

Interactions in Reddit Place 2022

Pietro Sillano - Complexity in Social Systems 2022

What is Reddit?

- Reddit is one of the most popular websites in the world
- 430 million active users per month
- Divided into forums called subreddits
- Members can write a new post, comment, up / down vote posts
- Often the communities linked to subreddits adopt their own language, rules and conventions → strong identity

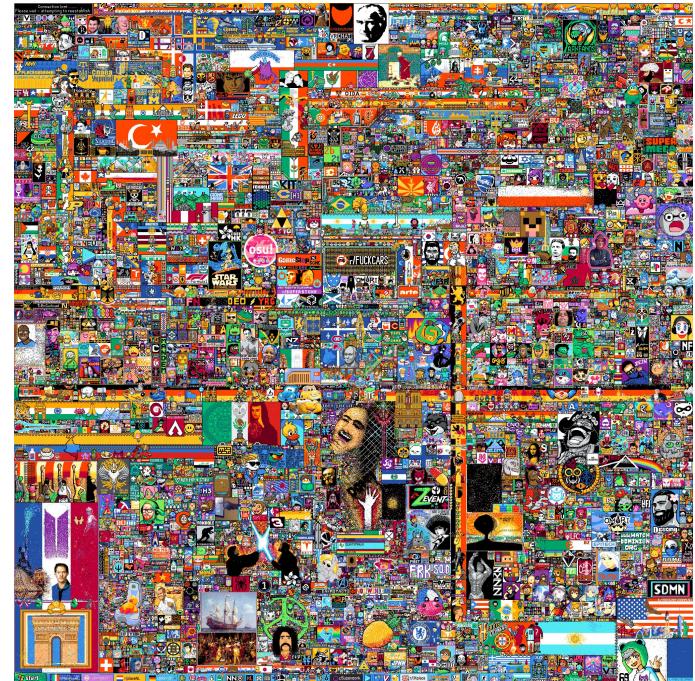


What is Reddit Place 2022?

- It is a collaborative project (2017 and 2022)
- Started on April 1, 2022, lasted 4 days
- 2000x2000 pixel canvas
- Each user could change the color of any pixel every 5-20 minutes
- Numerous collective artworks were formed autonomously

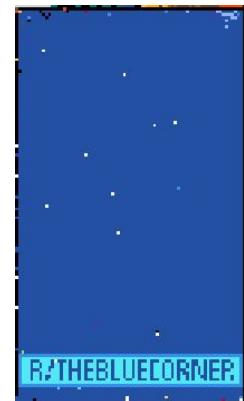
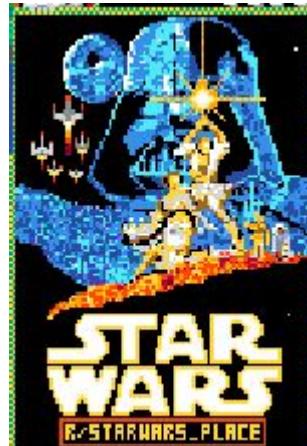


Studying the interactions between users and communities



[Timelapse Video](#)

Some of the artworks created



Datasets used

Reddit Place 2022 Official Dataset

- 24 GigaByte csv file
- Reduced to 4 GigaByte
- For each modified pixel:
 - Timestamp *
 - User_id
 - Coordinates
 - Color *

