

Undergraduate Thesis Prospectus

Analyzing Search Results:
A Chrome Extension for Personalized Web Search
(technical research project in Computer Science)

The Rise of Content Creators and Content Platforms
(sociotechnical research project)

by

Andrew Wang

November 1, 2021

technical project collaborators:

Mitchell Campbell

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Andrew Wang

Technical advisor: Hongning Wang, Department of Computer Science

STS advisor: Peter Norton, Department of Engineering and Society

General Research Problem

How are tech companies, service providers, retailers, content creators, and users shaping the internet?

The U.S. military created the internet in the late 1960s to bring network access to soldiers and officers during the Cold War (Tarnoff, 2017). Due to its success, the internet soon saw widespread adoption by civilian and commercial projects worldwide. By 2016, there were 3.4 billion people online with an average of 640,000 new users joining every day (Roser, 2015). In the United States, 92% of households own an electronic device that can connect to the internet (US Census Bureau, 2021). Today, innovations in every industry, including entertainment, education, pharmaceutical, and politics, all rely on the connectivity of the internet.

The concept of a “search engine” did not exist before the internet. First introduced by Archie in 1990, a search engine organizes data and provides an interface for search queries (Shedden, 2014). Nowadays, it is a ubiquitous tool for students, professionals, and researchers to gather information. To provide the most applicable results for individual users, general search engines, like Google and Bing, analyze search patterns from a variety of users and rank the results by relevance. Despite this, users often struggle with finding the information they want. The technical project in this prospectus evaluates how effective Google and Bing are at prioritizing results.

The internet has also introduced new platforms for social media and entertainment. Before the internet was popular, the dominant form of media was television and print. Between 2010 and 2014, people spent around 20% less time on traditional media and 84% more time on the internet (Top Media, 2021). In 2019, social media was the dominant method of media consumption (Top Media, 2021). The rise of content platforms and social media has created

many new opportunities for both established and new content creators. However, the rapid growth of these platforms has also caused controversy among its users that cause the platform to modify policy or functionality. The sociotechnical project in this prospectus examines how content creators and content platforms influence each other.

Analyzing Search Results: A Chrome Extension for Personalized Web Search

How can search engine results be better ordered for users?

This is a capstone project for the Department of Computer Science with Dr. Hongning Wang as the technical advisor. Project collaborators include Mitchell Campbell and mentors such as Nolen Wang, Aobo Yang, and Kaiying Shan.

Search engines aim to provide results that are timely, relevant, and applicable for any user query. Specialized search engines, such as JSTOR and Web of Science, are built for specific audiences and have filtering features tailored towards professionals. General search engines like Google and Bing need to make their interface intuitive for a wider audience and rely heavily on ranking algorithms to provide relevant results. On Google, which has the most advanced ranking algorithm, 28.5% of people click on the first search result and up to 92% of users only view results on the first page (Southern, 2020; Shelton, 2021). The top five results contain relevant information 68% of the time, so users often don't look at links further down the page (Shelton, 2021).

The project goal is to develop a Chrome extension that intercepts Google and Bing search queries, reranks the search query results using a machine learning model tailored to the user, and renders the sorted results to replace the original search engine results. A constraint of this approach is that Google limits the requests to their search engine so we are unable to make too

many queries at once. The extension will track what result the user selects to improve the machine learning model. After data collection, we can evaluate how effective our relevance modeling is compared to other general search engines and assess if a model tailored to a specific user provides any additional benefits compared to anonymous searching. The conclusions will help improve personalized search results for users across all search engines.

The Rise of Content Creators and Content Platforms

How do online content creators advance their agendas and influence the platforms they are on?

In the past few years, online platforms such as YouTube and Twitch have transformed the entertainment and marketing industries. Over 79% of the UK population is on Facebook alone, with Twitter and Instagram following close behind (Top Media, 2021). This increases to 96% for audiences between 16-24 who live in wealthier countries, such as Sweden or Portugal (Roser, 2015). In 2020, users consumed around 28 billion hours of content across Facebook, YouTube, and Twitch (Michael, 2021). As more time is spent on social media and mobile devices, the audience and demand for online content will continue to grow. In 2021, there are 50 million content creators in the U.S., meaning one out of every six Americans monetize original content (Yuanling and Constine, 2021). Today, about 30% U.S. kids dream of becoming a YouTube star when they grow up (Yuanling and Constine, 2021). The total available market of the creator economy has risen to \$104 billion and continues to grow, with a significant boost from the Covid-19 pandemic (Geysler, 2021; Murthy, 2021). The online platforms and the influencers have established practices that shaped the landscape of the market. How do content creators shape the platforms they use and how have these platforms responded to support their creators?

