Yourfeed: Towards open science and interoperable systems for social media

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Abstract

Existing social media platforms (SMPs) make it incredibly difficult for researchers to conduct studies on social media, which in turn has created a knowledge gap between academia and industry about the effects of platform design on user behavior. To close the gap, we introduce Yourfeed, a research tool for conducting ecologically valid social media research. We introduce the platform architecture, as well key opportunities such as assessing the effects of exposure of content on downstream beliefs and attitudes, measuring attentional exposure via dwell time, and evaluating heterogeneous newsfeed algorithms. We discuss the underlying philosophy of interoperability for social media and future developments for the platform.

Introduction

Today, more than half of the population of earth are on social media. As a tool for individuals to gain information about the world and connect with others, and as a platform for researchers to build a generalizable understanding about human nature (Lazer et al., 2020), the possibilities for social media to provide meaningful information and facilitate collective action are nearly endless. Yet the corporatized modern platforms that exist today have in many ways fallen short of this lofty vision.

For one, the profit incentive of social media platforms (SMPs) has prioritized designs and interfaces that put the priorities of the company above the user (Lorenz-Spreen et al., 2020). Newsfeed algorithms optimized for engagement (e.g. Facebook (Oremus et al., 2021)) or dwell (e.g. TikTok (Smith, 2021; Team, 2021)) keep users on-platform and in turn may drive the spread of misinformation (Hao, 2021), while many users are unaware of the fact that algorithms are dictating what they see (Eslami et al., 2015). Dark patterns (UX/UI elements that subtly trick you (Gray et al., 2018), for examples see Harris (2016)) abound on user interfaces. Platforms control user data and content policies, with little transparency or recourse for how these policies are created and enforced (Sadowski et al., 2021).

In addition, the culture and structure of social media platforms have drastically limited researchers’ ability to use them to generate public knowledge about their workings (Greene et al., 2022; Bail et al., 2022). Internally, SMPs have sophisticated experimental frameworks for understanding the effect of algorithms and interfaces on user behavior, which they use to further refine their platforms for profit. Yet these insights are held behind walled gardens of NDAs and industry secrets. Sometimes, the results of these studies are publicly shared, such as a 61-million person experiment to increase voter turnout (Bond et al., 2012), or the infamous experiment of emotional contagion (Kramer et al., 2014). In both cases, there was major public backlash about the impact of these systems, and the questionable ethics of such experiments (Jouhki et al., 2016; Zittrain, 2014; Zuboff, 2015).

For academics attempting to ask similar questions, they must rely on crude alternatives. One is partnerships with the companies, where the SMP grants the researchers access to user data to write public facing papers. However to ensure privacy, these datasets are often aggregated to a point that they are of limited use, and these partnerships might stall for political reasons (Doctorow, 2019). Furthermore, the SMP providing the data can set the agenda, and differentially favor academics whose research interests align with their strategy (Hegelich, 2020). Another approach is social media field experiments, where academics attempt to leverage platform APIs to conduct experiments with real users (Mosleh et al., 2022). These field experiments can however violate platforms Terms and Services, “poison the well” by undermining trust in digital ecosystems (Pennycook et al., 2021), and are often challenging to replicate as platforms change their policies to adapt. A final approach is controlled laboratory experiments with survey tools like Qualtrics. This paradigm allows researchers to run RCTs to understand the effect of design interventions on user behavior (see e.g. Pennycook and Rand (2021)). However, the context of Qualtrics leaves a lot to be desired for drawing generalizable inferences about the impact of interfaces and algorithms on user behavior (Lin et al., 2021). In particular, the standard Qualtrics approach presents social media posts one at a time, rather than in a newsfeed layout. This feed layout, however, is a critical design feature of modern social media platforms, and therefore Qualtrics omits key attentional features of online social media use and consumption.