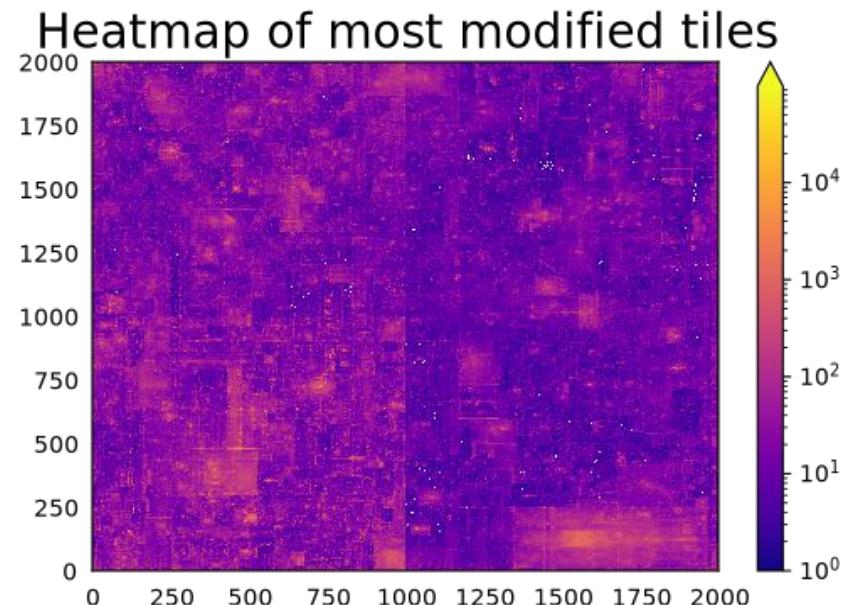
Atlas 2022

- Atlas of all artworks
- Annotated by the community
- 8180 different artworks
- Containing the outlines of each artwork

