

**Agile Web Application Development: Displaying Twitter Trends to Better Understand
Current Events Around the World**

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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

Social media is a great tool for understanding events that are occurring locally, but these social media applications can make it difficult to view global events, which places the user in a bubble of only local information. A solution to this issue was to create a web application that displays globally trending topics from Twitter in a more user-friendly way. To accomplish this goal, a team of four other interns and I utilized agile software development techniques. We used a specific agile framework called Scrum. My primary role on the team was as Scrum Master where I guided the team in following best practices for agile development. I used Jira, a product management tool, to track the development process and keep the team organized. I maintained effective communication with the technical lead who tasked us with the problem. I also worked directly on the software using development tools such as Spring Boot and Angular. By the end of the summer, our team had a working application that displayed globally trending Twitter topics, making current events from around the world more accessible. Future work on the application might include keeping track of historical trends to see how the world is changing over time.

1. Introduction

How can one use social media to better understand current events around the world

when social media is full of so much information? Over the course of my summer internship, this is the problem that the other interns and I set out to solve. We created an application to display trending Twitter topics in a way that allows for easier understanding of how current events are affecting different parts of the world. In order to appreciate a larger worldview, one must stray away from focusing solely on what concerns only them and recognize events that occur on a global scale. This project also gave me the opportunity to learn how agile development teams operate in the real world. I worked as the Scrum Master of the intern team and learned a lot about how to guide development. Obviously, having a working web application was an important goal of the internship, but learning the best practices for software development was also an important goal of the summer.

2. Related Works

An Application Programming Interface (API) is used to make requests for information from a website. The application we created uses the Twitter API to access information about trends to display them to our users. There are several other web applications that utilize the Twitter API to access Twitter content to create their own unique application. From the *trends24* website, users can select a location and see

the trends from every hour up until the current hour (trends24, n.d.) [1].

Another website, *Trendsmap*, allows users to “Explore the trends happening now using our interactive map view in any part of the world” (Trendsmap, n.d.) [2]. Our application has similar features enabling one to search for a location or use an interactive map to view current trends.

3. Project Design

The two main goals of my internship were to create a web application and to implement the agile Scrum framework. The first subsection addresses the actual web application development while the following subsection discusses how our team followed Scrum best practices throughout the internship.

3.1 Web Application Development

To start our project, we talked to the technical lead to gather the requirements for the web application. There were two main requirements that the tech lead gave us. The first was to create a heatmap of Twitter trends that displayed where certain topics are trending more. The second requirement was to be able to view trends by searching for a location. After gathering these initial requirements, we created a mockup of what we wanted the application to look like using a website called Figma.

We then began development on both the frontend and backend. Frontend development is related to how the website looks and what the user sees and interacts with. Backend development is the behind-the-scenes code that will actually make things change on the website after a user interacts with it. We used the software development frameworks Angular and Spring Boot to develop the frontend and backend, respectively.

The website has two pages. Figure 1 displays the “Home” page, which contains a large map of the world in the center of the screen, globally trending topics on the left, and a “trends preview” and “tweets preview” on the right. Users can click on a worldwide trend and then click a country on the map to view how “trendy” the topic is in that location. If the global trend is not as prominent in the selected location, the country lights up blue; and if the topic is trending more, the country lights up red. If the topic is trending the same as it is worldwide, then the country lights up white. If it is not trending at all in the selected country, it lights up gray. When users select a global trend, a few tweets relating to that trend will be displayed. Users can also simply click on a location on the map and see a “preview” of trends from that location. Users can select either a country or city using a toggle.



Figure 1: Home Page of Website

Figure 2 shows the “Locations” page, which contains a search bar for users to search for a location and view the trends for that location. There is also a button on the Home page that appears in the trends preview box after users select a location on the map that will take them to the Locations page to view more trends.

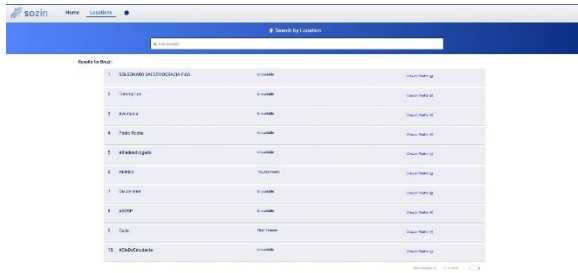


Figure 2: Locations Page of Website

The frontend development used Angular as the framework for the application. It also utilized Angular Material, which is a user interface library for the actual design of the website. Leaflet, a mapping library, was also used on the frontend for the world map. The backend development included the use of the Twitter API. There are two main API calls we use to get information from Twitter. The first call is to get trends given a WOEID or “where on earth identifier,” a location identifier created by Yahoo that has been deprecated (Twitter, Inc., 2022) [3]. This call is used to get global trends given the WOEID of 1 which indicates “worldwide.” This call is also used to get trends when a user selects a location on the map or searches for a location in the search bar.

