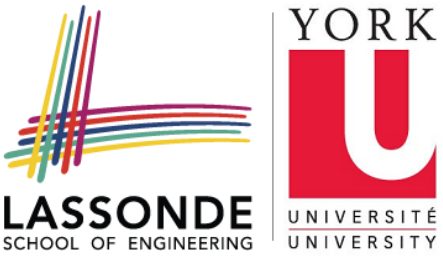

ENG 4000: Beta Gate 5

Project: Disaster Tweets - Real or Not: Natural Language Processing

Date: April 2nd, 2021

Team P

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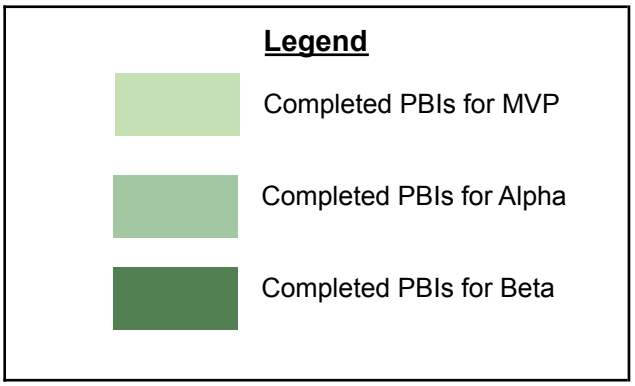
Product Backlog



PBI#	Product Backlog	Priority
1	Introductory tutorials and familiarization with the Kaggle challenge	High
2	Begin research about natural disasters in relation to Tweets	Medium
3	Research about existing projects related to our project	Low
4	Familiarize with common ML classifiers and metrics	High
5	Familiarize with NLP approaches and techniques	High
6	Familiarize with Tweet format and metadata	Medium
7	Familiarize with Kaggle test dataset	Medium
8	Implement first model to generate predictions on Kaggle dataset	High
9	Review performance of first model	High
10	Implement and combine hand-crafted preprocessing features with classification models	High
11	Implement an LSTM prediction model	High
12	Compare model performance	High
13	Survey current stakeholders to extract social media and news content sentiment	High
14	Discuss social need and scope of project	High
~~**15**~~	~~Find additional datasets on natural disaster Tweets~~	~~High~~
~~**16**~~	~~Clean and label new datasets~~	~~Medium~~
~~**17**~~	~~Test the new dataset on model~~	~~High~~
18	Combine classification models (e.g. combine non-neural models with LSTM models) to improve the model	High

19	Learn about web development and familiarize with deployment techniques	Medium
~~**20**~~	~~Implement data extraction feature to group Tweet keywords into events using Topic Modelling~~	~~High~~
21	Build the website	High
22	Deploy the ML model on the website	High
23	Retrieve live Tweets related to natural disaster from Twitter and add to the model	High
24	Survey current stakeholders to get feedback on the website	High
25	Improve the model/website based on stakeholders feedback	High
26	Analyze the social impact of the project	High
27	Expand stakeholders and learn about their needs (i.e. First Responders)	Medium
28	Design methods to further improve the classification models based on the data	High
29	Develop tools to allow semi-autonomous maintenance of the website	Low
30	Analyze SDG and the social impact of this project	High
31	Create a website Mock-up	High
32	Live feed table (Shows real and fake Tweets, make it visually appealing)	Medium
33	Group classified Tweets in to events based on keywords	High
34	Event pages (word clouds (relevant information), related Tweets, total number of Tweets, probability of event of each individual tweet)	High
35	Add a geographic search functionality to the website	High
36	Survey current stakeholders to get feedback on functionality and visual appearance	Medium
37	Deploy the website on a cloud server	High
38	Search Page (Static result table with a refresh button, keyword search, display related Tweets based on engagement (likes, quotes, retweets) and confidence of >90%)	High
39	Additional event page data visualization tools (Tweet volume graphs)	Low
40	Survey stakeholders (final product) for feedback and improve final product	Medium
41	Add mental health and disaster relief resources for users- GoFundMe links, hashtags for help line)	Medium
42	Final fixes on the website	Medium

Table 1: Product Backlog

Sprints

Sprint 7: Deployed Website on cloud server and implement Live Feed with filters

Completed PBIs: 32, 37
Tasks:

- Deployed website and PostgreSQL Tweet database on Heroku
- Implemented live disaster related Twitter feed
- Implemented live feed filters (e.g. Confidence, Verified Users, Minimum Engagement)

During Sprint 7, the website (composed of Dash back and front-end) and the PostgreSQL database storing disaster related Tweets were deployed to a cloud server using Heroku. As shown in the figure below, these subsystems are deployed such that users can interact with the website via an Internet browser. The users interact with the website front-end, which communicates with the back-end to retrieve and process Tweet data from the PostgreSQL database, and then returns the called data to the user.