To close the knowledge gap between the platforms and the public, we introduce Yourfeed, a modular tool for ecologically valid social media research. Yourfeed mirrors the at-
tential properties of social media by providing a feed layout for content. In addition, it tracks and surfaces the dwell time of each post, a key metric from industry that is hard to measure on traditional survey platforms like Qualtrics. Yourfeed is designed to be modular and interoperable, allowing researchers to upload their own components, such as stimulus sets, ranking algorithms, or design interventions. In this paper, we introduce the Yourfeed system, with several key features and studies researchers could run. We conclude with the implications of Yourfeed on building public knowledge about platforms impact user behavior, and how this knowledge might help nudge platforms to open up their policies and surfaces for a more democratic approach.

System Overview

Yourfeed is an experimental tool that allows researchers to conduct randomized studies in a feed environment (see Figure 1). To do so, researchers specify a series of conditions (e.g. 1 to n) on the create-studies page and a series of attributes for each condition. Once a set of experimental parameters has been submitted, Yourfeed generates a unique URL for that specific experiment. When a user first visits Yourfeed at that URL, the Experiment Parameter Randomizer assigns that user to a condition (the yellow box in Figure 1), and then renders the feed interface using the attributes for that condition. In particular, there are several types of attributes used to generate the feed interface for a given user. The first are the entity sets, which are sets of newsfeed items to display in the feed. Experimenters can select these sets for each condition, and also specify how many items from a given entity set are displayed. For each user, the items from the specified entity sets constitute that user’s inventory. This inventory is then ordered by a feed algorithm, which can be a user-specified blackbox algorithm (the blue box in Figure 1). The default algorithm simply orders the feed items in a random order, but researchers can upload their own bespoke algorithms in a standardized format. The sorted inventory is then populated with engagement scores (e.g. the number of likes or posts, the pink box in Figure 1). These engagement scores could be omitted if specified by the experiment parameters, sampled randomly for each post for each user (e.g. as down in Avram et al. [2020]), or actually show the number of likes or shares from other participants in the study. Finally, the sorted inventory populated with engagement is then displayed in the feed interface, which is additionally styled according to experimental parameters (e.g. with advertisements, a modal intervention, or a Instagram/Facebook skin). Following the feed interaction, participants proceed to a survey environment where post-task demographics and beliefs/attitudes can be assessed. Researchers can also upload their own entity sets at the upload page, and download the data for their experiments at the download-data page. The platform is available online at https://www.yourfeed.social

The affordances of Yourfeed allow researchers to ask research questions that would be difficult otherwise. Below, we enumerate several key features of Yourfeed and example research questions and studies that can be conducted with those features.

More ecologically valid studies on social media behavior and attitudes

There are many studies researchers can conduct on survey platforms like Qualtrics that can be directly transported into Yourfeed with added ecological validity. One class of studies involves measuring the causal effect of exposure of content on downstream beliefs and attitudes. Since researchers can specify different entity sets for different conditions, they can randomly assign participants to exposure of different topics, then follow up with the same set of survey questions as dependent variables. For example, a researcher might randomly vary the amount of content related to climate change, and look at how that influences how important participants perceive climate change to be. A second class of studies involves measuring the impact of a design intervention on sharing behavior. For example, a researcher might introduce
Figure 2: Top left: Dwell and share data for a user as they scroll through Yourfeed. A red dot corresponds to posts the user decided to share, while a hollow red dot corresponds to posts the user shared and then unshared. Top right: Dwell and like data for a user as they scroll through Yourfeed. Bottom left: Dwell and bookmark data for a user as they scroll through Yourfeed. Bottom right: Average dwell time of 100 users over the course of a browsing session (Entity order = 0 is the top of the newsfeed, entity order=100 is the bottom).

