Thesis draft

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1 Introduction: Reddit, gamers, and social networks

Gaming is an omnipresent artistic medium enjoyed by a plurality of Americans. Research from the *Entertainment Software Association* (E.S.A.) has found that about 65% of American adults play video games. About 46% of said gamers are female (Association, 2019). The E.S.A.'s research counters the tired trope of gamers as young, immature boys. Despite the prevalence and diversity of gamers academia is woefully behind on ludology, the study of gaming. Gaming lacks the prestige of other artistic entertainment media such as books, music, and film. An interested party may find texts on the innovations of Allen Ginsberg's poem *Howl* or Sonic Youth's *Daydream Nation* while scarcely finding an academic article on the contributions of the video game *Doom*.

Ludology is as exciting as fields such as A.I. despite lacking the selfsame effervescence. In other words, ludology may be studied from many different angles. Political sociologists would find much to mine from the philosophical schisms in the gaming community. Recent grassroots movements to push for more representation in video games spawned a revanchist and sexist counter movement. Besides the political, sociologists may write ethnographies of the online communities or interactions that occur within gaming. Mark Chen's *Leet Noob: The Life and Death of an Expert Player Group in 'World of Warcraft'* is a study of a group of gamers who tackle dungeons in *World of Warcraft*. Chen writes from the perspective of both a gamer and a social scientist to apply theories such as social and cultural capital, actor-network theory, social construction, et cetera to the video game (Chen, 2011). The list above is clearly not exhaustive. However, I'd like to mention, as an aside, that online communities are transient; ignoring ludology risks permanently missing out on an aspect of culture.

My thesis focusses on the intersection between network science via the social network Reddit and video games. I am particularly interested in the distribution of gamers across subreddits. Reddit and the related terminology will be explained below. I hypothesize that gamers are more likely to post on multiple gaming subreddits (that is, gamers are more likely to have a community that spans across subreddits). Analyzing the network dispersion of gamers is useful for both the social sciences as well as marketing. Network science is concerned with the spread of information by virtue of its focus on ties. Users who post on multiple subs may pass information across subreddits.

My guiding principle is thus to use my statistical and computing skill coupled with my domain knowledge of video games in order to contribute to ludology. Previous studies on gaming lack domain expertise while exhibiting logical fallacies—both of which seem to be caused by the hermetic world of academia. More proper ludology needs to seed the field until the study of video games resembles writing on music or films.

An anecdote engendered my thesis. I've observed; anecdotally, like many others; that nerds of a feather tend to flock together. Gamers tend to share a sample from a common set of interests such as anime, wrestling, technology, certain tastes in music, et cetera. This observation is far from holistic—meaning, gamers do not adopt all of the same traits, and clearly not every person who watches wrestling, for example, is a gamer. However, the basic observation led to my thesis. My research is not seeking to answer that question specifically, but my thesis may provide the groundwork toward studying that larger topic. Gamers may preferentially attach to other gamers or to other ostensibly related subjects such as anime or eSports. Either conclusion—that gamers preferentially attach or not—is useful for ludology.

