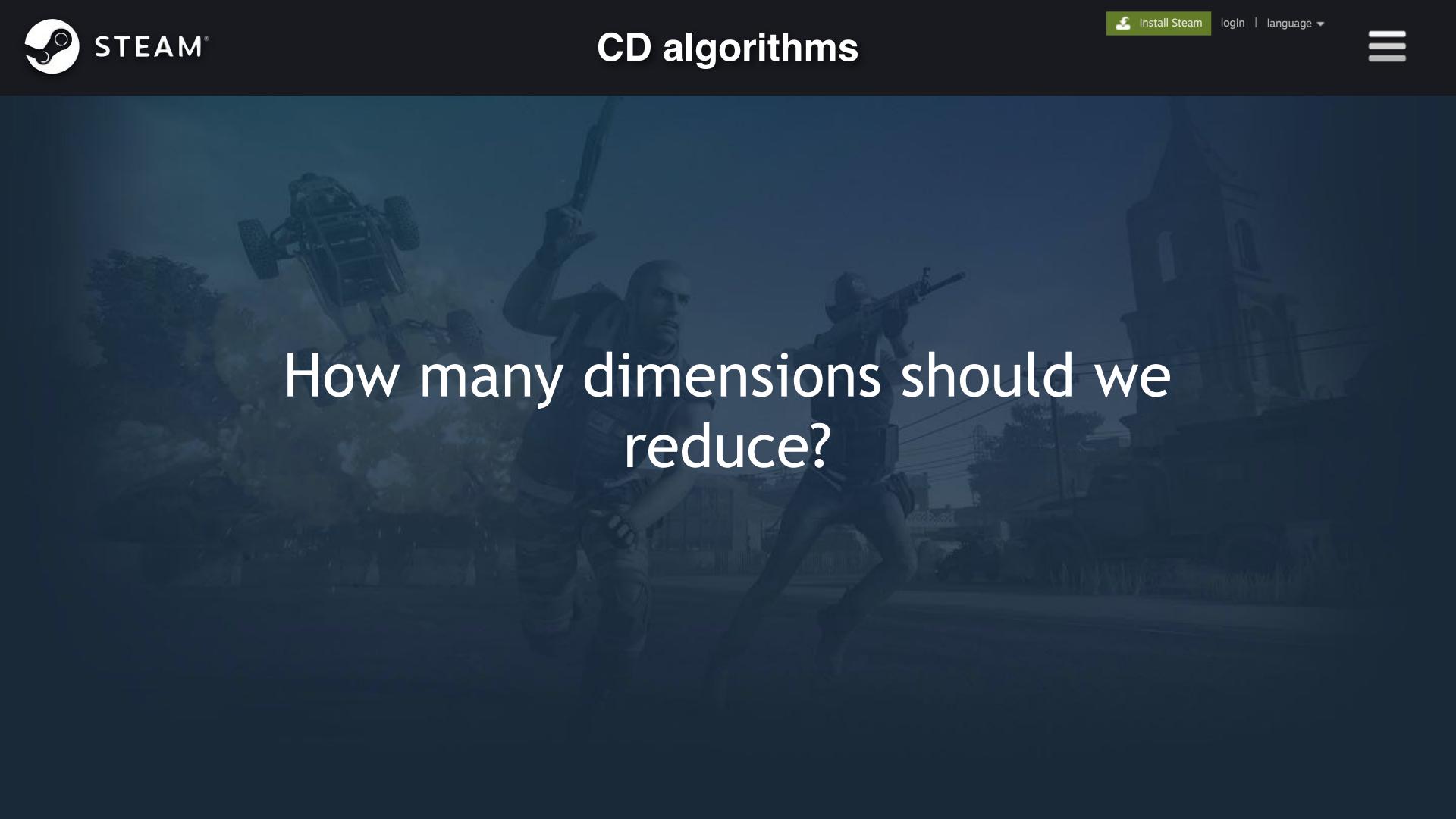
After filtering the edges



After filtering the nodes



CD algorithms



How many dimensions should we reduce?