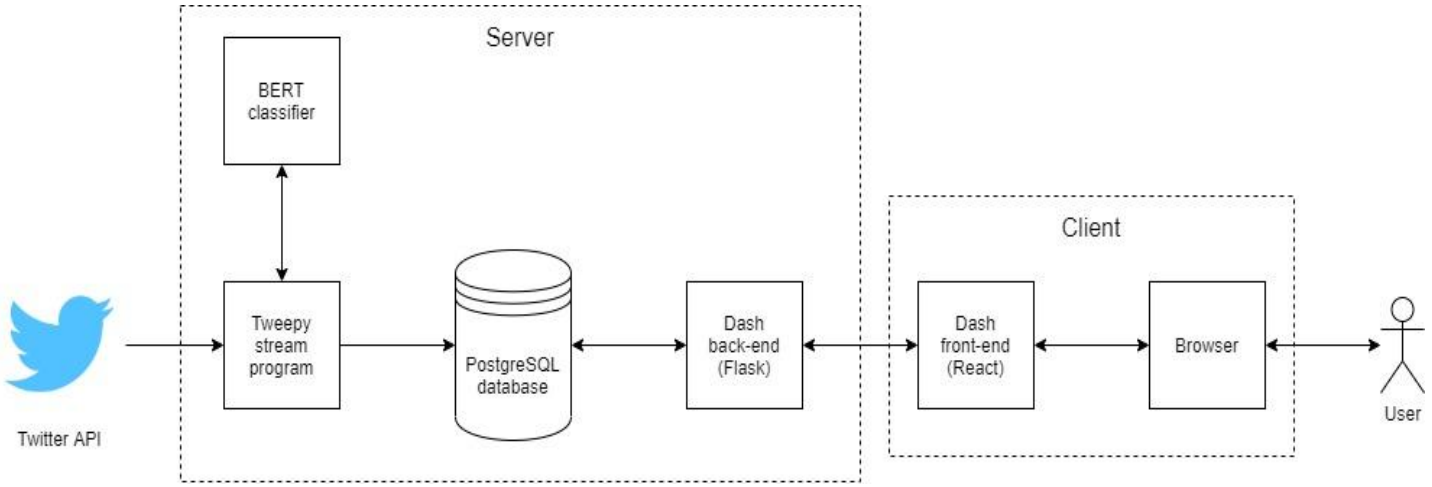


Figure 1: System Diagram for the Web Application

After the initial deployment of the website, the Live Feed page is implemented as shown in the figure below. It displays the disaster related Tweets in a visually appealing manner, and also shows the colour coded confidence level of whether the Tweet is truly disaster related or not, as generated by the BERT machine learning model developed in previous releases.

Next, filters are added to the page such that users may adjust the parameters of which Tweets they would like to see on the Live Feed page. They can filter Tweets based on the disaster related confidence level, whether or not a Tweet is posted by a verified user, as well as by Engagement level (referring to the sum of Likes, Retweets, and Responses on a Tweet). These filters give users the added functionality of modifying the types of disaster related Tweets they would like to view on the website.

