

## Bubble Popper: Filling the Niche for Easily Accessible Opposing Viewpoints

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### **Background**

In 2016, the nation began to pay attention to the perils of homogeneous news consumption. Specifically, the outcomes of the 2016 election revealed a deeply politically divided population, isolated in echo chambers of their own world views. While those in liberal, urban environments fed off of progressive narratives, those in rural, conservative areas continued to hear the ideologies sung by their communities. This problem, coined “the filter bubble,” by tech executive Eli Pariser, summarizes the lack of cross-pollination of ideas in the current political sphere.<sup>1</sup> Citizens filter out content they do not prefer to interact with, and in doing so limit their field of knowledge and interaction. They confine themselves into an ideological bubble, which leads to massive political surprises like the unpredicted election of President Trump. Now, more than ever, academics and politicians have placed a premium on undoing the effects of this filter culture, which has lead to political divisiveness and isolation.<sup>2</sup> Over 67% of Americans primarily get their news from social media platforms, which are algorithmized to incorporate news sources from people within a user’s social circle who tend to share their political viewings.<sup>3</sup>

Now, technology startups and news companies are attempting to design solutions to this pervasive issue, by creating platforms that make alternative points of view more easily accessible

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<sup>1</sup> Pariser, *Beware Online “Filter Bubbles.”*

<sup>2</sup> Aless et al., “The Surprising Speed with Which We Become Polarized Online.”

<sup>3</sup> Moon, “Two-Thirds of American Adults Get News from Social Media.”

to readers who might otherwise be stuck in one frame of mind. The Wall Street Journal released an interactive tool titled, “Blue feed, Red Feed,” which allows users to click on an issue and see how conservative and liberal social media news feeds would react to the issue.<sup>4</sup> This has garnered national attention because of the striking discrepancies between the two sides of news outputs. There have been other attempts to break this bubble as well. A site called “Top Bottom Center” allows a user to make an account on their website, which then allows them to customize their preferences. The site then generates a feed with news articles that come from diverse perspectives. The last platform that has been gaining recognition, “Read Across the Aisle,” has come out with a chrome extension that tracks where a user spends most of their reading time. Considering themselves a “Fit-bit for your Filter Bubble,” the platform helps users become more aware of their potentially homogenous consumption of news. However, each of these platforms require a user to use their source on a third party website, which involves changing a user’s preferences and consumption habits.

Bubble Popper, a chrome extension that generates alternate viewpoints to an article a user is currently reading, fills a unique need in the sphere of filter bubble technology. Rather than going through the hassle of creating a customized account or viewing alternate opinions through a third- party source, a user simply has to install the extension and click on the button to display an opposing article within the frame of their browser. A user can view their article side by side with opposing viewpoint, and have the ability to contrast the narratives seen in both. Although this may not necessarily convince people to believe a different opinion, it makes them aware of the different forms of argumentation that exist about the topic. Because news sources are now

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<sup>4</sup> Keegan, “Blue Feed, Red Feed.”

associated with a keenly political perspective, Bubble Popper uses the site that a current article is read on to assess political leaning and assigns an alternate perspective based on an opposing source. The objective is to help users easily educate themselves about the untouched realm of journalism that they may not interact with in their daily lives. We hope that with tools like ours, the American public can slowly move closer together in empathy and political understanding.

### **Methodology: how our algorithm works**

Bubble Popper’s algorithm follows a straightforward series of steps to travel from interpreting the current article being read to displaying an article of an opposing viewpoint.

The first step in Bubble Popper’s algorithm is to complete a concept analysis of the current article being read by using Aylien, a Natural Language Processing (NLP) Application Programming Interface (API).<sup>5</sup> Performing a simple web request to Aylien using the URL extracted from the current tab yields a response with concepts extracted from the article. Each concept is tagged with a “support” value, a metric that indicates their relevance to the article at hand. Bubble Popper first manually assigns heavier “support” weights to concept terms that are contained in the article title and then sorts the concepts based on these new weightings. It then focuses on the the top two or three of these terms, depending on contextual features.

Next, Bubble Popper uses the current tab’s URL to determine the political leaning of the news source being viewed by using a dataset curated by AllSides.<sup>6</sup> That dataset assigns each news source a Left, Left-Center, Center, Right-Center, or Right leaning. To determine media bias for each source, AllSides uses blind bias ratings from many different users. First, users are asked

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<sup>5</sup> “AYLIEN Text Analysis API | Developer Portal.”

<sup>6</sup> “Media Bias Ratings.”

to rate their own bias, and then to rate the bias of articles they read. AllSides then compiles these data points to see how different “bias groups” rate different articles, and finally rates each source based on average article bias ratings of several articles from the source.<sup>7</sup>

Using this dataset of media source biases and the bias of the article currently being read, Bubble Popper creates a list of all of the sources that fall into the opposite category and then randomizes it. Then, using the top terms from Aylien, Bubble Popper recursively searches Microsoft’s Bing Search API<sup>8</sup> for each source in the list of opposing sources until a relevant article is found. Once an article is found, it is displayed in the Bubble Popper popup along with a link to open it in its own new tab.