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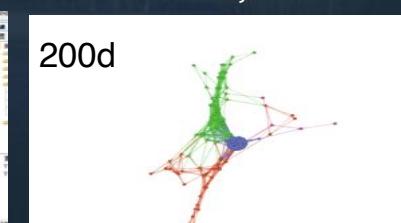
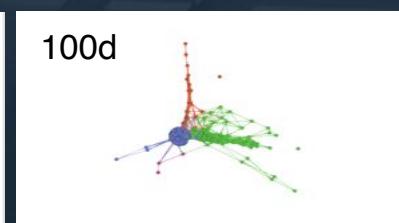
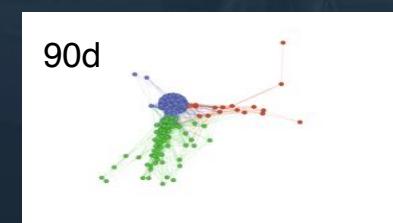
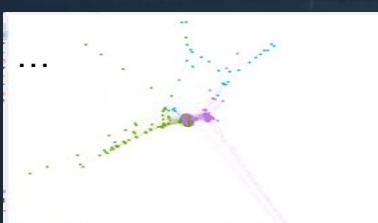
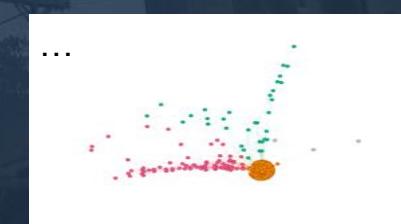
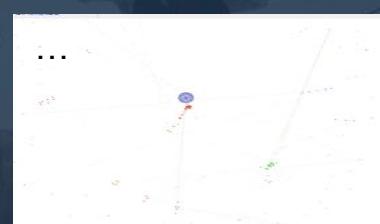
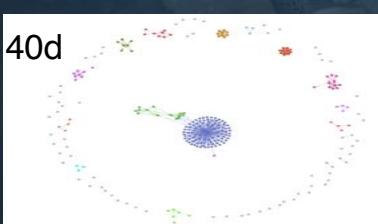
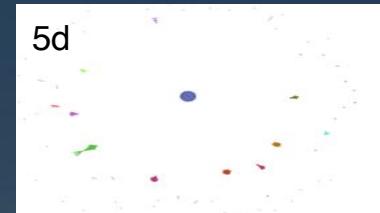
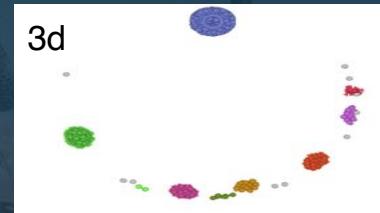
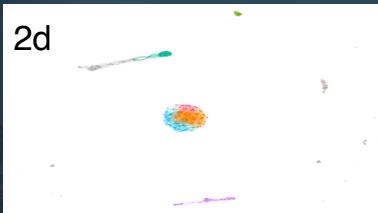
Install Steam