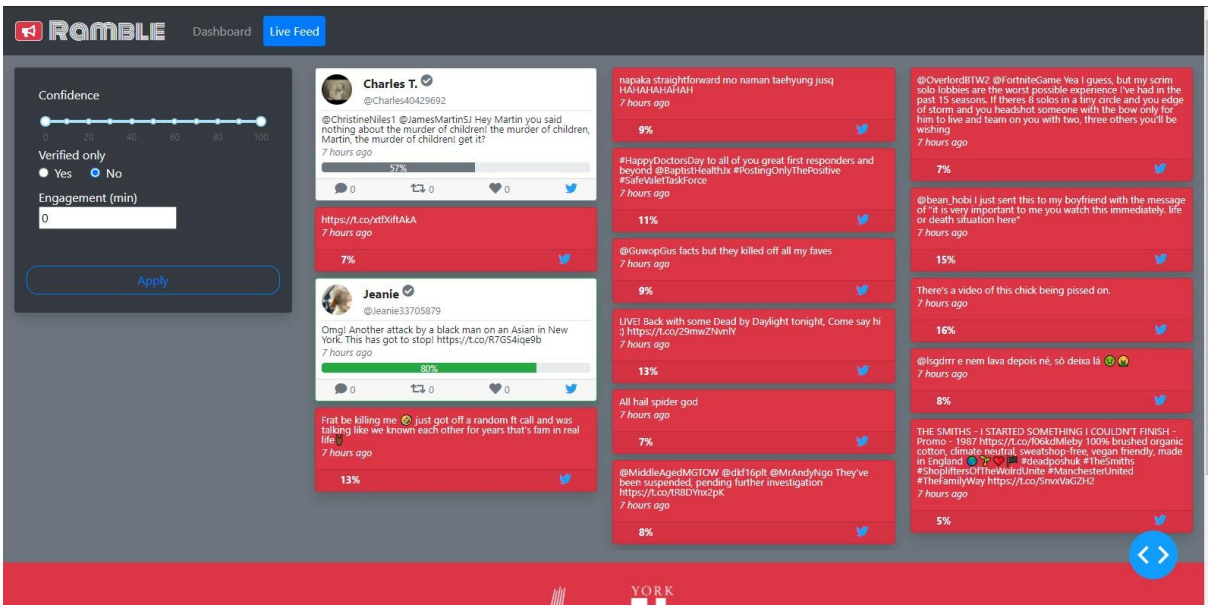


Figure 2: Live Feed of Disaster Related Tweets

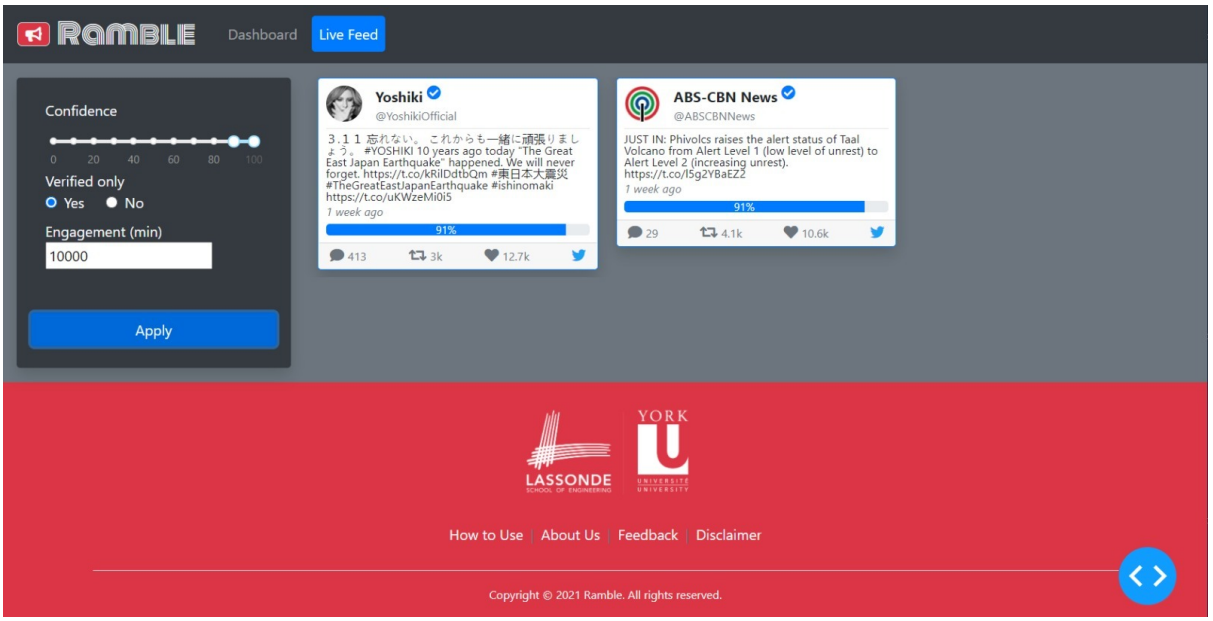


Figure 3: Live Feed with Filters

Sprint 8: Retrieved Stakeholder Feedback on Website

Completed PBIs: 36

Tasks:

- Create survey to test the user interaction with the website
- Reflect on the results of the survey to plan for improvements

During sprint 8, the team surveyed the current stakeholders (general public) to get feedback on the website. The feedback from the stakeholders will be useful for improving the current

website for the Final Release stage. The survey consisted of the following evaluation parameters:

- How visually appealing is the layout of the page?
- How user friendly do you think the page looks?
- How likely are you going to use our website?
- How can the website be improved?

The questions above were asked for the following implemented pages:

Dashboard Page: This page shows a map of disaster tweets pinned to a location and along the side some of the live tweets. On this page the user can hover over the dots on the map to get tweets from that location.

