IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Web Based Earhquake Detection Application

Authors Name/s Manash Pratim Borpatra Gohain

School of **Computer Science and Engineering**

Lovely Professional University

Pharwara 144411, India

Authors Name/s Amaranath Ganapati Moger

School of Computer Science and Engineering

Lovely Professional University

Pharwara 144411, India

Authors Name/s Jatin Chutani

School of Computer Science and Engineering

Lovely Professional University

Pharwara 144411, India

Authors Name/s Nishant Heer

School of Computer Science and Engineering

Lovely Professional University

Pharwara 144411, India

Guide Name/s Dr Shivi Sharma

School of Computer Science and Engineering

Lovely Professional University

Pharwara 144411, India

Abstract*— A very necessary tool viable to be used across any smartphone, tablet, PC to be informed of earthquake. As it a natural disaster it is very difficult to predict and issue warning. We have proposed a tool that will inform all of the quakes including recent ones that happened. The idea of the project is absolute solitary and will be useful for society. There are many applications out there but a very few shows real time data. Our project will showcase and feed real time data and will monitor for significant earthquakes. From the research we have analyze and conclude that however our project will predict through predetermined damage threshold they are not most accurate outcome when the earthquake magnitude and location are accurately determined. It is a web-based application built on various frameworks such as Express JS, Node JS, React JS, Bootstrap. We have used Heroku for cloud platform to deploy our server and as it supports all of the programming languages.

***Keywords*— API, Limiting, Caching, Fetch data (API), Filtering, Updating, Google Maps**

I. Introduction

Very few tools are out there which show data of earthquake and for the end users it becomes very difficult to check through APIs. Our application is easy to use and users can easily search for the epicenters of earthquake. The people of earthquake prone areas can easily keep track of it and get warning in case epicenter falls nearby areas. Our application collects data through Application programming interface (API) from USGS. We have used Python as programming language and our algorithm imports and analyze data and then it limits data up to 10 request data by the user. The request data of given magnitude are fetch to the user end and the data will be of recent spikes.

The following example will display our application approach-

Suppose an earthquake of magnitude 1.4 is seen in Mumbai, India. User has to request data to server with magnitude as parameter. If the user request of magnitude of 3.0, the request will be handle by server. The server will validate if it is a valid magnitude. Since the recent magnitude is of 1.4, error will display on users end. If the magnitude is valid , it will search for all the magnitude of 1.4 that was seen recent and will display upto 10 results.

II. Background

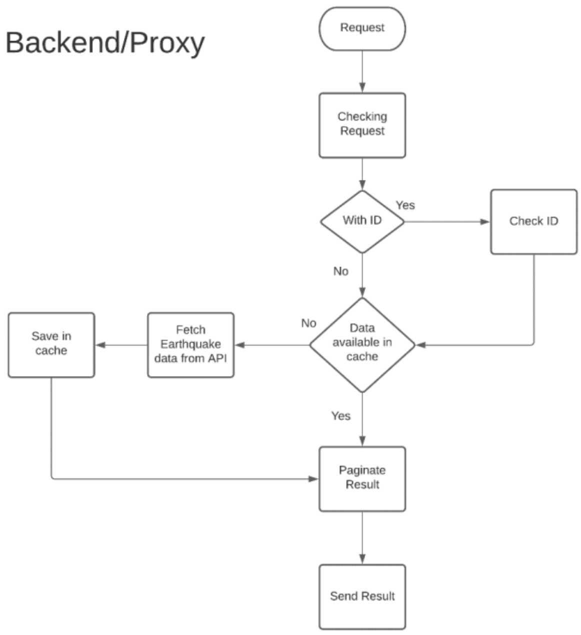
We have used Heroku for cloud deployment. Our algorithm imports google maps so as to pin point of the events of epicenters. When the user comes for the first time in our server the data of 24 hours is cached in users end and update after 24 hours. There it performs caching. [7] We have also used limiting in our algorithm to make less load in the server and as well as to the user side. So the request by end user see results up to 10 recent earthquake of the given magnitude alongside the pin point of epicenter. On clicking the epi-center it will direct user to google maps of the spike site. Algorithm will always have access to API of USGC https://earthquake.usgs.gov/fdsnws/event/1/[METHOD[?PARAMETERS]].

We have tried to proposed a system that will-

- Alert earthquake prone area 24*7
- Real-time geosocial data
- Keep track of events of epicenters

- Import API

III. PROXY MODEL



[2] Server will have access to API USGS. User will request data- The request is handled in server which is deployed in Heroku. The first time users data will be saved in server. It will check if user has ID and certainly it will fetch data into cache and if not data will be displayed to the end user. The data to the user side will keep updated and the algorithm makes sure it is updated for every 24 hours.