Suppose a user is reading an article entitled “Climate Policy in Trump’s America” on CNN. Passing it through Aylien’s Concept Analysis API and then sorting those concepts by weight might yield “climate change” and “Trump” as top concepts. Then, using the dataset from AllSides, CNN would have a “Center-Left” rating, so the “Center-Right” randomized list generated might include Fox News and The Washington Times. If Fox News is first, the Bing search query would be “climate change Trump site: foxnews.com.” Fox News probably has a relevant article to display, but assuming for the sake of illustration that it does not, the next query would be “climate change Trump site: washingtontimes.com”. Hopefully, this search yields a relevant article, and then it would be displayed in the popup.

## **Discussion**

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<sup>7</sup> “How AllSides Rates Media Bias.”

<sup>8</sup> “Bing Web Search API | Microsoft Azure.”

In the development of this chrome extension, we ran into several problems, especially in designing our algorithm. Initially, we decided to simplify the search query and simply take the title of any given article and search for it on the opposing sources. So, continuing from the prior example, if a CNN article was entitled, “Climate Policy in Trump’s America,” our algorithm would make a search on Bing with the query, “Climate Policy in Trump’s America site: foxnews.com.” However, more often than not, article titles are extremely specific and yield no search results when queried against the opposing viewpoint. On nearly every source we tried it on, this developing version of the extension did not work. We decided we needed to analyze the article’s contents in order to deliver proper search results. This is when we decided to implement the content extraction text analysis API, Aylien, to highlight the main concepts on each article. We then used the score of the relevance of the concept to the article and appearance in the article title to rank the concepts that we would then use in the search. So now, for the same article, our Bing search would be “climate change trump site: foxnews.com” based on the key concepts returned by the article analysis. This allowed us to make more targeted searches that yielded more fruitful results.

We also ran into issues with the source list we used. Initially, we began using a dataset that we retrieved from Top Bottom Center,<sup>9</sup> which was a compilation of numericized political leanings from -1 being the most liberal to 1 being the most conservative. Top Bottom Center analyzes hundreds of articles on each news source and assigns leanings based on the rhetoric used in these articles. However, when we used this source, we found that there were several irrelevant sources included in the dataset, like ESPN or Sports Illustrated that would not yield the

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<sup>9</sup> “Calculated Political Bias of News Sources.”

desired articles. It also was an incomplete list that did not contain some widely read sources like CBS, NBC, or Forbes. We decided, then, to pivot to All Sides, another source that rates news sources on their political leanings. This source, however, had too many media sites included, even the *Duke Chronicle* or *Food Democracy Now*. To ensure that our list did not get contaminated with too many irrelevant sources, we used our best judgment to only use the major, popular news sources. We manually deleted the ones that did not have high ratings or consistently led to errors when we ran our algorithm.

The biggest challenge that we still face in our model is the relevance of the produced article. Sometimes, the text analysis API highlights concepts that, in reality, are not critical to the current article. If the concepts are wrong, then the search is wrong, and the whole extension does not work as effectively. However, we can only use the tools at our disposal, and since Natural Language Processing is still a developing field, we cannot ensure that it works precisely every time. However, for our intents and purposes, it is the best tool we can find. Additionally, sometimes the Bing search does not produce a relevant result, and we cannot find an article on the opposing source. This leaves an error message on the extension, which happens more often than we would like. Although we faced many challenges in the development of Bubble Popper, the final product is functional and can be useful. These challenges were instrumental in our development of a better product.

### **Improvements on Bubble Popper**

There are many ways in which we could improve Bubble Popper. One such improvement is to automatically check for an opposing viewpoint in the background as soon as the user views an article and then to alert the user that such an article has been found. The alert could come in

the form of a small icon change on the Chrome extension, or it could come in the form of a small popup in the top right corner with the article title, encouraging the user to expand the popup it to read the full article. That way, the user would not have to remember to click on Bubble Popper to find an opposing viewpoint, and the user would also not be disappointed after clicking on Bubble Popper in the off chance that Bubble Popper cannot find a suitable opposing viewpoint.

Another area we could improve is in our bias analysis. Currently, we use a single dataset to determine the political leaning of the sources of both the current article being read and the opposing viewpoint article we find. Expanding our reach to include many more bias rating datasets in these determinations should lead to more neutrality and mitigate more of the oddities that are naturally found in such subjective datasets as these. It will also allow us to accept and return a broader range of sources, which is an issue because Bubble Popper currently only works with just over 50 sources.