An important implication of Yourfeed’s design is that share rates on the platform are lower. In a recent Yourfeed experiment with 876 participants recruited from Prolific, the overall average share rate was 7.7%, overall average like rate was 12.1%, compared to a share rate of 32.5% and a like rate of 31.3% on Qualtrics (using data from Epstein et al. (2021)). This suggests that share rates from Qualtrics, while correlated with actual sharing (Mosleh et al., 2020), may be systematically larger than they would be on platform.

Quantifying attention dynamics via dwell time
A key limitation of survey experiments on engagement with social media is that they often show social media posts one by one, which forces attentional capture on each one. Such setups are contrived and differ dramatically from the design of feed-based platforms, where some posts grab attention while others are scrolled past. Building on the metrics and practices of the online advertising industry (Hwang, 2020), Yourfeed measures the amount of time a user spends looking at a particular post by recording the amount of time that post is viewable (e.g. dwell time). A researcher could treat this value itself as an outcome variable, and look at which user- and item-level covariates are predictive of different attention dynamics.

To underscore the kinds of data Yourfeed collects and generates, we present pilot data from a study conducted on Yourfeed (run in June 2022 with N=876 participants recruited from Prolific). As shown in Figure 2, Yourfeed provides granular data about how long each participant dwelled on a given post (entity), and how they engaged with each. We also find that dwell time decreases over a browsing session, whereby participants spend the most time on the top item in their feed, and the least on the bottom.

Serving and evaluating heterogeneous newsfeed algorithms
Recently, Gizmodo made public a series of Facebook papers which elucidate the inner workings of how Facebook operates. Among these are experiments that compare algorithmic ranking to chronological newsfeeds (Cameron et al., 2022). There has been growing concern about the effects of algorithmic ranking on user behavior (Eckles, 2022; Sassine et al., 2022), and political information flow (Reuning et al., 2022).
but a lack of methods for studying these effects directly has resulted in leaked internal SMP documents being a key method for public knowledge on the topic.

Just as entity sets or design interventions can be randomly assigned to participants, so can feed algorithms. This feature allows researchers to causally assess the effects of different algorithms on user behavior. For example, a growing body of work has recommended newsfeed algorithms that are more aligned with social priorities (Cen and Shah [2021], Bhadani et al. [2022], and Yourfeed provides a platform for evaluating the effects of these algorithms on user behavior.

In addition to randomly assigning participants to different algorithms, Yourfeed could randomly assign participants to different worlds, each of which evolve independently (Salganik et al., 2006; Epstein et al., 2021). This feature allows researchers to quantify the variation introduced by such algorithms via counterfactuals, and to measure ecosystem-level outcomes, like the diversity of content (Epstein et al., 2021).

As an example, a researcher could create a study with three conditions: a control condition where items are randomly ordered, a second condition with a newsfeed that optimizes and sorts by engagement (e.g., shares, like Facebook), and third condition with a newsfeed that optimizes by dwell time (like TikTok). For the two algorithmic conditions, participants could be assigned to one of 10 worlds which evolve independently. In particular, for a given user the order of the newsfeed is determined solely by the patterns of engagement (in the second condition) or dwell (in the third condition) by other participants assigned to that user’s world. The researcher could compute the diversity of content across each world, and therefore assess the causal effect of the ranking algorithms on diversity across worlds.

Related Work

Many recent papers have developed custom platforms to explore behavioral aspects of social media. Avram et al. [2020] developed Fakey, a simulated newsfeed game that over 8,500 users played. They randomized the engagement metrics associated with each post, and find that exposure to social engagement metrics increases vulnerability to misinformation. Roozenbeek and Van der Linden (2019) developed Bad News, a browser based that over 15,000 users engaged with. They found that users’ ability to detect misinformation increases after gameplay, across demographic subgroups. Epstein et al. [2021] developed Meet the Ganimals, an online platform for generating and curating AI-generated hybrid animals (Epstein et al., 2020), that over 10,000 players engaged with. OpenHuman (Greshake Izovaras et al., 2019) is a community-based platform that gives users higher levels of personal data access and control. Other experimental platforms have explored participatory algorithm design and algorithmic auditing. Bhargava et al. [2019] developed Gobo, an experimental system for exploring user control of invisible algorithms in social media. Gobo allowed users to control the ranking of posts in their newsfeed with manual controls, such as the seriousness or rudeness of posts, or the gender of the poster. Turingbox (Epstein et al. [2018]) was an experimental two-sided market where contributors could upload algorithms for evaluations, and social scientists could evaluate them, towards understanding the consequences of their behavior (Epstein et al. [2018]).