2 Background: Social network analysis

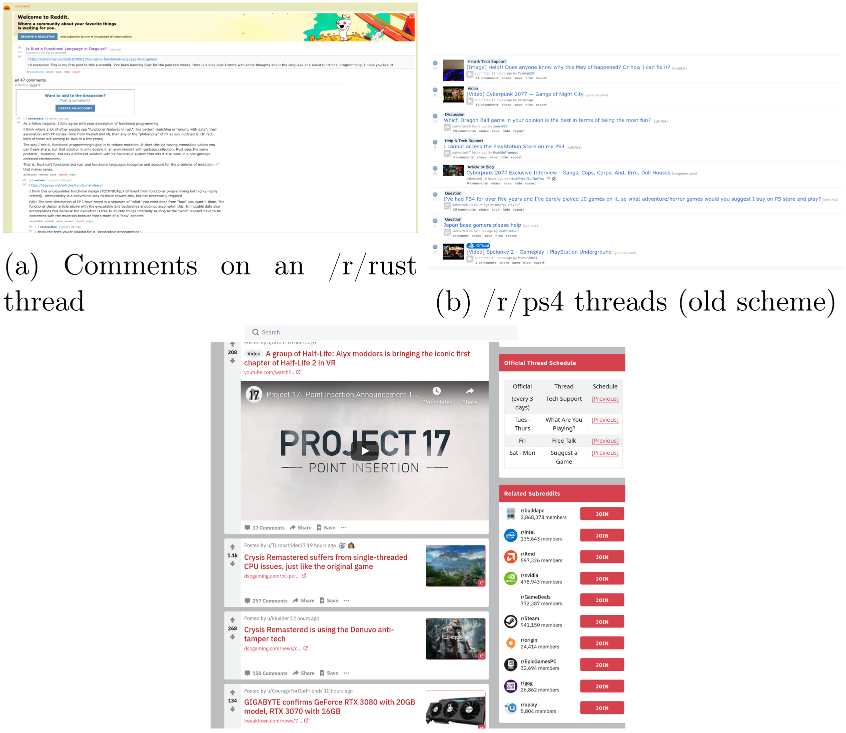
2.1 A digital approach

My goal is to contribute to both ludology as well as studies of Reddit. Gaming by virtue is a heavily technological affair. Gamers are often only lightly insulated from technology. For example, anyone who follows gaming news would likely run into computer terms. Even gamers who do not follow gaming news would run into patches, lag, bugs, or have to know how to connect their consoles to the internet, et cetera. Gaming is unlike television or cable in that video games have a strongly "digital native" feel—especially for P.C. (computer) gamers. Gamers discuss video games online on platforms such as Reddit or news sites with forums and comment systems. The culmination of these "techy" qualities does not imply that all gamers are computer scientists but that they are generally reasonably comfortable with technology. All of this is to say that a network analysis focussing on gamers and Reddit is sensible because of the focus on internet media.

2.2 Why video games?

Gamers and ludology, as discussed earlier, are legitimate areas of study that are largely ignored by academia as well as having an image problem regardless of gaming's prevalence. Gaming as a medium is sometimes strangely maligned as coercing individuals toward violence. In 2019, President Donald Trump as well as Kevin McCarthy and Dan Patrick, both Republican politicians, scapegoated video games as reported by an article in the New York *Times*. The article explains that games are often blamed for shootings despite the lack of causal evidence. The American Psychological Association, according to the *Times*, is that video games and violence are not linked. Dr. Chris Ferguson of the A.P.A. humorously mentioned that the data linking bananas to suicide are about the same as those data connecting video games and other media to violence (Draper, 2019).

Most research published on gaming is cursory while also lacking domain knowledge on the subject. A search through databases that compile articles, such as JSTOR, on video games shows that research is decidedly lacking in imagination as they mostly focus on the antiquated violence question. One such article published in *Frontiers of Psychology* exhibits a very flawed methodology in studying gamers. The researchers use an imbalanced and relatively small random sample that skews young and male. Females consisted of a scant 15% of their sample. The writers justified the skewed sample by referencing a two decade old paper despite publishing their article in 2019 and using recent sources otherwise (von der Heiden, Braun, Muller, and Egloff, 2019). Research from the NPD Group corroborates what the E.S.A. found and gamers already know: about half of gamers are women and more females own the 3DS, Wii U, and Nintendo Switch than males (Valentine, 2019). Beyond the poor sampling the research heavily relies on p-values without associated effect sizes. Furthermore, the basis for the study is intrinsically flawed. Gamers are a wide social unit. We would not sample around 3000 music buffs in order to see if "problematic music listening" is associated with "poor psychological functioning."



Welcome to Reddit.

Where a community about your favorite things is waiting for you.

and subscribe to one of thousands of communities.

77 Is Rust a Functional Language in Disguise? (self.rust)

submitted 1 day ago by ceronman

https://ceronman.com/2020/09/17/is-rust-a-functional-language-in-disguise/

Hi everyone! This is my first post to this subreddit. I've been learning Rust for the past few weeks. Here is a blog post I wrote with some thoughts about the language and about functional programming. I hope you like it!

all 47 comments

sorted by: best

Want to add to the discussion?

Post a comment!

[–] bowbahdoe 68 points 1 day ago

As a fellow clojurist, I fully agree with your description of functional programming.

I think where a lot of other people see "functional features in rust", like pattern matching or "enums with data", their association with FP comes more from Haskell and ML than any of the "philosophy" of FP as you outlined it. (In fact, both of those are coming to Java in a few years).

The way I see it, functional programming's goal is to reduce mutation. It does this via having immutable values you can freely share, but that solution is only doable in an environment with garbage collection. Rust sees the same problem - mutation, but has a different solution with its ownership system that lets it also work in a non garbage collected environment.

That is, Rust isn't functional but rust and functional languages recognize and account for the problems of mutation - if that makes sense.