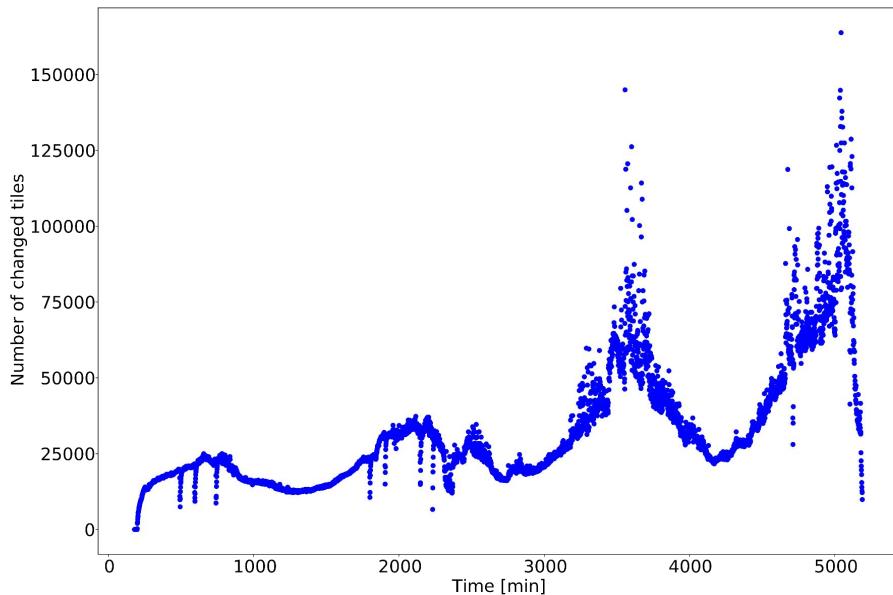
* not used in analysis

Some data of the canvas

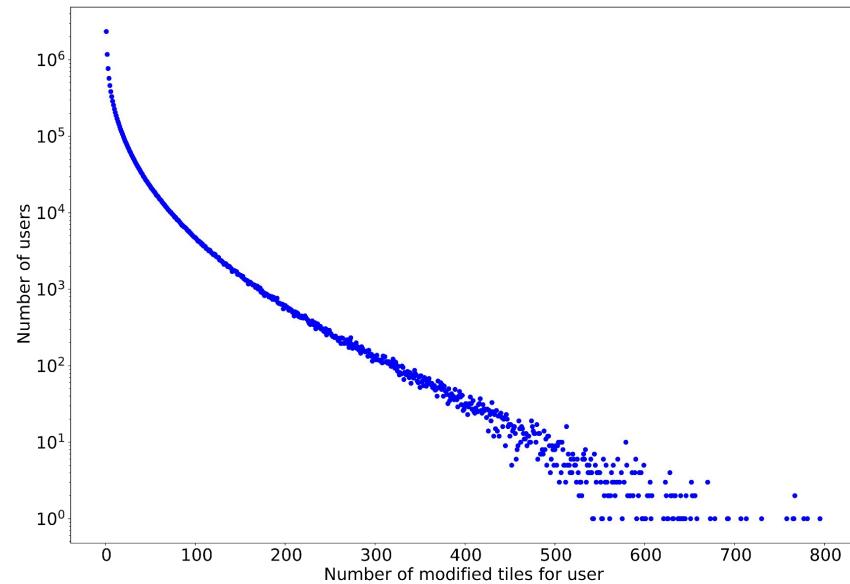
- 160 Million pixels modified
- 10 million unique users
- The pixel (0,0) has been modified 98807 times
- 4% of the pixels have only been changed once



User activity



The activity grows during the three days until it culminates in the last moments over 100k tiles per minute



Most users have drawn a few pixels up to users who have edited hundreds of pixels

Interactions between users

Link if modified the same pixel:

- Too many nodes, links
- Micro interaction



Link if modified to a same portion of the canvas:

- Larger scale
- Defined artworks (Atlas dataset)



Which artworks to consider?

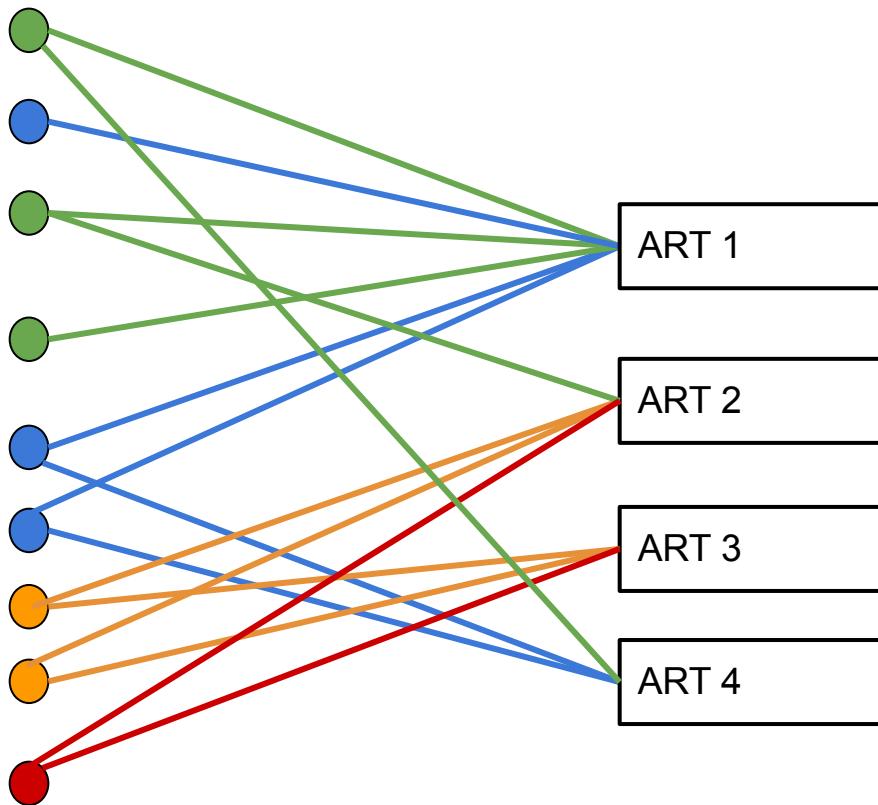
- Community artworks where collaboration was not evident (Flag of Ukraine and EU countries, LGBT Flag and supporter communities etc) → **Time consuming**