Perhaps most closely related to Yourfeed are tools developed for researchers to conduct social media research. The Mock Social Media Website Tool (Jagayat et al., 2021) is an open-source software for studying social media. Participants in the MSMW can like posts, share posts on a timeline, add their own posts and reply to other posts. The (Mis)information Game (Butler et al., 2022) is an online testing platform that allows researchers to customize posts, source information and engagement information. Unlike a feed environment, (Mis)information Game presents posts one at time for users to interact with and comment on. Community Connect (Mahajan et al., 2021) is an open-source and customizable platform for experimentation, designed for controlled information flow across groups through bridge nodes.

Discussion

There are several components that constitute modern social media platforms. The first is the underlying social data on which the platform is based, such as the social graph and posts or comments. The second is the recommender algorithm which for a given user’s inventory serves a subset of that content to their feed. The third and final is a “skin” or interface by which this feed content is displayed and users interact with the medium. The current model of social media offers a monolithic experience with each of these components molded together, with no opportunities for users to select alternative components, like newsfeed algorithms or skins. This walled-garden approach means that SMPs can carefully design these components with their incentives in mind (e.g. maximizing profit via engagement optimization) and serve them to users who have no choice but use them if they want to access the platforms. Yourfeed offers an alternative, interoperable vision of social media. Rather than a cloister, there could exist a rich ecology of third-party newsfeed algorithms and skins, each designed with a different perspective and goal in mind. Users could access the same underlying data, but specify the particular components that satisfy their goals. On one hand, this would augment user autonomy by providing an expressive grammar by which to interact with social media. And on the other hand it would spur innovation as developers compete to make newsfeed algorithms and skins that users actually want to adopt. The economics of this paradigm involve unseating the dominance that current SMPs have on the market, which is exciting future work beyond the scope of this white paper.

Along the lines of this call for interoperable systems are questions of who should own the underlying data. Currently, the data is centrally owned and stored by the SMPs themselves. However, there is a growing body of work that suggests that the data can be owned and stored by the communities that create that data, in data cooperatives (Greshake Tzovaras et al., 2019), Pentland and Hardjono (2020) or a pluralistic social network (Chow 2022, Zignani et al. 2018).
There are several limitations to the existing instantiation of Yourfeed. First, like its survey antecedents, there is no explicitly "social" components of the browsing experience: users have no profile picture or other identifying characteristics, posts have no author, and perhaps most critically, clicking share does not in fact share that post with anyone. These decisions are intentional, as we focused primarily on capturing the attentional affordances of browsing a feed, not the social affordances. However, we hope the next version of Yourfeed accommodates more of these features. In addition, Yourfeed caters to a research audience who recruits participants from online labor markets like Amazon’s Mechanical Turk or Lucid. As such, interacting with the platform is part of a transactional task for money, rather than the in situ way most people interact with social media. In the future, we hope Yourfeed and tools like it that 1) offer radical alternatives to the social media status quo and 2) prioritize experimentation and public knowledge over profit will become more preferable for social media users, and therefore generate organic participation.

Building on a legacy of speculative design (Dunne and Raby 2013), Yourfeed offers a low-friction sandbox for designers, scientists, and citizens to prototype their own ideas for how social media should look and operate. We hope the development of such affirmative visions will bootstrap all three prongs of reform, and in turn help social media become a tool for helping society solve complex challenges.

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