

Pop the Feed Filter Bubble: Making Reddit Social Media a VR Cityscape

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ABSTRACT

On Reddit, users from tens of thousands of communities create and promote internet content, including pictures, videos, news, memes, and creative writing. However, like most social media feeds, subscribing to a very small subset of available content creates filter bubbles. These bubbles, while created unintentionally, skew perceptions of reality. This phenomena provides an impetus for researchers to design techniques breaking out of filter bubbles. Virtual reality provides opportunities for new environments that contextualize social media among multiple perspectives. We present one solution to the filter bubble problem: *Blue Link City*, which enables contextualized exploration of Reddit.

1 INTRODUCTION AND RELATED WORK

On Reddit, users from tens of thousands of communities create and promote internet content, including pictures, videos, news, memes, and creative writing. As consumers of content, users can subscribe to specific communities that match their tastes. However, this potentially creates a “filter bubble”, where the targeted content users enjoy fosters skewed perceptions of what most people believe. Like most social media, Reddit uses subscription-based feeds that present content in linear lists, ordered based on upvotes and recency. Researchers have previously identified filter bubbles on Twitter [6], which provides similar feeds. The filter bubble problem also contributes to larger concerns about machine learning algorithms and their potential to unwittingly reinforce social inequality [11]. This project seeks to call attention to the filter bubble problem and presents our approach for mitigation. We discuss and demonstrate an alternative to linear feeds for consuming social media. *Blue Link City* is a virtual reality environment that maps communities from Reddit into a virtual cityscape.

1.1 Presence in VR and Casual Browsing

In Virtual Reality research, presence [2] is the subjective feeling of being lost in the moment or the reality of the system. Casual web browsing creates a similar sense of presence. Elswailer et al. describes Casual-Leisure contexts as having separate goals than standard Information Behavior Models [5]. They found that people seek out mood boosters in everyday situations, accepting many informational outcomes rather than having a particular goal or informational need. We emphasize the *exploring for the experience* use case from Elswailer et al., which typically refers to exploring novel physical spaces where the goal is to learn about the space. In this leisurely context context, the focus is about the experience itself instead of an informational goal.

1.2 Reddit and Other Social Media Feeds

Reddit is a link and text sharing social media site where individual posts are constantly shifting in importance and prominence based on votes from users [13]. One of the key aspects of Reddit is that it is organized into hundreds of thousands of topic specific *subreddit* groups. Each post is voted on by users to impact its “hot”

score and current placement [14]. One thing Facebook, Twitter, Pinterest, and Reddit have in common is that they all use a feed-based subscription model. Content is prioritized with algorithms and be scrolled through. While displaying content in lists has advantages, non-linear spatial arrangements better support finding emergent and creative connections among content [8, 15] and conceptualization through visual thinking [10]. In 3D environments, meaningfully spatialized information is ideal for learning activities [12]. This spatialization helps people remember and learn automatically, which we find to be better than linear feeds. Social media exploration is a personally meaningful form of creativity where more diverse experiences can be considered more creative [7]. We suggest that helping contextualize content mitigates filter bubble effects.

2 BLUE LINK CITY

To create the cityscape structure, we start with data from Reddit, construct a graph that connects related subreddits in a force-directed graph, use an interactive application to create the city, and finally export the structure into the virtual environment. For data from Reddit, we used data from Woolf [16]. In this scheme, all subreddits are represented as nodes, with edges between them representing co-occurring comments from users. When a user comments at least five times in two subreddits, a score of 1 is added. For example, there are 621 users who commented five times in both */r/guns* */r/firearm*, making an edge with a weight of 337 between nodes */r/guns* and */r/firearms*. Using this data, we construct a graph in an interactive web application that uses a D3.js visualization (Figure 1 a) to author a cityscape. We mapped each node to a subreddit, and represented it as a building. Once we were satisfied with our organization of the city, we snapped the nodes in position to city blocks. We included relatively large spacing between buildings to create a grid where the virtual user can navigable through the city, and the overall effect results in city blocks with a mix of larger and smaller subreddits.

We import the building structures into Unity to generate a cityscape (Figure 1). The city structure takes advantage of networks [1] to support serendipity, while enabling non-linearity [8] in the arrangement of curated subreddits. Each building represents a subreddit. For each building, we place text titles of the name of its subreddit at the top. Buildings display new content when looked at (via head tracking) for more than three seconds. New posts appear from the top of the building towards the ground. Each post wraps around the building and shows a title and thumbnail image or “self” text. The size of building are mapped to the number of the subreddit’s subscribers. Subreddits with few subscribers are narrow and short, while those with many subscribers are wide and tall.