login | language ▾



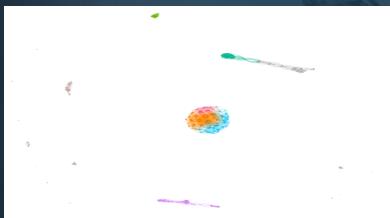
CD algorithms

simple_AE



CD algorithms

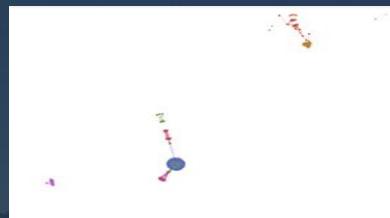
simple_AE



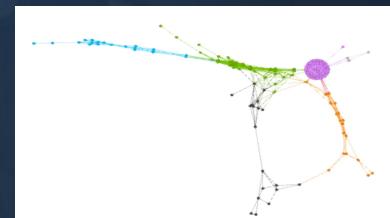
num:11 modularity0.294



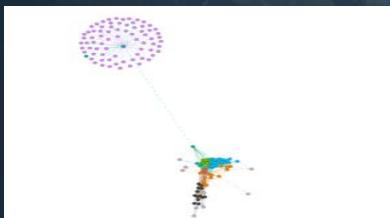
num:8 modularity-0.293



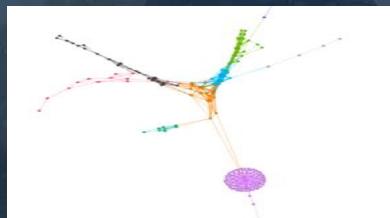
num:12 modularity0.029



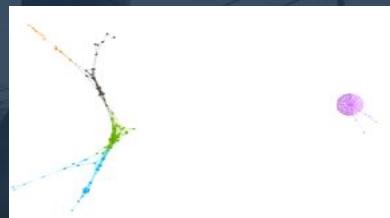
num:11 modularity0.029



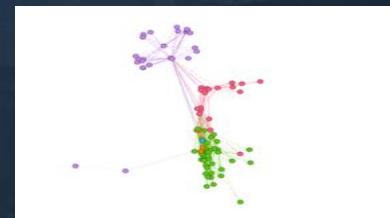
num:10 modularity0.185



num:9 modularity0.115



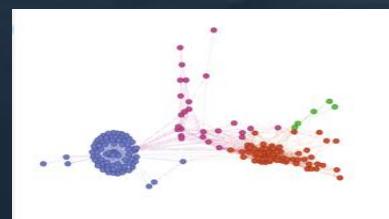
num:7 modularity-0.015



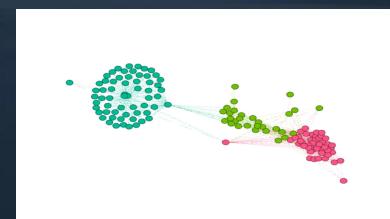
num:6 modularity-0.124y



num:27 modularity0.021



num:9 modularity-0.044



num:5 modularity-0.041



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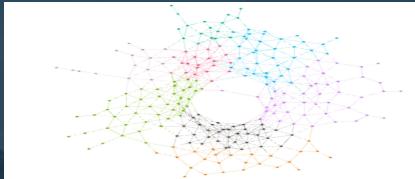
Install Steam

login | language ▾



CD algorithms

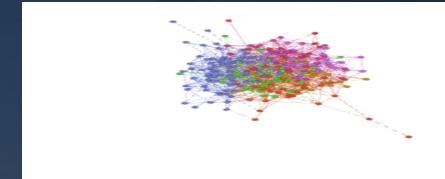
vgg



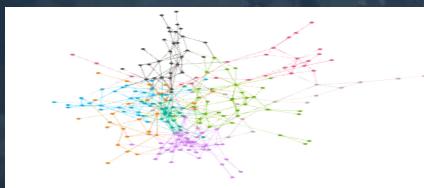
num:10 modularity0.228



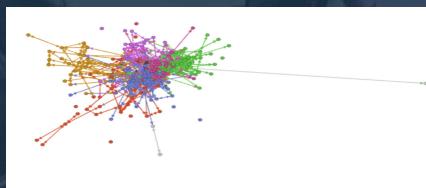
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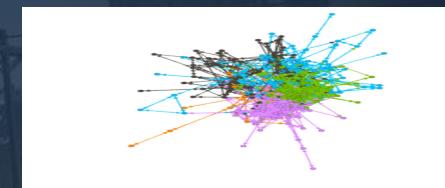
num:8 modularity0.104