- Random choice

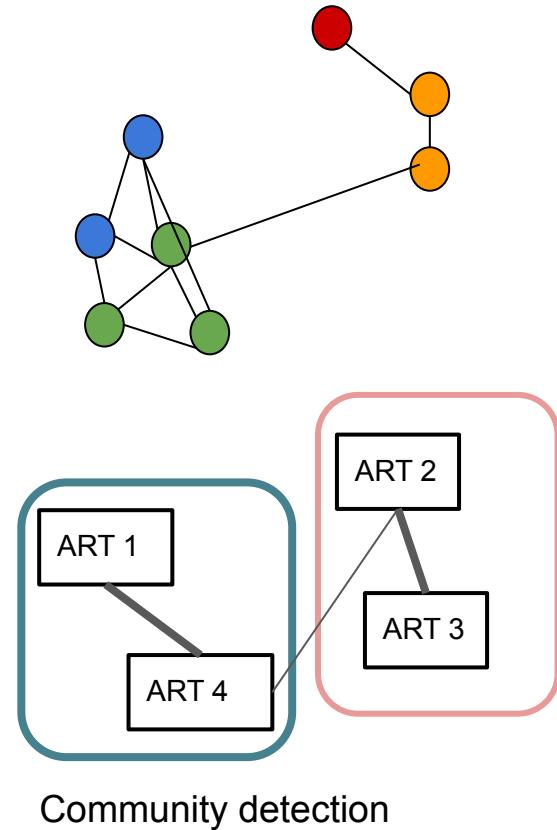
1st set: **30 artworks** of 5k - 10k pixels

2nd set: **100 artworks** from 5k - 100k pixels

Step of the analysis

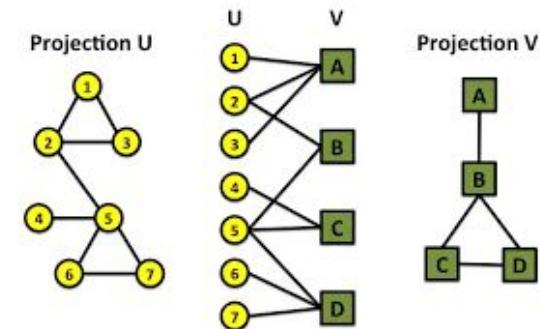


Projection
→



Projections on a unipartite network

- **Simple projection:** Links are not weighted, so networks with different structures will have the same one-party representation.
- **Simple weighting:** Links are weighted directly by the number of users in common.
- **Newman projection:** Links are weighted according to this rule:
 - W decreases if there are many co-authors of J ,
 - W is large if u and v are the only authors of J

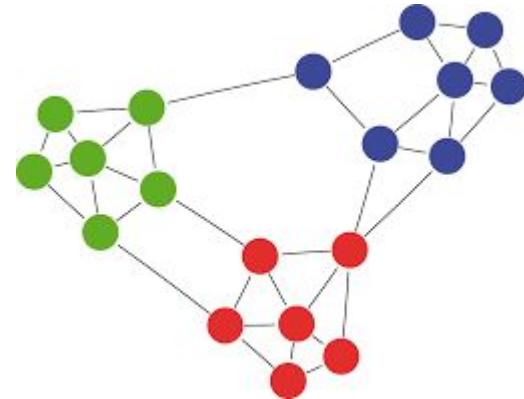


$$w_{u,v} = \sum_j \frac{\delta_u^j \delta_v^j}{k_j - 1}$$
$$\delta_u^j = \begin{cases} 1 & u \rightarrow j \\ 0 & \text{altrimenti} \end{cases}$$

Community detection Method

I used Newman's greedy algorithm based on
modularity:

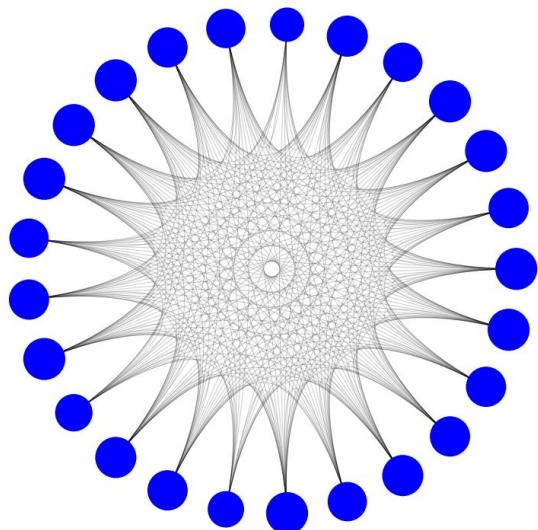
$$M_k = \frac{1}{L} \sum_i^{n_k} \left(w_i l_i - \frac{d_i^2}{4L} \right)$$



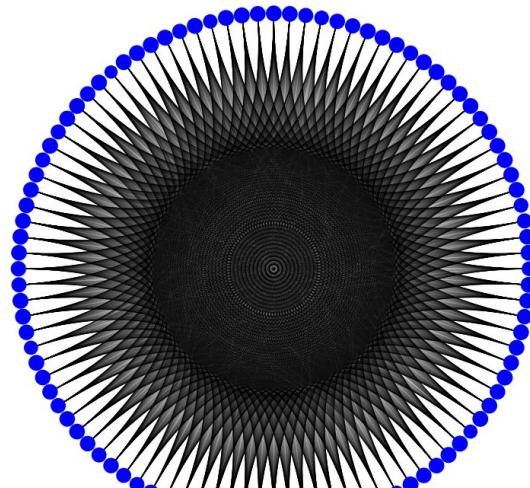
Partition k with maximum modularity is chosen

Unweighted artworks projection

- I lose information on the topology of the network
- The links are all equivalent



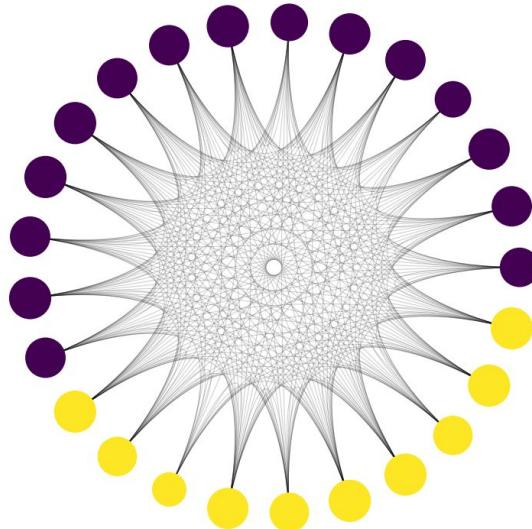
$N = 30$



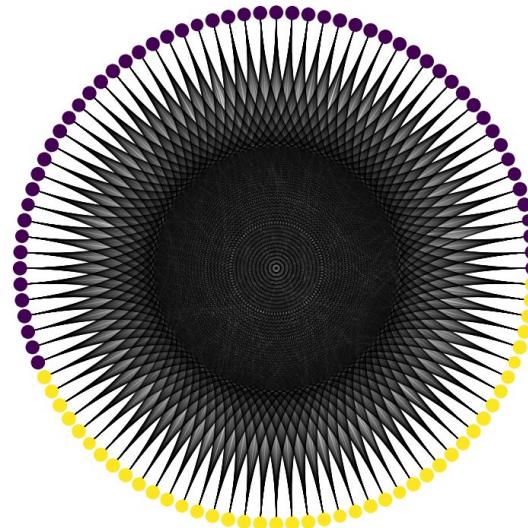
$N = 100$

Unweighted artworks projection

- I lose information on the topology of the network
- The links are all equivalent
- The community structure is not informative (random)