Not only could we pull from more datasets to determine the political leaning of a given *source*, but we could use more advanced methods to determine the political leaning of a given *article*. One method of doing so would be to use generic Natural Language Processing (NLP) APIs, such as Amazon Comprehend<sup>10</sup>, IBM Watson<sup>11</sup>, or Microsoft Cognitive Services<sup>12</sup>, to determine the big ideas from a given article and then assess political leaning from there. The advantage to this is that we are free to construct a less-biased method of bias determination, but the disadvantage is that these APIs are not tailor-made for this use case. An alternative to these

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<sup>10</sup> “Amazon Comprehend - Natural Language Processing (NLP) and Machine Learning (ML).”

<sup>11</sup> IBM, “IBM Watson.”

<sup>12</sup> “Cognitive Services | Microsoft Azure.”

generic APIs is to use Top Bottom Center<sup>13</sup> or similar APIs that are specifically made to analyze the political leaning of a body of text. The advantage is obvious: ease of integration. The disadvantage, however, is the lack of control we have over the algorithm. In fact, that lack of control in both the generic and specific APIs could lead us to eventually developing our own NLP solution by creating our own models and training data, despite the whole host of ethical questions that would arise from such an undertaking, not to mention the time commitment and difficulty.

Once we have the ability to assess the political leaning (and other textual features) of a specific article, and not just the source as a whole, we can use it in multiple places in Bubble Popper. The first and obvious use case would be to analyze the current article being read for political leaning. Using that rating, rather than the host source of that article, would give a much better indication as to what is being read, especially since some large and well-known sources, such as The New York Times and The Washington Post, publish articles that lean both ways. Furthermore, analyzing potential counter-articles for political leanings and then choosing which article to display based on those results, rather than assuming the sources they come from yield enough relevant information, would improve the quality of our point-counterpoint display. Lastly, and this improvement may appear to be obvious but requires sophisticated computing, our textual analysis could prescreen articles to ensure relevance to the topic at hand, rather than completely relying the keywords that we plug into a search engine to return the most appropriate results.

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<sup>13</sup> “Top Bottom Center.”



After determining the bias in the source, article, counter-source, and counter-article, we could use that information to inform the user the political leanings of each by using one or multiple small red-blue graphic scale(s) with arrows to indicate where each item leans (the specific graphical representation of this data can be determined later; it is more important that the idea of doing so be mentioned). This small display would aid the user in self-assessing what they are reading, and it would add to the general utility of Bubble Popper as a bias-checker as well.

Lastly, we could make improvements to Bubble Popper by collecting anonymized data about which articles are displayed in response to which other articles and search terms. In the aggregate, this data would make a big difference in how we restructure our algorithm to provide better counterpoints to whatever the user may be reading.

### **Potential Research on Bubble Popper**

The creation of Bubble Popper opens up many potential avenues of research that relate directly to the use of the platform as well as to changing the political leanings of the population and general trends in society.

One potential area of inquiry is to complete analysis of the push model of Web 2.0 in the context of Bubble Popper. The push model directly contrasts the pull model of Web 1.0, and the two models compare how actively users seek content on the internet. In the pull model, which was popular in Web 1.0 (loosely defined as before social media began the idea of notifications and feeds), users had to actively search for information on the internet, whether through search engines such as Google or platforms such as Facebook. Recently, in Web 2.0, the push model has dominated the pull model by providing content prior to user request and predicting the

desires of the user before the user themselves knows their own desires. Assessing whether Bubble Popper holds up to this new standard by assessing usage of the extension when alerts and/or popups are enabled compared to when all forms of reminder of the presence of the extension are disabled.

Building off of that inquiry, it would be of great interest to determine the effect opening counter-articles on users' political leanings. Speaking specifically to the previous point, it would be interesting to discover the extent to which the pull model's forced use increases the sway a given counter-article has on the user, the reasoning being that actively seeking out another side might represent a greater willingness to change one's views. More broadly, however, it will be important to poll users to see if their political leanings are actually affected by Bubble Popper, or to see at least if their minds are more open to hearing an opposing viewpoint without closing off and becoming offended. Along the lines of polling, we will run occasional general surveys to ask how we are doing with Bubble Popper and if there is anything users would like to see differently or added to the extension.

Another interesting question to answer about Bubble Popper is to determine which demographics and political leanings lead someone to download the extension and to actively use it. This question arises from the fact that any given news product, try as it might, will never be viewed by everyone as completely neutral. Case in point: one of the most seemingly neutral and well-intentioned avenues of journalism, fact-checking, tends to be seen as either neutral or *left-leaning*. Thus, it would be interesting to determine the perceived political slant of Bubble

Popper, and then to attempt to root out the cause of it, whether it be in the datasets used, the algorithmic choices made, the third-party APIs used, or some other area.

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