num: 7 modularity0.251



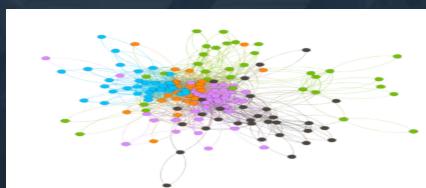
num: 6 modularity0.185



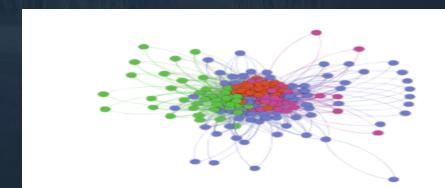
num: 8 modularity0.038



num:11 modularity0.173



num:5 modularity-0.016



num:6 modularity-0.066



05 Insights & Demo



- 11 communities
- SimpleAE
- After t-SNE
- Dimension: 2



- 10 communities
- vgg19
- After t-SNE
- Dimension: 2

What we know we know

- Series games belong to closer community generally.



What we know we know

- Most of action games have image in same community.
- (e.g. war games and shooter games)



What we don't know we know

- Horror games and action games can belong to same community.
(with high frequency)



- Many horror games have action elements.
- Many action games have dark and bloody scenes
- Both above affect the design style of the posters.

What we don't know

- Images in the same community appear similar in tone.
(simpleAE)
- Images in the same community appear similar in shape.
(vgg19)



simpleAE community #3



simpleAE community #5

What we don't know



Vgg19 community #1



Vgg19 community #9

Something Interesting

Let's focus on game series!

TOMB RAIDER



HALF-LIFE

Something Interesting



Community #10



Community #5

What happened to Half-life ?

Source

New game engine

Handles the game's visual, audio, and artificial intelligence elements.

The Source engine comes packaged with a heavily modified version of the Havok physics engine that allows further interactivity. When coupled with Steam, it becomes easy to roll out new features.



Community #10



Community #5

Something Interesting

Mike Harrington

Harrington founded Valve in 1996 with Gabe Newell, another former Microsoft employee. He and Newell privately funded Valve for the development of Half-Life.

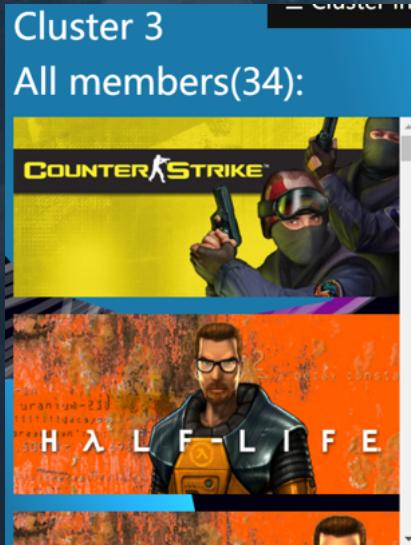
On January 15, 2000, after the success of Half-Life, Harrington dissolved his partnership with Newell and left Valve to take an extended vacation. Actually, he and his wife started the journey around the world with a 77-foot boat.

Harrington returned to the software industry in 2006. He is currently the CTO at The Committee for Children.



Something Interesting

Ooooooops! CS and Half-life in the same community!



2000



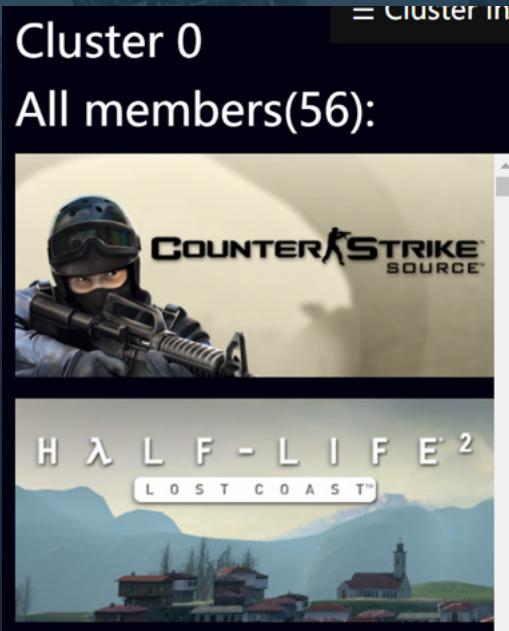
2004



1998

Something Interesting

Ooooooops! CS and Half-life in the same community!