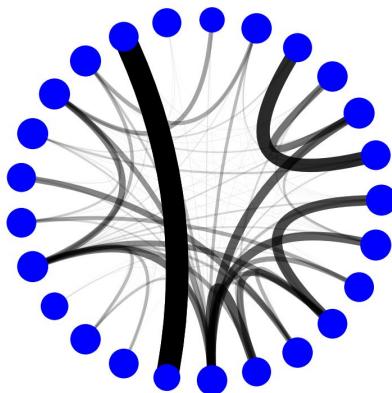
$N = 30$



$N = 100$

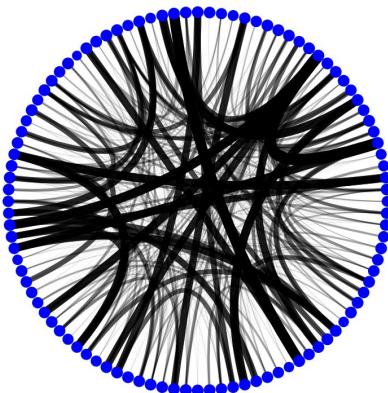
Weighted artworks projections

- The links are not equivalent



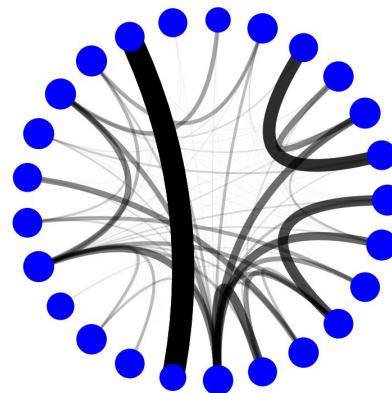
Simple weighting

$N = 30$



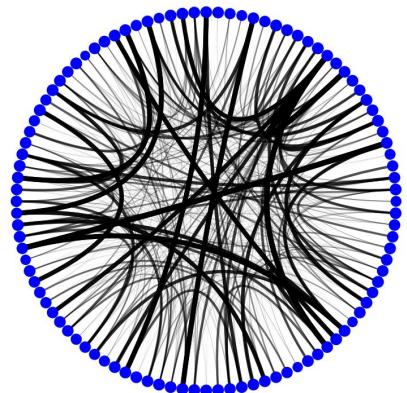
Simple weighting

$N = 100$



Newman weighting

$N = 30$

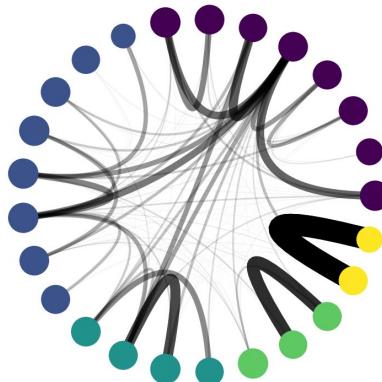


Newman weighting

$N = 100$

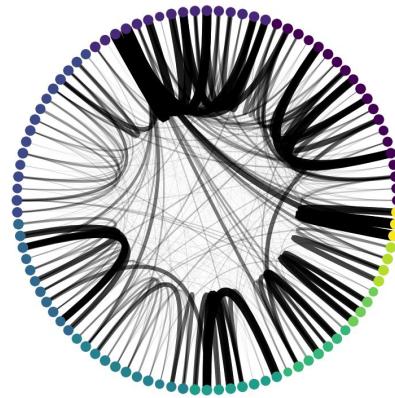
Weighted artworks projections

- The links are not equivalent
- The community detection algorithm also considers link weights



