Team 19

Argus

Ji Woong (Eric) Park, Sahithi Tummala, Adam Rutledge, Eugene Poh, Bhavik Sardar

Problem Statement:

It has become increasingly important to raise awareness regarding environmental issues. Because of this, we have decided to create Argus, an all-in-one environmental monitoring app which is designed to be minimal, intuitive to use, and fast to use. With Argus, users will be informed of the climate activity and other environmental activities such as current and future value of temperatures, rising sea levels, and greenhouse gas emissions all in one place..

Background Information:

Target users:

Everyday normal individuals who are invested in the environmental health of our planet and seek to do simple tracking of current and future trends in environmental issues will find Argus to be a very helpful web application that is easily accessible online and simple to use for basic tracking of the environmental activities that they care about. Furthermore, environmental activists can use our web application to see the change, positive or negative, in environmental activity and what they could do to help, or sustain, the current environment. On the other hand, our application can also be used by individuals who are not necessarily interested in the environment, but want to know what environmental events and activities might happen in the future, based on current data and trends and just want to be prepared.

Existing solutions:

The most similar solution to our problem that currently exists is globalclimatemonitor.com. It offers many of the datasets that we plan to implement, just without future prediction or a smooth interface. There are other apps that do not solve our specific problem, but use similar technology to track other things in the world, such as weather. Examples of these are noaa.gov, weather.com, and mobile weather apps where there is a smooth interface used to track a small subset of values (such as precipitation or cloud cover) with future prediction.

Limitations:

Existing solutions that track environmental factors have certain limitations, which Argus plans to address in order to distinguish themselves from other existing web applications or environmental monitors. One of the major limitations currently is that many environmental monitors existing today tend to focus on only one environmental issue or aspect. In order for some to get a comprehensive summary of current and up-to-date information regarding environmental activity, users will have to search for multiple applications that track different activity. Additionally, many existing solutions have a user interface and front end that is not intuitive or user-friendly and tend to have responsiveness issues.

We plan to address all of these issues and introduce other major features missing from existing solutions to Argus in order to create an effective and user-friendly environmental tracking monitor.

Requirements:

Functional requirements:

1. As a user, I would like to be able to view the temperature at my location
2. As a user, I would like to be able to view future temperature readings at my location
3. As a user, I would like to be able to view the greenhouse gas emissions present at my location
4. As a user, I would like to be able to view the future greenhouse gas emissions present at my location
5. As a user, I would like to be able to select the specific type of greenhouse gas emissions that I would like to monitor
6. As a user, I would like to be able to view earthquake activity present at my location
7. As a user, I would like to be able to view future earthquake activity present at my location
8. As a user, I would like the website to automatically fetch real-time weather data from the internet.
9. As a user, I would like the website to make efficient use of a relational database to store historical weather data.
10. As a user, I would like the website to automatically update its database with the real-time data.
11. As a user, I would like the database to be capable of storing future predicted weather data alongside the historical data.
12. As a user, I would like the machine learning models to feed directly into the database when they make predictions on an hourly interval.

13. As a user, I would like the website's database to be capable of replacing future predictions with real data once real data is available, and replace outdated future predictions with improved ones when they are available.
14. As a user, I would like to be able to use Argus from most of the popular modern browsers.
15. As a user, I would like to be able to use Argus from most of the popular operating systems.
16. As a user, I would like to be able to use Argus from any location in the world, provided I have access to the internet.
17. As a user, I would like to be able to access Argus from a web hyperlink.
18. As a user, I would like to have different map layers and be able to change to a specific layer easily.
19. As a user, I would like to be able to zoom in on the web map.
20. As a user, I would like to be able to zoom out on the web map.
21. As a user, I would like to be able to drag the web map from my map window view.
22. As a user, I would like to be able to drop a pin on the map and the pin will contain a pop up that has the information of the environmental activities I am interested in and will stay there until I remove it.
23. As a user, I would like a server to host the web application
24. As a user, I would like a server to store data and be safe from security threats
25. As a user, I would like a server to be safe from security threats
26. As a user, I would like the server to be fast enough to not experience slow response.
27. As a user, I would like to have precise data from reliable sources.

28. As a user, I would like to have a filter feature to not see the data I don’t need.
29. As a user, I would like to be able to see updated data every hour or day.
30. As a user, I would like the website to be secured so that my location information is not leaked.
31. As a user, I would like to be able to take in temperature information through a heatmap with a legend.
32. As a user, I would like to be able to view this website on mobile.
33. As a user, I would like to be able to view the rising sea levels present at my location.
34. As a user, I would like to be able to view the future rising sea levels present at my location.
35. As a user, I would like to be able to interact with the prediction models.
36. As a user, I would like to be able to filter out what time interval I want to see data from.
37. As a user, I would like to be able to monitor humidity based on the location that I am currently in.
38. As a user, I would like the application to find and use reputable datasets that relate to the environmental activities monitored to use for predictions.
39. As a user, I would like the application to normalize environmental datasets to use for predictions.
40. As a user, I would like the application to be able to predict and forecast future temperature values.
41. As a user, I would like the application to be able to predict and forecast future precipitation values.

42. As a user, I would like the application to be able to predict and forecast future earthquake activity.
43. As a user, I would like the application to be able to predict and forecast future tsunami activity.
44. As a user, I would like the application to analyze the data outputted from the Time Series Prediction Models.
45. As a user, I would like the web application to be able to work seamlessly on mobile devices.
46. As a user, I would like the web application to save my current customization such as environment activities I have selected and personalized filters via web cookies.

Non-functional requirements:

Usability:

The web interface should be simple and intuitive for the user to use. The web interface should also not be cluttered with too many features that render it confusing to view. We also want to ensure that our application is accessible on most popular screen sizes and resolutions. It should be easy to toggle and select the specific environmental activity that the user wishes to monitor within at most a few clicks without reloading the web page.

Portability:

The web app should be usable on most popular operating systems including but not excluding, Linux, MacOS, Windows, iOS and Android. The web app should also work on most modern browsers including but not excluding, Chrome, Firefox, Microsoft Edge.

Flexibility:

Our software architecture should allow our web application to be extensible and modular to allow simple additions of more datasets and machine learning models to our system and display them on the web app without much extra work.

Performance:

Current attempts at similar web apps fail when it comes to loading map data in real time, so we want our app to be more performant in real time scrolling and panning on the map. For example, Argus should load a given section of the map within 1000ms on a good internet connection.

Reliability:

Apps with world maps often have graphical bugs and glitches, so we plan to design a robust and well-tested system that avoids these problems. Additionally, the website should not have a downtime of more than 30 minutes.

Maintainability:

The web app must periodically retrieve updated data by having 4 simultaneous requests to the public dataset sources every 1 hour and update the models accordingly automatically without developer intervention.