Live Feed Page: On this page you will see a live feed of tweets. Different filters can be applied to the tweets. The confidence level of it being a tweet related to disaster is indicated by the percentage. The user can select tweets that are only from verified accounts. And the engagement, which is the sum of the replies, retweets, and likes of the tweet can also be filtered.

Here are the results of that survey:

For the Dashboard Page:

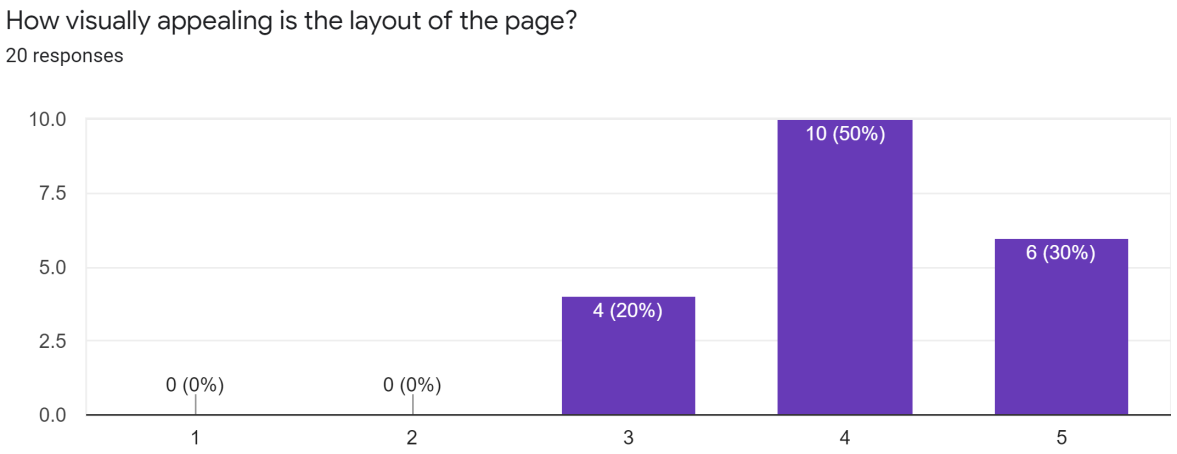


Figure 4: Dashboard Page Visual Survey Results

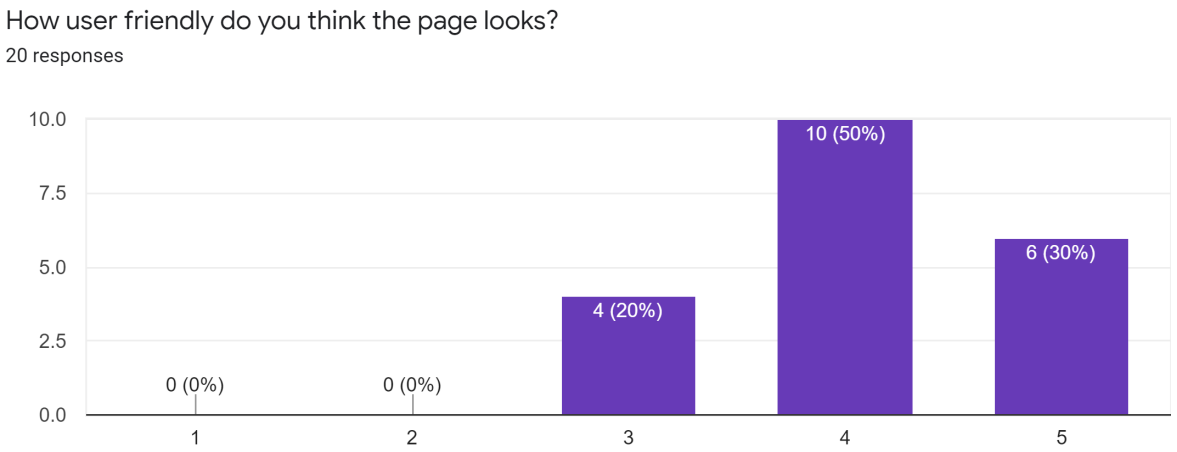


Figure 5: Dashboard Page User-Friendliness Survey Results

For the Live Feed Page:

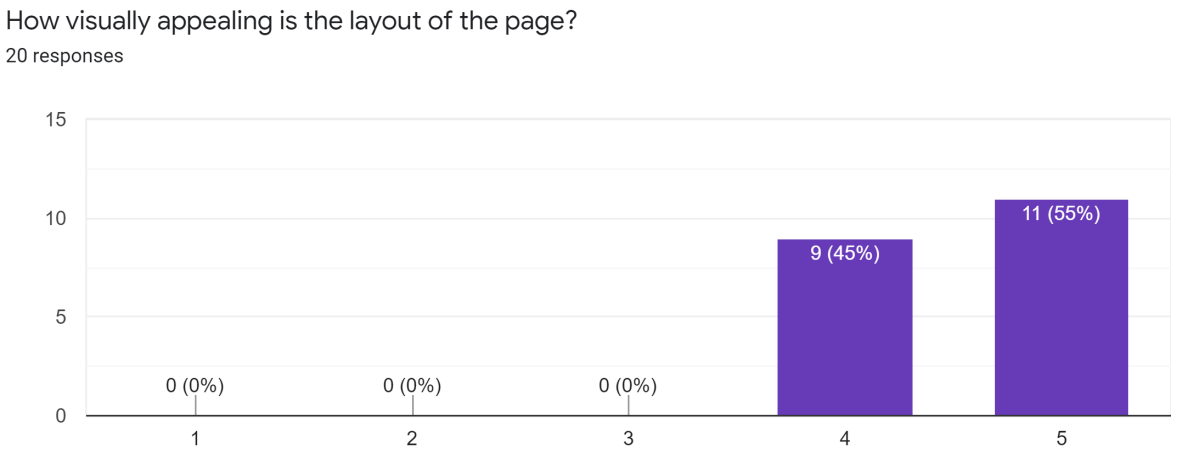


Figure 6: Live Feed Page Visual Survey Results

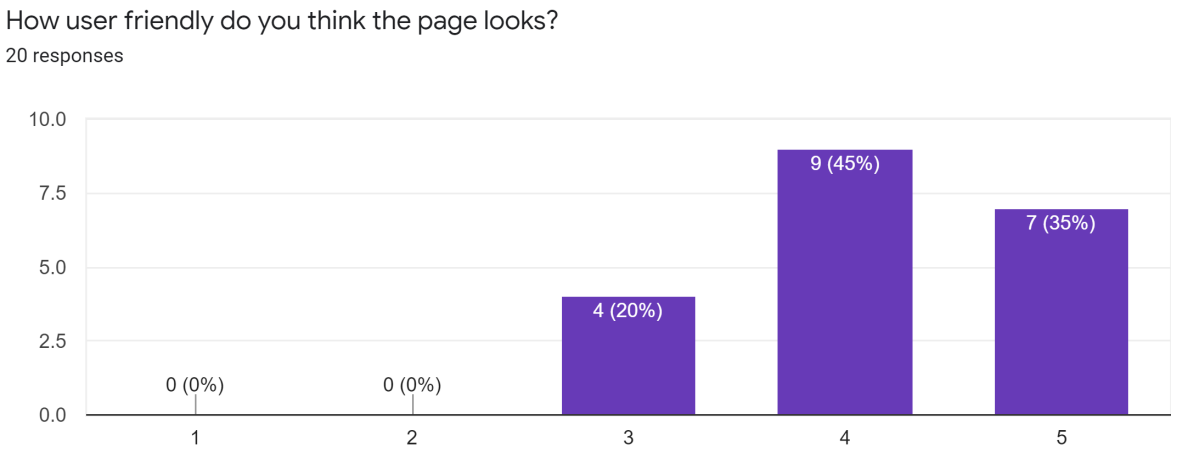


Figure 7: Dashboard Page User-Friendliness Survey Results

For the overall website:

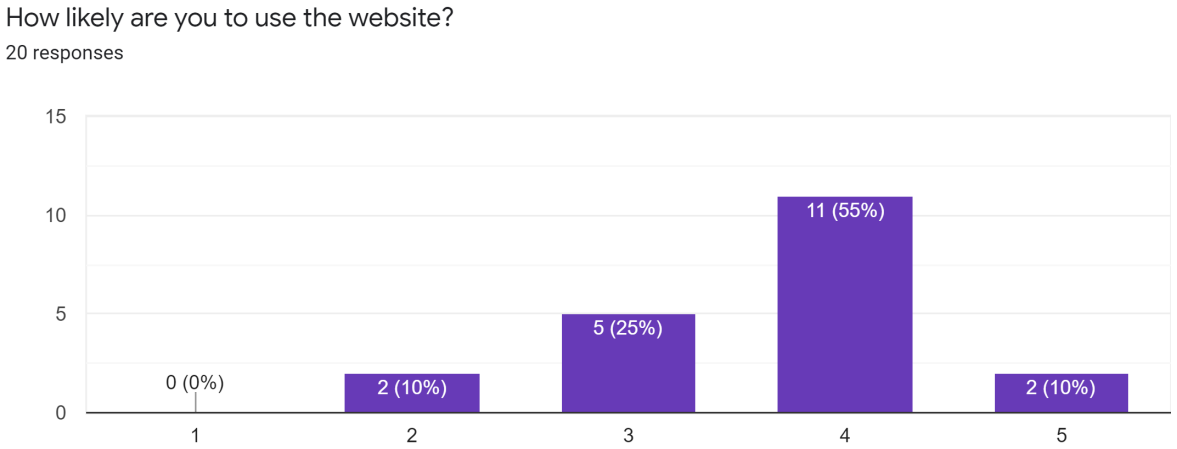


Figure 8: Website Usage Survey Results

Some of the comments received on how we can improve the website:

Nothing. It looks fantastic.

What is engagement?

The website looks good so far. I would suggest adding a time filter. Excited to see more of the website soon.

Maybe you should have a better name for the confidence and engagement in the filter.

Good job so far! Is the live feed on the map page changing to display more tweets? And will you be adding a search?

This looks good so far. The dashboard page could have some labels to make the information more understandable.

There can be improvements in many areas to list the text is hard to read and colour contrast can be better for a visual outlook. The viewer would find it hard to navigate furthermore the navigation tool could be better for ease of the viewer. The text seems clustered and therefore the average viewer might lose attention.

The survey results show some general responses that are common between multiple potential users which are summarized in the table below. During this sprint, the team discussed the stakeholder feedback for the current look of the website survey and elicited the potential improvements from user suggestions to be implemented in the Final Release stage.

User Response	**Potential Improvements (to be implemented in the Final Release)**
Some users wanted labels to make the information on the website more clear	Adding more labels on the website can make the information more clear with a purpose
Users had difficulty reading the text	Make the text, font size bigger to make it easy to read
Some of the users thought the filter labels for engagement and confidence should be more clear.	Add sub headings explaining what each of the filters mean.
Several users suggested to have a time filter	Add a time filter that allows users to view recent or old tweets based on their interest

Table 2: Potential Future Improvements from User Feedback

Sprint 9: Improved Website and Geographic Search

Completed PBIs: 25, 35
Tasks:

- Improved the website based on the feedback from stakeholders acquired in sprint 4
- Implement the geographic search on the website

The stakeholder provided feedback on website mockups and what to improve for the actual website during sprint 4. Listed below were some of the recommendations:

Designs overall look a little boring and how is this website useful for me?

The layout looks okay. Could have better graphics. What are the buttons for on the side of the page?

Looks good but needs some rework on the design

Color is so boring so you might want to work on that

It looks okay but I think because these pictures are in black and white it makes it less appealing

For an improvement I would say I don't think it's visually appealing. For the text it's concise but on the events page there's a lot of white space that could be optimized better.

Pages are black and white. Definitely needs improvement

Better graphics and should show verified tweets.

Provide more real estate for the map if that is a significant functionality to the app.

Upon reviewing the survey results from Sprint 4, some general responses found to be common between multiple potential users are summarized in the table below. During this sprint, the team discussed the stakeholder feedback from the mockup surveys and elicited the improvements from user suggestions.

User Response (Recommendations from Sprint 4)	**Improvements (Implemented in Sprint 9)**
Website interface is user friendly and easy to navigate for most users	Kept a simple layout for the website making it user friendly and easy to navigate.
Use of more colours will make the website more visually appealing	Colour coding made the website more interesting and informative (e.g. coding "true" disasters Tweets in green and "fake" disaster Tweets in red)
Unsure of what the navigation symbols on the side of the website are indicating	Navigation bar is more clearly embedded in the top of the website layout and consist of clear text to indicate its purpose

Table 3: Improvements made based on User Feedback from Sprint 4

As shown in the figure below, the geographic search functionality allows the user to filter the Live Feed of disaster related Tweets by location. The options are presented to the user in a drop-down menu (e.g. in the figure below, "Philippines" is selected). The map then zooms into the selected geographic location, and Tweets are filtered such that only Tweets from the relevant location are displayed to the user.

The use case of this functionality is such that users may be primarily interested in disaster from a specified location (for example, their current city/country or their home city/country). As such, the capacity is provided for users to view disaster related Tweets within a geographic range that are of greater personal interest to the user.