2.1 Interaction and Exploration

For hardware, we have used both a Leap Motion controller connected to an Oculus Rift (see Figure 1 b) and the Oculus Touch controllers. We developed a bimanual gesture technique for navigation in 3D environments, which we describe very briefly in this work. To translate, users clasp the fingers in each hand together and pull their hands toward or away from the HMD. Spreading hands wider makes the translation fast, while putting hands closer together makes it slow. The accuracy of the Oculus Touch was much better than the Leap motion. Overall, we found this to be an effective and natural-feeling

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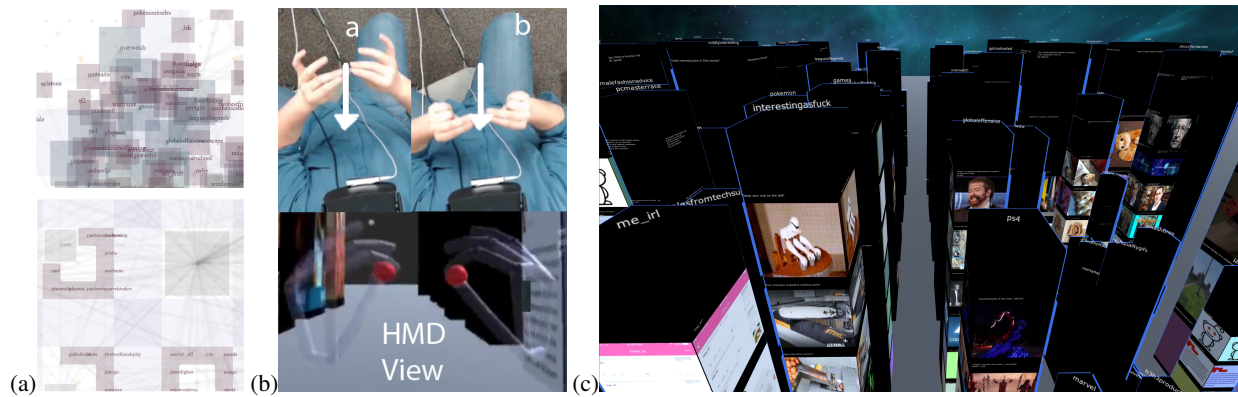


Figure 1: In (a), the top shows initial force directed graph with the bottom showing a top down. For (b), we show the Leap Motion navigation. In (c), we show a portion of Blue Link City, with a spatialized Reddit as a social media cityscape. In the VR application, users can fly around and browse content up close, or from a distance. Demos and videos of the Blue Link City authoring tool and environment are available at bluelinkcity.com.

technique for exploration. It is “hyper-natural [3]” in the sensation of accelerated swimming beyond natural speeds.

In Blue Link City, a user can view subreddit buildings to see fresh content appear. Often, this reveals interesting juxtapositions in the structure of the city and posts. For example, one view shows a subreddit about a popular show on Reddit (*Rick and Morty*), is juxtaposed with */r/shittyaskscience* and */r/talesfromtechsupport*. This indicates that, in this region of the city, people who comment about the popular show also have a tendency to joke about science and describe horror stories about supporting technology. Another proximal juxtaposition shows that */r/SandersForPresident* resides near */r/socialism*, which are close but not as close to */r/politics* and */r/the_donald*. In this virtual environment, browsing political posts in nearby buildings juxtaposes content from posts that day from multiple and conflicting perspectives.

3 DISCUSSION AND CONCLUSION

Virtual Reality feeds should be spatial. Linear feeds dominate social media experiences on desktop and mobile platforms, but they also strengthen filter bubbles. In positive instances, feeds expose people to options they might not have otherwise found [9]. However, feeds can lead people to feel that everyone agrees with their own ideas. Cialdini’s work on social proof shows people change their expectations based on how they see others behave [4]. Algorithms [11] and individuals’ choices to subscribe to narrowly-sourced feeds are both to blame. In order to help people overcome filter bubbles, it is important offer multiple perspectives. In Blue Link City, different regions of the spatialized community are shown simultaneously. Users can move across these communities in any path while maintaining a general sense of their orientation. In this way, we argue spatial techniques are needed for VR for casual-leisure [5] browsing.

Use big data techniques to populate VR contextualized social media environments. In our VR application, we used a combination of force-directed layout and interaction to arrange the structure of the city. We did not create the content manually, but relied on big data methods to populate its content. We believe that linear feeds of social media produce filter bubbles. VR environments can mitigate this problem by contextualizing posts among multiple perspectives. By design, the structure of Blue Link City juxtaposes content to help encourage more creative [7] and contextualized exploration.

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