[–] reeinten 10 points 1 day ago*

https://degoes.net/articles/functional-design

I think this encapsulates functional design (TECHNICALLY different from functional programming but highly highly related). Immutability is a convenient way to move toward this, but not necessarily required

Edit: The best description of FP I have heard is a separate of "what" you want done from "how" you want it done. The functional design article above with the executable and declarative encodings accomplish this. Immutable data also accomplishes this because the execution is free to mutate things internally as long as the "what" doesn't have to be concerned with the mutation because that's more of a "how" concern

[–] CouteauBleu 5 points 1 day ago

I think the term you're looking for is "declarative programming".

(a) Comments on an /r/rust thread

24 Help & Tech Support [Image] Help!! Does anyone know why this May of happened? Or how I can fix it? (i.redd.it)
submitted 12 hours ago by Tazman20
31 comments share save hide report

88 Video [Video] Cyberpunk 2077 — Gangs of Night City (youtube.com)
submitted 18 hours ago by harushiga
15 comments share save hide report

14 Discussion Which Dragon Ball game in your opinion is the best in terms of being the most fun? (self.PS4)
submitted 8 hours ago by xman886
29 comments share save hide report

8 Help & Tech Support I cannot access the PlayStation Store on my PS4 (self.PS4)
submitted 7 hours ago by RumbleTrumpet
4 comments share save hide report

39 Article or Blog Cyberpunk 2077 Exclusive Interview - Gangs, Cops, Corps, And, Erm, Doll Houses (thegamer.com)
submitted 15 hours ago by IHateMyselfButNotYou
6 comments share save hide report

12 Question I've had PS4 for over five years and I've barely played 10 games on it, so what adventure/horror games would you suggest I buy on PS store and play? (self.PS4)
submitted 10 hours ago by lookfgx-xt5782f
30 comments share save hide report

• Question Japan base gamers please help (self.PS4)
submitted 24 minutes ago by ZaWarudo20
comment share save hide report

35 Official [Video] Spelunky 2 - Gameplay | PlayStation Underground (youtube.com)
submitted 15 hours ago by MrValhallaYT
3 comments share save hide report

(b) /r/ps4 threads (old scheme)

Posted by u/Artum 10 hours ago

208 Video A group of Half-Life: Alyx modders is bringing the iconic first chapter of Half-Life 2 in VR

youtube.com/watch?...

17 Comments Share Save ...

Posted by u/Turbostrider27 19 hours ago

1.1k Crysis Remastered suffers from single-threaded CPU issues, just like the original game

dsogaming.com/pc-per...

257 Comments Share Save ...

Posted by u/kluader 12 hours ago

268 Crysis Remastered is using the Denuvo anti-tamper tech

dsogaming.com/news/c...

150 Comments Share Save ...

Posted by u/CourageForOurFriends 10 hours ago

134 GIGABYTE confirms GeForce RTX 3080 with 20GB model, RTX 3070 with 16GB

tweaktown.com/news/7...

Official Thread Schedule

Official	Thread	Schedule
(every 3 days)	Tech Support	[Previous]
Tues - Thurs	What Are You Playing?	[Previous]
Fri	Free Talk	[Previous]
Sat - Mon	Suggest a Game	[Previous]

Related Subreddits

r/buildapc 2,868,378 members	JOIN
r/intel 135,643 members	JOIN
r/Amd 597,326 members	JOIN
r/nvidia 478,943 members	JOIN
r/GameDeals 772,387 members	JOIN
r/Steam 941,150 members	JOIN
r/origin 24,414 members	JOIN
r/EpicGamesPC 32,694 members	JOIN
r/gog 26,862 members	JOIN
r/uplay 5,804 members	JOIN

(c) /r/pcgaming threads (new scheme)

Figure 1: Examples of Reddit, a forum-like social network

2.3 What is Reddit?

Reddit is a social network reminiscent of the forums and bulletin board systems (B.B.S.) of the past. Reddit is designed for lengthy deliberation, or at least facilitates it, which is like forums and unlike Twitter or Facebook. Subreddits is Reddit parlance for a community which is similar to a forum. Pseudonymous users may post or reply to discussion topics. Individual subreddits are moderated by screened volunteers from the community; rules are enforced and users may not be able to post if their reputation—known as karma—is too low. Needless to say, Reddit's structure engenders higher quality content—generally speaking at least as Reddit is also home to lengthier discussions on puerile matters. Reddit users, who are pseudonymous, are known by the demonym Redditors.