2004

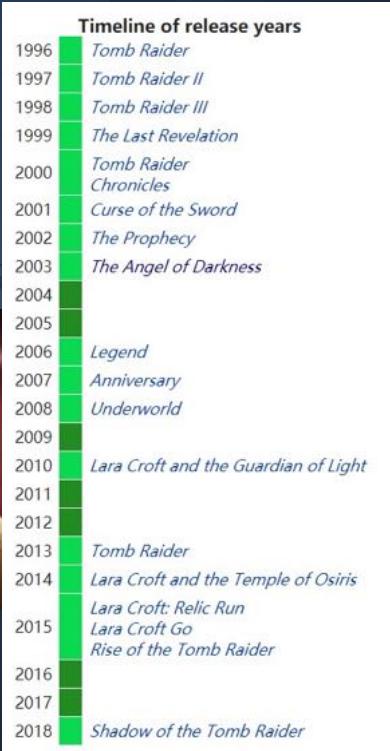
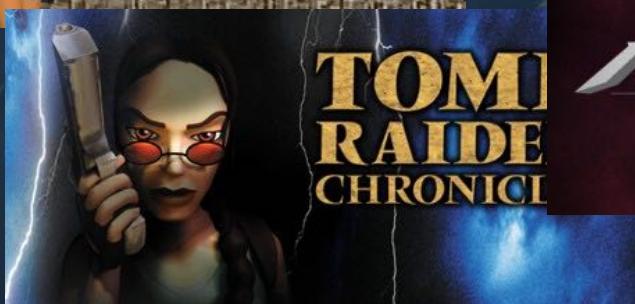


2005

APPID	NAME	CURRENT
753	Steam	13,388,146
578080	PLAYERUNKNOWN'S BATTLEGROUNDS	531,505
570	Dota 2	593,119
730	Counter-Strike: Global Offensive	491,718
377160	Fallout 4	10,826
271590	Grand Theft Auto V	188,716
863550	HITMAN™ 2	1,805
370910	Kathy Rain	634

Something Interesting

TOMB RAIDER



Something Interesting

Ubisoft has unified design style!

(A yu zhen zhuan yi!)

STEAM

What we know we know

- Series games belong to closer community generally.

The screenshot shows the Steam store page for "ASSASSIN'S CREED ODYSSEY". The main image is the game's cover art, featuring a Spartan warrior in red and white armor standing on a rocky cliff. Below the main image are smaller thumbnail previews of other Assassin's Creed games: "ASSASSIN'S CREED II", "ASSASSIN'S CREED IV: BLACK FLAG", "ASSASSIN'S CREED: BROTHERHOOD", "ASSASSIN'S CREED: UNITY", and "ASSASSIN'S CREED: REVELATIONS". The page also includes a "Install Steam" button and links for "login" and "language".



Something Interesting



Install Steam

login | language ▾





- [1] <http://steamdb.info>
- [2] <https://github.com/ankonzoid/artificio>
- [3] <https://scikit-learn.org/stable/modules/clustering.html#affinity-propagation>
- [4] https://en.wikipedia.org/wiki/Half-Life_2
- [5] https://en.wikipedia.org/wiki/Half-Life_2:_Episode_One
- [6] <https://en.wikipedia.org/wiki/Counter-Strike>
- [7] [https://en.wikipedia.org/wiki/Counter-Strike_\(video_game\)](https://en.wikipedia.org/wiki/Counter-Strike_(video_game))
- [8] https://en.wikipedia.org/wiki/Tomb_Raider
- [9] <https://www.ubisoft.com.cn/games/acod>



THANKS



Q&A