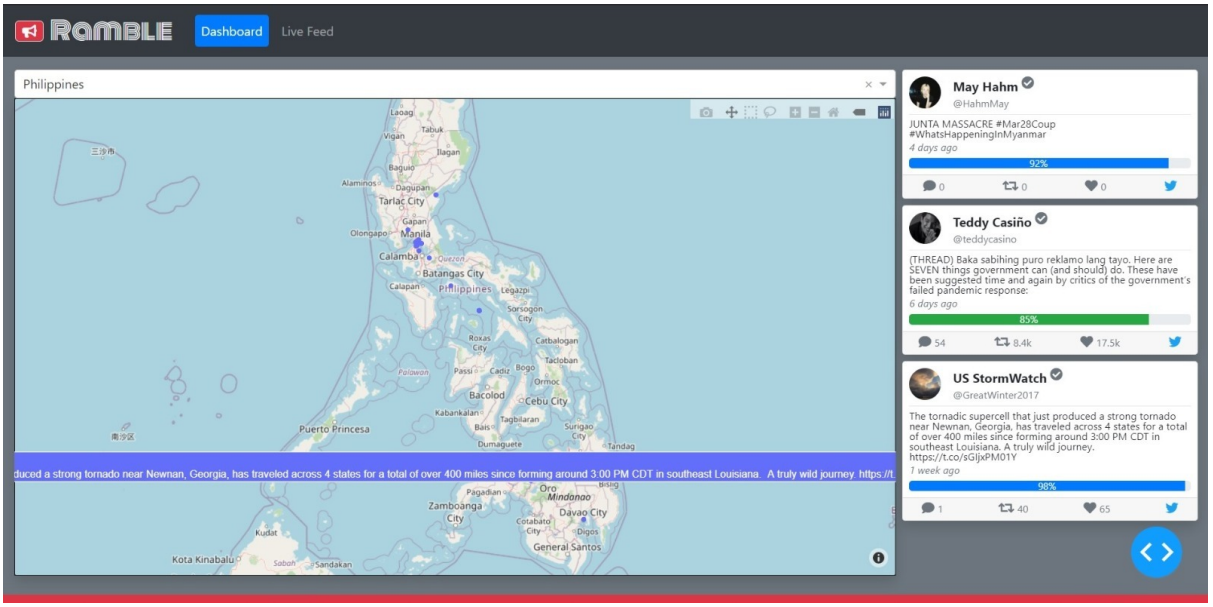


Figure 9: Geographic Search

For failure tracking, the Github Issues mechanism is used to keep track of bug and error reporting. Detected bugs can be flagged and discussed between the team in the issue thread, and labels can be tagged to the report to describe the issue and potential solutions. Team member(s) can be assigned to the bug such that errors in the project can be systematically resolved. This mechanism allows for a detailed log of the bugs and errors that the team encountered throughout the incremental project sprints. As a result, project version history can be easily tracked and if similar bugs are encountered in future sprints, solutions and changes to the project can be reviewed and resolved in an efficient manner.

System Issues

Alpha (Issues)	Beta (Solution)
No geographic search function implemented in order to allow users to conveniently search a particular location they are looking for	The website consists of a geographic search option where a user can search for tweets by providing locations.
Website and database were only locally deployed, not on a cloud server so that other users can access it.	The website and database was deployed to Heroku.
Live Twitter feed table on the dashboard page only displayed 3 tweets.	A separate page for the live feed page was created. This page displays multiple tweets.
Users should have the ability to view only Tweets that reach a specified confidence threshold, which is generated by the ML (BERT) model of being disaster related or not.	Confidence filter implemented where users can specify a minimum confidence value on the Live Feed page, such that the feed will display only Tweets that have a confidence value higher than the specified threshold.
Users should be able to view Tweets based on popularity	A filter has been added where users can specify an engagement threshold (number of Retweets, Likes and Replies) such that only Tweets with greater engagement are displayed.
Users should be able to view Tweets from verified user accounts about the disaster events	Verified filter is implemented for users to limit the number of Tweets that shows up to only verified people and organizations (makes a Tweet more reliable)

Table 4: Alpha Issues and Provided Solution in Beta

Path to Final Product Release

- Final fixes on the website
- Event grouping using keywords*****
- Event pages -> displaying top 3 events*****:
    - Word clouds (relevant information)
    - Related Tweets
    - Total number of Tweets
    - Probability of event of each individual tweet
- Search Page shows a static result table with a refresh button
    - keyword search
    - Display related Tweets based on engagement (likes, quotes, retweets) and confidence of >90%
- Additional event page data visualization tools (Tweet volume graphs)*****
- Survey stakeholders (final product) for feedback and improve final product
- Disaster relief and mental health resources******

***Event Page**
The website will consist of event pages. The main page will display top three events and each event is grouped together using the same keywords of a disaster related tweet. When a user clicks on a top event on the main page, they are directed to the event page. The event page will have related Tweets as well as the probability of an event. It will show the total number of Tweets and a word cloud, showing all the relevant/useful information. As for the final release, the event page will have a tweet volume graph as a visualization tool to further enhance it.