Reddit reflects gaming's preeminence via *many* the many subreddits on the topic; individual consoles, series, genres, abstruse memes, as well as technological concepts such as emulation all have incredibly active subs. Reddit is the seventeenth most popular site in the world according to *Alexa*, a subsidiary of Amazon that collects internet data. The social network's position varies from day to day but remains consistently high. Reddit is ahead of several prominent sites such as Netflix, Hulu, Crunchyroll, Instagram, Microsoft's site, Live (Outlook), Twitch, Bing, eBay, AliExpress, and others. Reddit is mainly behind sites such as Chinese social networks such as Weibo as well as Google and YouTube Alexa, 2020. The largest gaming subreddit on Reddit, */r/gaming*, is the fourth most popular total which places *gaming* above the subreddits for music, sports, relationships, movies, news, gifs, cats, cute pictures, books, programming, et cetera. In fact, the only subreddit more popular than *gaming* that is *not* a default subscription is */r/funny*. The subreddit for *League of Legends*, a single video game, is the sixtieth most popular subreddit Sizz, 2020.

Redditors may post on as many or as little subreddits as they wish. For example, a user may post on the subreddits for PlayStation 4, P.C. gaming, Linux, and the systems programming language, Rust. Another user may frequent the subs for K-Pop, anime, and the Nintendo Switch.

2.4 Big data—Volume, Variety, and Velocity

Graph theory does not imply big data, but network science scales well to a high number of observations.Computational social science naturally trends towards big data, such as large graphs or natural language processing. Amir Gandomi and Haider Murtaza argue that the term "big data" is often misunderstood which may impact comprehending a big data project. Big data is traditionally defined by the three Vs: volume, variety, and velocity. Volume is the most straightforward of the three concepts. The "big" in big data suggests a generous amount of information. Volume is simply that—a lot of data Gandomi and Haider, 2015.

Variety and velocity are the more interesting of the three Vs. Big data is often raw and heterogeneous. Unlike the nicely structured flat files data are often distributed as, the majority of existing data are unstructured and multiformat Gandomi and Haider, 2015. For example, Twitter data would likely arrive in a set of different languages with varying levels of grammar, zeitgeist and context specific references, embedded multimedia, retweets, et cetera. With that said, Twitter data may still be pulled from a clean API which means that Tweets are hardly the most unstructured data a scientist would find. Variety, thus, also refers to the format of data; different image or video formats must be handled, and unstructured data must be appropriately stored as well.

Big data is not only intractably diverse but they are also produced at a high velocity Gandomi and Haider, 2015. For example, consider all of the data gathered by voice processing systems such as Siri, Alexa, or Google Assistant. Simply browsing the internet, even with JavaScript and DNS blocking, produces an enormous amount of data. Cellphones collect data more or less constantly, especially with more programs/apps in use. [1]

The three Vs galvanized the use of certain techniques of gathering and analyzing data. Natural Language Processing, graph theory, unstructured databases, clustering, et cetera are not new, but big data have made such techniques both more viable as well as more necessary. NLP, neural networks, as well as computer vision are hotshot fields of data science more generally as well as the computational social sciences due to the prevalence of so much data. After all, what else would we do with said data Gandomi and Haider, 2015?

Finally, social network analysis is at least a century old but big data presents new applications.