Review of Research

Researchers have investigated why users are becoming content creators and how users affect their platforms, especially through social media. Bennet and Segerberg (2012) discovered that collective action has been accelerated from the rise of social networks and digital media, which content creators thrive upon. Osborne et al.'s (2018) concluded that collective action often arises from the conflict between groups challenging and defending the status quo, as that unifies participants within each group. This is shown by Cotter (2018), who found that when Instagram updated its post-selection algorithm, some influencers supported the change as a challenge to game the system while others protested that the algorithm stifled creativity in posts. Cotter (2018) labeled the groups as relational influencers, who focus on cultivating relationships with their viewers, and simulated influencers, who aim for high visibility and engagement without authentic relationships. The flux between these two groups was studied by Törhönen et al. (2019), who discovered that the motivating factors in content creation are shifting from enjoyment to income due to the gamification of incentives by platforms like Twitch. Roese (2018) focused on the co-dependence between news media and social media. Roese (2018) found that journalists adapt to social media algorithms to maximize exposure while also reporting on events that become popular because of social media, with both parties catering to what the end-user wants to see.

Participants

There are a variety of participants among content creators, primarily consisting of unorganized social groups on social media. One category of participants includes those who want to make their platform safe and fair for all content creators. These include those who rally

against harassment from bots on their platforms, believing that their platforms should be free from bot abuse and spam (Apodyopsis_, 2021). Others protest double standards and unequal policy enforcement. As a response to unclear bans on Twitch, JennaTwitch (2019) tweeted “If a man did this to his cat on Twitch, he’d be banned.” Another semi-organized group advocates for protection for marginalized streamers, organizing events for influencers to show solidarity against “hate raids” (RekItRaven, 2021).

Other unorganized content creators strive to increase the wages they earn and promote advertising transparency from their platforms to guarantee a steady income for themselves and other influencers (Solon, 2020). The American Influencer Council is a trade organization for digital creators that aims to legitimize content creation as a business venture (Jennings, 2020). The founder of the AIC, Qianna Smith Bruneteau, hopes to change the public perception that content creation “is not a real job” (Jennings, 2020). Another trade organization, the Association of Influencers & Content Creators, is dedicated to getting representation for influencers in the marketing industry and advocating for “protections for all digital creators” (Hawkins, 2020). There is a trade union, known as FairTube, that promotes equal treatment and monetization opportunities for creators on YouTube (Youtubers Union, 2018). FairTube strives to get YouTube “to treat creators with more respect and appreciation” (FairTube, 2021).

Participants also include the major media platforms, such as YouTube, Facebook, and Twitch who aim to maximize profit margins through advertising and exploiting content from influencers. In Alphabet’s 2019 press release, they stated that they were “pleased” with YouTube, as it had earned over 15 billion in advertising revenue (Alphabet Inc., 2020). Mark Zuckerberg, CEO of Facebook, reported that Facebook “make good progress this quarter” as Facebook revenue increased by 35% (Facebook Inc., 2021). Amazon, the parent company of Twitch,

reported that helping customers over the pandemic would be “expensive for us in the short term, but it’s the right prioritization for our customers and partners” (Amazon.com Inc., 2021).