Since this API endpoint requires a WOEID, we created a service to retrieve the WOEID, given coordinates or given a location name. To accomplish this, we created a database of all the locations for which Twitter tracks trend information. When users search for a location by name in the search bar, the database will retrieve the WOEID through the location name. If a user selects a location on the map, then the city or country will be fetched and the WOEID will be retrieved in the same manner as before.

The second Twitter API call is used to retrieve tweets given a trend. This is used when a user selects a worldwide trend and a few tweets relating to that trend are displayed on the right side of the website.

We faced a few challenges relating to the Twitter API during development. The main issue was that we did not have the highest level of access to the Twitter API, which means we did not get to use all of the API calls that we would have liked to use. We originally wanted to be able to use real time tweets relating to a selected trend, but we could not use this API call without full access. We also had issues with getting rate limited during development and testing of our application. Due to our access level, we could only make a certain number of calls within a time period and we would quickly reach this limit as there were five people making API calls at one time. During development and testing, we would each have to use our own API account to avoid rate limiting each other on the account that the production website was using. In the future, we would like to solve this issue so that we do not limit our API calls quickly.

3.2 Agile Software Development

During the internship, we followed the Scrum agile development framework which is a process for completing software development. The goal is to always have a working product, which means completing a certain amount of work during a “sprint” which lasts two weeks. As Scrum Master, I facilitated several different types of meetings. Every morning we would have a meeting to talk about what we completed the day before, what we are going to be working on today, and whether we were blocked in any way. This short meeting is called the daily standup.

To track our development progress, we used Jira. The Jira board contains “stories” which are relatively small tasks that someone will implement. Stories are tracked through the different stages of development, including “To Do,” “In Progress,” “Code Review,” and “Done.” Tracking progress in this way

helps teammates stay on track with their work.

On the last day of every sprint we would have a meeting called “sprint planning” to decide as a team what stories to bring into the next sprint. Also, on the last day we would meet with the technical lead and discuss what we had accomplished during the sprint and demonstrate our application to him.

Near the start of the next sprint we would have another meeting called “retrospective” in which the team discussed what worked well during the sprint as well as what could be improved in the future. The purpose of this reflective meeting is to make sure the team is working together and to identify and amend any issues for the future. Throughout the development of the application, we followed the Scrum best practices which ensured a smooth development process.

4. Results

At the end of the internship, our team had a working web application that made it easier for users to view global Twitter trends. Figure 3 shows the Home page after user interaction. A user selected a global trend on the left and then selected the United States to see how trendy that topic is there. Since the U.S. is blue, the selected trend is trending lower in the U.S. than it is globally. Brazil was the next country selected and the gray shows that the selected trend is not trending in Brazil. The top right of the screen shows a trends preview of what is trending in Brazil along with a button to take the user to the Locations page where they can see more trends. Below that is the tweets preview for the selected trend.



Figure 3: Home Page After User Interaction

Figure 4 shows the Locations page after a user has searched for a location in the search bar. Japan was entered into the search bar and trends in Japan are listed. Users can page through the trends as only 10 are shown as a time.



Figure 4: Locations Page After Search Bar Interaction

On the second-to-last day of the internship, the other interns and I presented our web application to the whole company. Throughout the summer we had demonstrated our application to the tech lead after finishing each sprint, but the presentation was more than a simple website demonstration. Presenting to the whole company allowed me to work on my more formal presentation skills and allowed our team to not only showcase what we created but also how we went about it. In addition to a working web application, I gained a better understanding about agile software development, the Scrum framework, and learned new skills as a Scrum Master.

5. Conclusion

During my internship I worked with four other interns to create a web application to display global Twitter trends in a more user-friendly manner. We followed agile software development best practices, and I learned how a Scrum team works in the real world. I gained many valuable skills during my internship including technical, leadership, communication, and presentation skills.

6. Future Work

Future work on our application might include implementing historical trends which would mean keeping track of trends over time to better understand how the world changes. We would also like to find a solution for the issues relating to our Twitter API access level.

7. UVA Evaluation

The most helpful class I took at UVA to prepare me for my internship was CS 3240 Advanced Software Development Methods. In this class, we worked in teams of five students to complete a web application. We also learned about Scrum and agile software development. This class simulated what my internship experience would look like.

References

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