2.5 Weak ties in social networks

To doGranovetter, 1973

2.6 Co-posting networks via Reddit

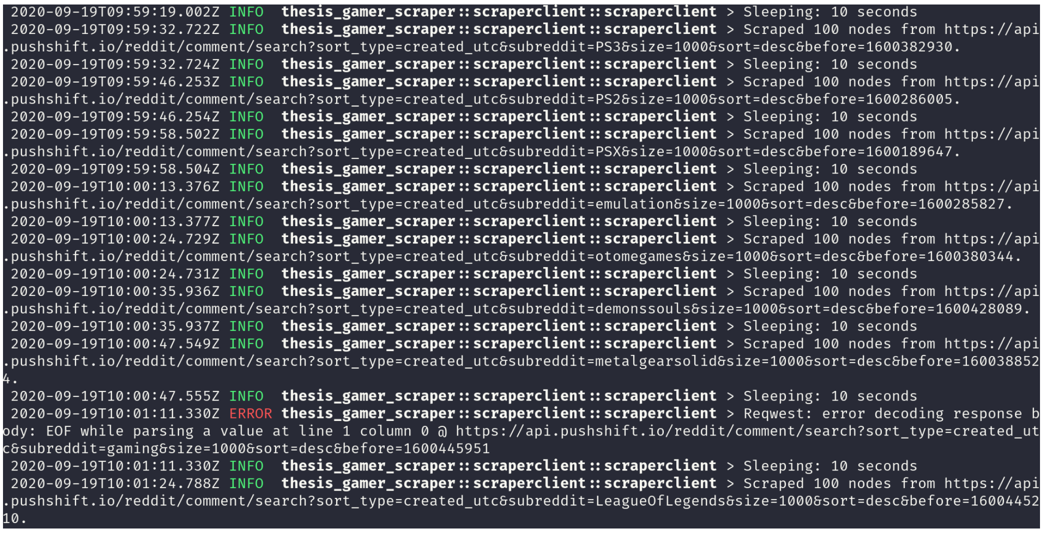
To do

3 Methodology

My research project requires relatively recent data as well as observations relevant to video games. Researchers in the computational social sciences seem to trend toward gathering their own data. The internet is a dynamic space of constant data production. Structured data may be limited or flawed for many topics, including ludology. Scraping data allows computational social scientists to gather raw, unpasteurized data rather than relying on old, static sources. A survey, for example, is saliently flawed for gamers because conducting one properly would likely require a large sample across a wide span of ages as well as capture gamers who play on different platforms. Scraping data seems both more reliable as well as more direct in a case like that as well as for my project.

While large Reddit data sets exist via the *Stanford Network Analysis Project* as well as *Kaggle*, scraping data from Reddit is not too difficult

[1] Data are collected in a manner so megalomaniacal that the European Union instituted the General Data Protection Regulation to protect the privacy of E.U. citizens.



```
 2020-09-19T09:59:19.002Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T09:59:32.722Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=PS3&size=1000&sort=desc&before=1600382930.
 2020-09-19T09:59:32.724Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T09:59:46.253Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=PS2&size=1000&sort=desc&before=1600286005.
 2020-09-19T09:59:46.254Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T09:59:58.502Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=PSX&size=1000&sort=desc&before=1600189647.
 2020-09-19T09:59:58.504Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:00:13.376Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=emulation&size=1000&sort=desc&before=1600285827.
 2020-09-19T10:00:13.377Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:00:24.729Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=otomegames&size=1000&sort=desc&before=1600380344.
 2020-09-19T10:00:24.731Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:00:35.936Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=demonssouls&size=1000&sort=desc&before=1600428089.
 2020-09-19T10:00:35.937Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:00:47.549Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=metalgearsolid&size=1000&sort=desc&before=160038852
4.
 2020-09-19T10:00:47.555Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:01:11.330Z ERROR thesis_gamer_scraper::scraperclient::scraperclient > Reqwest: error decoding response b
ody: EOF while parsing a value at line 1 column 0 @ https://api.pushshift.io/reddit/comment/search?sort_type=created_ut
c&subreddit=gaming&size=1000&sort=desc&before=1600445951
 2020-09-19T10:01:11.330Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Sleeping: 10 seconds
 2020-09-19T10:01:24.788Z INFO  thesis_gamer_scraper::scraperclient::scraperclient > Scraped 100 nodes from https://api
.pushshift.io/reddit/comment/search?sort_type=created_utc&subreddit=LeagueOfLegends&size=1000&sort=desc&before=16004452
10.
```

Figure 2: Scraper hard at work

due to the open Reddit API Reddit, 2020. Bindings for Python exist via *PRAW* as well. However, the Reddit API imposes several restrictions and requires an account to use properly as well. The restrictions are reasonable due to Reddit's high traffic: rapacious scrapers may hammer the site and associated Content Delivery Networks. Caching services, such as the open source Pushshift, aims to alleviate the stress caused by scrapers as well as provide a more convenient API Baumgartner, n.d. I opted for Pushshift to gather my data due to its flexibility.

My scraper gathers N Node-Edge pairs from a provided list of subreddits. I wrote the scraper in the systems programming language, Rust, and the source code is available on GitHub[2]. My program's high level logic is as follows:

1. Collect 100 nodes with associated metadata from a subreddit. Each observation contains the Redditor name, epoch timestamps, and subreddit name.

2. Paginate by setting the *before* API parameter to the earliest timestamp from the recent scrape of 100 nodes.

3. Add each gathered node to a hash set which precludes duplicate observations.

[2] https://github.com/joshuamegnauth54/thesis_gamer_scraper

4. Repeat steps one through three for the set of subreddits in a round robin manner.

5. Repeat steps one through four until N is reached.

6. Remove deleted users and automoderator replies.

7. Hash all of the Redditor names with SHA256 at an attempt at privacy[3].

8. Save everything to a CSV.

My data set[4] contains about 78,000 observations gathered via the logic above.

References

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[3] Very little of the data sets found online actually hashed the user names as the information is all public. However, hashing at least adds a minimum layer of privacy.

[4] Available here: https://github.com/joshuamegnauth54/GamerDistributionThesis2020/data

von der Heiden, J., Braun, B., Muller, K., & Egloff, B. (2019). The Association Between Video Gaming and Psychological Functioning. *Frontiers in Psychology.*