****Disaster relief and mental health resources**
This section would include links to disaster relief resources like links to nonprofit disaster relief organizations and GoFundMe pages and links to mental health resources like helplines and links to mental health organizations.

ITP Metrics Reflection

Individual statements on ITPMetrics survey (Peer feedback)

Jessie Leung

The Peer Feedback given in the ITP Metric survey reinforced my sentiment that as a whole, my team was invested in working collaboratively to produce the best project that we could. My team constructively voiced both their appreciation and suggestions for how we could best work together. The feedback provided in the ITP Metric survey encouraged me to take note of my social and work responsibilities and how this might affect my contribution to the ENG 4000 capstone project. Resulting from this, I decided to make sure to set aside time to contribute for the project. My team members were also very supportive to this, and noted that the entire team would be accommodating to the varying schedules of each team member.

Binte Zehra

The ITP Metrics is a great tool to measure and reflect on my strengths and weaknesses as well as, how my team sees me versus how I judge myself. Specifically, the Peer Feedback helped me realize how my team appreciates my efforts and values my opinions. Their positive feedback regarding my performance, motivates me to work harder to achieve more and keep up the good work. In the future, if my team has any suggestions on how I could improve myself, I will take their suggestions and work towards achieving that goal. I want to work collaboratively with my team as well as enjoy this whole experience and come up with a project that can help the society in one way or the other.

Paul Sison

Prior to completing ITP Metric surveys, my suspicion was that peer feedback would only reinforce what I already knew were my weaknesses. But reading my teammates comments and their limitless support motivated me to work in a manner that would always see great benefit to the team. It was also surprising to learn that what I see as weakness can be appreciated by others.

Neena Govindhan

Doing the ITP Metrics Peer Feedback not only gave my peers a chance to give me feedback, but also allowed me to reflect on my own performance. The feedback I received from my peers has helped me to improve on the different aspects of the teamwork competencies, some of which I had also realized I needed to improve on. The positive feedback I had received made me realize what I was able to achieve and needed to maintain in order to be a good team member. However, I do believe there are always improvements to be made, i.e. check my blindspots, so I will strive to improve in all aspects and ask for my peers' feedback to keep improving.

Jonas Laya

The ITP Metric survey played a key role to my success in working with our team project. The feedback I received from the survey guided me on how to tackle the project with my team members. I greatly appreciated getting honest comments and suggestions from my team. With their constructive feedback, I was able to adjust myself accordingly to develop myself

better with my team members. I am now able to communicate and contribute more with the team which created a more positive environment for us. The ITP Metric survey also created a great opportunity for me to show my appreciation and to voice out my suggestions to my team members.

Team statement on ITPMetrics survey

As per our ITP Metrics, Team Dynamic report, as a whole we work well as a team. In terms of Communicate, compared to the Gate 3 report, now our Communicate score had increased. Because we are following the Agile project management approach we have been in more contact in terms of scrum meetings and we have more defined roles that are still flexible. We also have gotten to know one another much better, that we are more comfortable to be more open with one another.

In terms of Adapt, again our scores have increased in this gate. This is because prior to Gate 3, we were splitting up the tasks and putting it together and going over what needs to be changed at the end. But now there is more communication because of the scrum meeting and more in tune with what each other is doing. Still there are some days where time management is still an issue, because of other courses and personal lives, but with the planning we are more on track than before. Even if certain tasks don't go exactly as planned, we planned some buffer time so that there is time to catch up with the tasks.

In the Relate section, as a team we have been good at contributing to work equally and have had a positive environment where no conflicts have arisen as such. That hasn't changed much since. In terms of conflict, we hardly have major ones, we usually talk it out and get everyone's opinion and if someone is wrong, they would openly admit it. As a team we try to maintain a positive energy and environment for work. And we have built that trust in one another to do that work.

In the Educate section, since all of us don't have that much experience with web development, learning that has become more important. Since we all have different learning styles, we leveraged on team members that were able to grasp material much faster to get certain tasks done which we planned during the scrum meeting, but we all continue to learn and contribute to the progress of our project. We as a group had also chosen to learn about using Dash for our web development, which acts as both front-end and back-end, so there was a little bit of a learning curve. We still continue to be open to learning and especially now will be focusing on the social aspect.