References

- Alphabet Inc. (2020, Feb. 3). Alphabet Announces Fourth Quarter and Fiscal Year 2019 Results [Press release]. https://abc.xyz/investor/static/pdf/2019Q4_alphabet_earnings_release.pdf
- Amazon.com Inc. (2021, Oct. 28). Amazon.com Announces Third Quarter [Press release]. <https://ir.aboutamazon.com/news-release/news-release-details/2021/Amazon.com-Announces-Third-Quarter-Results/default.aspx>
- Apodyoopsis_. (2021, Sep. 26). Hoss Is Not The Only Follow Botting Username - new one 'Gunz0' and there is over 300+ of them, please [Tweet]. Twitter. https://twitter.com/Apodyoopsis_/status/1442071310125862912
- Bennett, W. L., & Segerberg, A. (2012). The Logic of Connective Action. *Information, Communication & Society*, 15(5), 739–768. Web of Science.
- Cotter, K. (2018). Playing the visibility game: How digital influencers and algorithms negotiate influence on Instagram. *New Media & Society*, 21(4), 895–913. Web of Science.
- FairTube. (2021, August 25). The oppression of the creators needs to stop. After all, there would have been no YouTube without the creative, [Facebook Post]. Facebook. <https://www.facebook.com/watch/?v=407954954291679>
- Facebook Inc. (2021, Oct. 25). Facebook Reports Third Quarter 2021 Results [Press release]. <https://investor.fb.com/investor-news/press-release-details/2021/Facebook-Reports-Third-Quarter-2021-Results/default.aspx>
- Geyser, W. (2021, Aug. 11). Creator Earnings: Benchmark Report 2021. Influencer Marketing Hub. <https://influencermarketinghub.com/creator-earnings-benchmark-report/>
- Hawkins, T. (2020, July 9). Actually, The First Trade Organization Founded by Influencers in 2019, Relaunches. PRWeb. https://www.prweb.com/releases/aicc_actually_the_first_trade_organization_founded_by_influencers_in_2019_relaunches/prweb17245197.htm
- JennaTwitch. (2019, July 20). If a man did this to his cat on Twitch, he'd be banned. This is the reality of current day [Tweet]. Twitter. <https://twitter.com/JennaTwitch/status/1152628090679336960>
- Jennings, R. (2020, July 17). Cameo and the future of influencer marketing. Vox. <https://www.vox.com/the-goods/2020/7/17/21328582/cameo-promotional-influencer-marketing>
- Michael, C. (2021, Jan. 29). Over 27.9 billion hours watched across Twitch, YouTube Gaming, and Facebook Gaming in 2020, according to r . . . Dot Esports.

<https://dotesports.com/streaming/news/over-27-9-billion-hours-watched-across-twitch-youtube-gaming-and-facebook-gaming-in-2020-according-to-report>

Murthy, N. (2021, Sep. 8). The Continuous Growth And Future Of The Creator Economy. Forbes.

<https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2021/08/30/the-continuous-growth-and-future-of-the-creator-economy/>

Osborne, D., Jost, J. T., Becker, J. C., Badaan, V., & Sibley, C. G. (2018). Protesting to challenge or defend the system? A system justification perspective on collective action. *European Journal of Social Psychology*, 49(2), 244–269. Web of Science.

RekItRaven. (2021, Aug. 20). We are continuing the fight. Shout out to @LuciaEverblack and @ShineyPen for helping me with [Tweet]. Twitter.

<https://twitter.com/RekItRaven/status/1428847935022841868>

Roese, V. (2018). You won't believe how co-dependent they are: Or: Media hype and the interaction of news media, social media, and the user. In P. Vasterman (Ed.), *From Media Hype to Twitter Storm* (pp. 313–332). Amsterdam University Press.

Roser, M. (2015, July 14). Internet. Our World in Data. <https://ourworldindata.org/internet>

Shedden, D. (2014, Nov. 24). Today in media history: The first Internet search engine is released in 1990. Poynter.

<https://www.poynter.org/reporting-editing/2014/today-in-media-history-the-first-internet-search-engine-is-released-in-1990/>

Shelton, K. (2017, Nov. 29). The Value Of Search Results Rankings. Forbes.

<https://www.forbes.com/sites/forbesagencycouncil/2017/10/30/the-value-of-search-result-s-rankings/?sh=89e63f144d3a>

Solon, O. (2020, July 1). “I can't trust YouTube any more”: creators speak out in Google advertising row. The Guardian.

<https://www.theguardian.com/technology/2017/mar/21/youtube-google-advertising-policies-controversial-content>

Southern, M. (2020, July 16). Over 25% of People Click the First Google Search Result. Search Engine Journal. <https://www.searchenginejournal.com/google-first-page-clicks/374516/>

Tarnoff, B. (2017, Nov. 28). How the internet was invented. The Guardian.

<https://www.theguardian.com/technology/2016/jul/15/how-the-internet-was-invented-1976-arpa-kahn-cerf#comments>

Törhönen, M., Sjöblom, M., Hassan, L., & Hamari, J. (2019). Fame and fortune, or just fun? A study on why people create content on video platforms. *Internet Research*, 30(1), 165–190. ProQuest.

Top Media. (2021, July 21). Social Media vs Traditional Media Statistics. Top Media.
<https://topmediadvertising.co.uk/social-media-vs-traditional-media-statistics/>

US Census Bureau. (2021, Oct. 8). Computer and Internet Use in the United States: 2018.
Census.Gov.
<https://www.census.gov/newsroom/press-releases/2021/computer-internet-use.html>

Youtubers Union. (2018, March 7). The Spark. <https://youtubersunion.org/content/spark>

Yuanling, Y., & Constine, J. (2021, April 30). SignalFire's Creator Economy Market Map.
SignalFire. <https://signalfire.com/blog/creator-economy/>