

Leveraging Twitter Data: Creating a Global Hub of Trending Events

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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

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ABSTRACT

Twitter, one of the largest social media platforms in the world, allows users to share short online messages called tweets. When Twitter deems a particular topic popular enough, these topics are considered to be "trending" and they are then shown to users based on their following, location, and interests. As it currently stands, Twitter offers no easy way for users to view and compare trends from around the globe. For my internship, I worked on a team that created a web application that collected Twitter trending topic data and gave users the ability to easily view and compare what is trending worldwide and what is trending in a specific country. I worked on both the user interface and backend functionality of the application. The user interface was built in TypeScript using Angular and the backend was built in Java using Spring Boot. The core functionality of the application was finished, but there were some issues in regards to the rate limit on Twitter's API. Future additions include an API workaround to reduce rate limiting, sentiment analysis for tweets under trends, trend and tweet translation, as well as analysis of trends over time.

1. INTRODUCTION

Over the years, Twitter has evolved into more than just a platform for people to send witty messages to their friends. A survey of 4,713 social media users found that Twitter users, on average, consume more news than users

on any other social media platform [2]. How often do you hear that a recent or significant event is trending on Twitter? While developing our application, we asked ourselves: "How can we sift through the large volume of Twitter data and create an application that allows users to keep up with current events around the world?" Our solution to this problem took on the form of a web application that displays the current top-ranking global trends alongside a heatmap for trends selected by the user. Additionally, the application allows users to search for trends in any location, city or country, for which Twitter has data.

2. RELATED WORKS

With the rise of the digital age and social media, the way people get their news coverage has changed. Martin (2018) discusses how the leading source of news on the internet has shifted towards social media over traditional news sources. In fact, she states that people are more likely to hear breaking news first on social media than anywhere else.

When looking at Twitter specifically, Rosenstiel et al. (2015) examines the findings of a survey of 4,713 social media users. They found that "74% of those who use Twitter for news do so daily." Furthermore, a study conducted by the Pew Research Center, Walker et al. (2021), discovered that 55% of Twitter users in the U.S. said that they

consistently get news on the platform. The intention behind including these works is to paint a picture of the impact of social media sites, such as Twitter, on the news consumption of people today.

3. PROJECT DESIGN

For our project, we were tasked with creating a web application from the ground up. This offered us more creative freedom in designing our application because there was no existing codebase to work from. The application consisted of two main parts: the frontend and the backend. The frontend, or user interface, is the design of the application and makes calls to our backend to fetch the data to display on the website. On the other hand, the backend makes calls to the Twitter API for the data requested and passes it to the frontend.

3.1 IDENTIFYING LIMITATIONS

Given that our application runs on Twitter data, one of the first steps in our design process was to identify limitations that Twitter had set on its API. In doing so, we were then able to develop our application within the scope of access we had available to us. As of now, Twitter offers three different access levels to their API: essential, elevated, and academic research. Our team was able to obtain elevated access, which provided us with most of the endpoints we planned on using. However, there were some that we did not have access to, which resulted in our having to pivot our project slightly.

3.2 DESIGNING THE UI

Another major part of the design process was planning out the user interface of our website. We wanted our application to be neatly designed, but also intuitive. Our initial website mockups were designed in Figma and acted as our base. We then tried to recreate our mockups as closely as possible in the actual application. However, near the

end of development we decided to refactor the user interface to better account for the changes in our application's scope since the initial mockups were created. Though our final application didn't look exactly like our mockups, they were very important as we referenced them heavily throughout development.

The design of our final application was comprised of two pages. The first being the homepage (Figure 1), which contained the list of globally ranked trends, as well as the heatmap. The second was the location search page (Figure 2). This is where users could search for a specific location and see the top 50 trends in that location. Users could navigate between the two pages using the navigation bar at the top of the page.

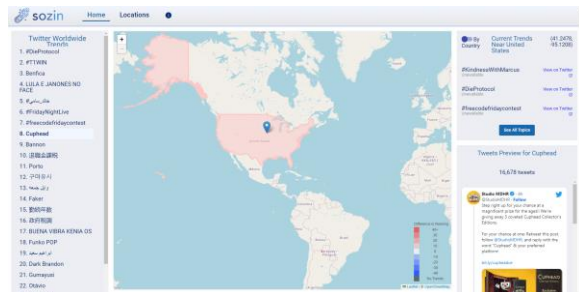


Figure 1: Homepage

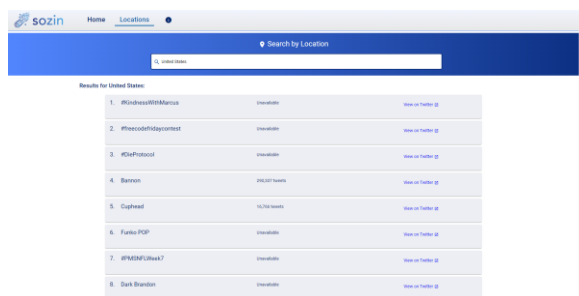


Figure 2: Locations Page

Our user interface was written in TypeScript using Angular, a frontend framework. In addition, we also used Angular Material, which made styling our website a lot easier.

3.3 CONNECTING THE BACKEND

While the frontend may be the only thing users see, it cannot do anything without a backend to feed it information to display. Our backend, written in Java using Spring Boot, handled making the request to the Twitter API. To do this, we used the Twitter4J library, which essentially took care of retrieving data from Twitter and allowed us to focus more on parsing the data for our needs. We then created various endpoints that our frontend could call when a user made an action on the website. For example, one of our backend endpoints took in a set of coordinates and would return the country closest to those coordinates.

4. RESULTS

While there are still some additional features we would like to have implemented, the application's main features were finished by the end of the internship. We had successfully developed an application that took Twitter data and organized it in a way that allowed users to easily see and compare trending topics from different parts of the world, something that Twitter currently lacks. Afterwards, we had the opportunity to present our application to the whole company, showcasing what we had been working on over the summer.

5. CONCLUSION

As social media has grown in recent years, these platforms have become more than just a means of keeping up with friends and family. They contain vast amounts of data that can be used in other beneficial ways, such as in our application. In completing our application, we successfully demonstrated how social media can be used to stay up-to-date with current events around the world. However, this is only one use case of social media, involving only one social media platform.

Our application utilized data readily available on Twitter and made it easy to visualize and parse through. Twitter could easily implement this application themselves to further improve the user experience on the site. Through our application, I hope that people begin to think about how social media can be utilized in ways beyond simply networking and how data available on social media can be incorporated in applications like ours.

6. FUTURE WORK

If we had more time, our next steps would have been to implement a feature that tracks how trends change over time and a rate limiting workaround. Since our application involves keeping up with current trending topics, a feature enabling users to see how a particular trend has changed in areas such as tweet volume and popularity would be helpful.

Additionally, we would have also liked to implement a way to prevent rate limiting on the site. One solution we considered was to have users login to their own Twitter accounts, so we could use their API credentials. As implemented, our application used a single set of Twitter API credentials for every user on the site, which was a major source of rate limiting.

7. UVA EVALUATION

Coming into my internship, I felt confident that my coursework had adequately prepared me for software engineering. The class that was most useful in preparing me for the summer was CS 3240, Advanced Software Development Techniques, as the work in this class greatly resembled the internship environment. However, every CS course I had taken introduced me to important coding fundamentals and concepts that I used throughout the internship.

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