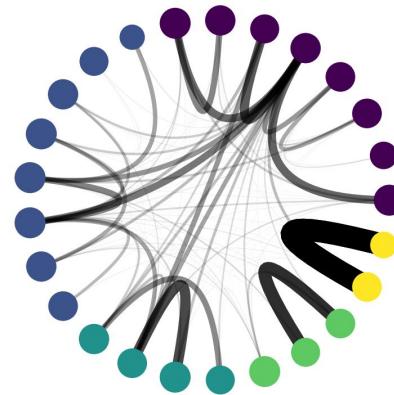
Simple weighting

$N = 30$



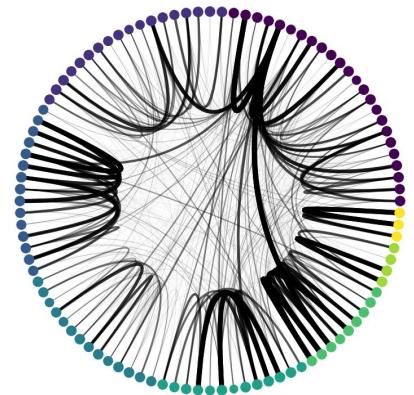
Simple weighting

$N = 100$



Newman weighting

$N = 30$



Newman weighting

$N = 100$

Results

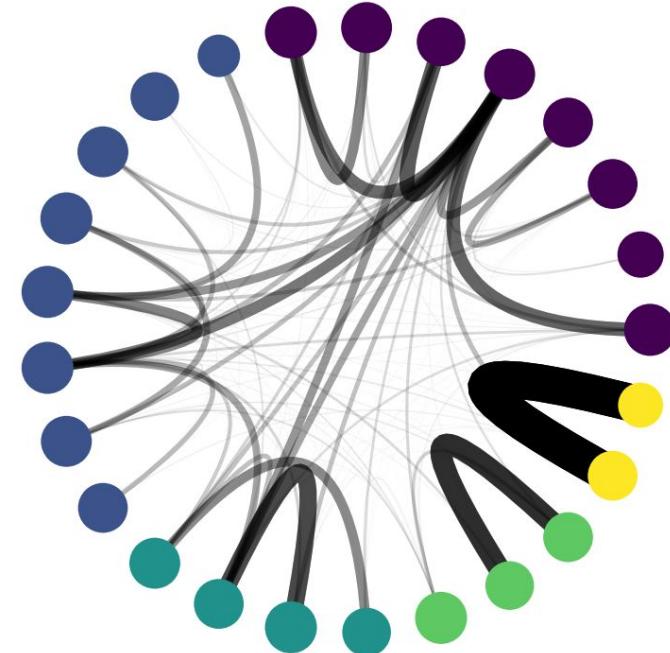
Zuko and Toph
The Blue Corner
Bratishkinoff
Flag of Italy

Billy Herrington Tribute
Flag of Iran

Burdurland Logo
or up!
OMORI Title Screen

Mr. Incredible
Kirby
Girl Group Alley
Teddy Fresh x The H3 Podcast x Pokémon war
MC / WC Alliance
Z event flag
Flag of Poland
Baltic flags

wubby7
Touhou Hijack
Sor Juana Inés de la Cruz
Longnose Alley
Barış (peace) sign
Indian artwork
Flag of Bulgaria
Brazilian / Irish flag



Future developments

Extensions:

- Consider more artworks (all?)
- Eliminate overlaps between artworks

New analyzes or methods:

- Deepen the Collaboration / Competition relationships
- Analyze the dynamics and evolution over time (hidden artworks)

References

- Rappaz, Jérémie, Michele Stack, Robert West, and Karl Aberer. "Latent structure in collaboration: the case of Reddit R / place." In Twelfth International AAAI Conference on Web and Social Media. 2018.
- Ying Fan, Menghui Li, Peng Zhang, Jinshan Wu, Zengru Di. "The effect of weight on community structure of networks" in PHYSICA A 378 (2007) 583–590

Dataset:

- <https://place-atlas.stefanocoding.me/>
- <https://www.reddit.com/r/place/>

Analysis and Visualization libraries:

- NxViz
- NetworkX