Fig 1. Pin-points of epicenters

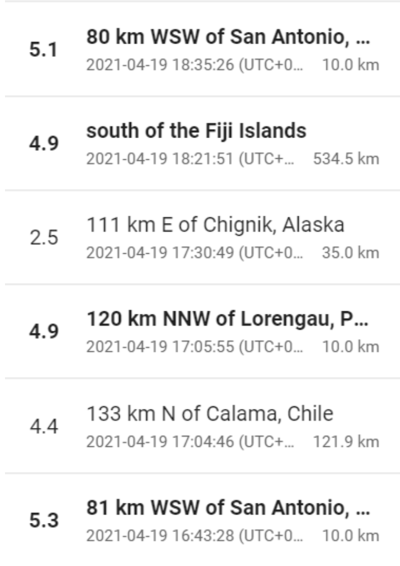


Fig 2. Precise location of the spike site along with date and time

IV. APPROACH

In this section, we present our approach for earthquake detection application on the analysis of collected data. Specifically, we have evaluated our approach through systematic result analysis, we describe some of the implementation details.

A. *Approach Overview*

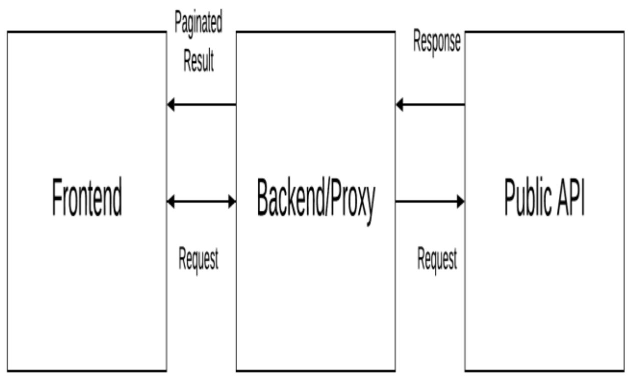


Fig 3. Approach overview

Figure 3 gives an overview of our approach. Our Earthquake application mainly comprised of
1) Web- application
2) Open API's
3)Error management system
4) Filtering search
5) Real time location view of the recent earthquake(google api) .

When a user sends a request from frontend , first the request is received by backend server, then the backend server approach the public api, the api gives the appropriate results to the backend and that request will be shown to the user through the frontend. If a user sends a invalid request the backend will through an error to the user.
[4]Our application shows real-time earthquake data to the user, even the user can filter the result by changing the magnitude parameter, for example. If an user wants the

earthquake data of magnitude more than 2.5 , our backend will filter out the results and shows only the data of earthquake magnitude more than 2.5. Lastly, the Google API shows the real time earthquake which are happened recently with accurate locations. This feature ensures that the users get all real-time data in single application without wasting more time.

Fig. 4 real-time earthquake location

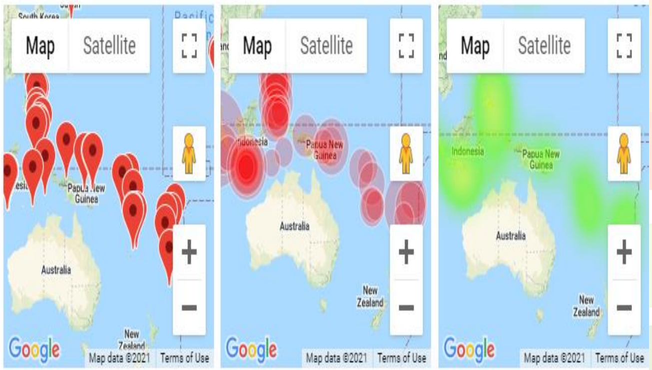


Fig. 5 Data visualization

Figure 5 shows different data visualization, in our application an user can see earthquake data in mainly 3 types of visualization 1) basic markers 2) circles 3) Heat maps. Basic markers shows exact location of the earthquakes which happened recently , then, red circles the size of the circles are relative to the magnitude of the earthquakes bigger the earthquake the size of the circle will be bigger. Lastly, Heatmaps are simple yet powerful way of displaying the earthquakes, These visual data will give the user more accurate details.

If the user request the earthquake data without filtering user will get the data of 10 earthquakes per page and if user wants to check again , they can get more details by going to next page .url endpoint will be “api/quakes?page=2”

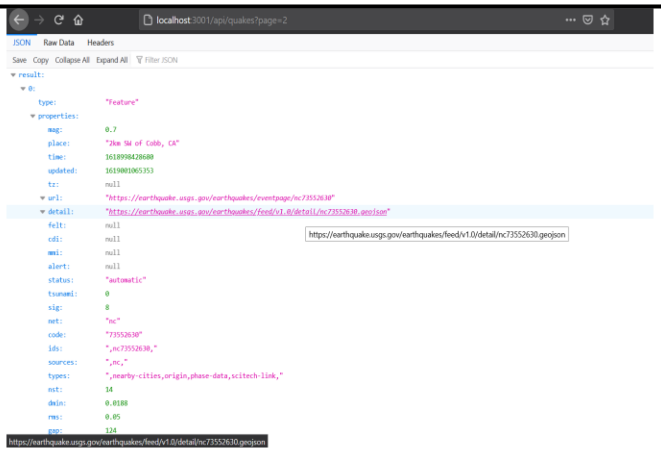


Fig. 6 backend data per page

If the user wants specific data like they need only details of earthquake which is more than magnitude 1.5 or 2.5 they can get the details by filtering options, for example when user select 1.5 magnitude in filtering section the request sent to the backend and from backend server fetch data by requesting the API then send the result to the user. This will help user to get what he requested. Figure 7 and Figure 8 shows details of the request in the form of JSON data.

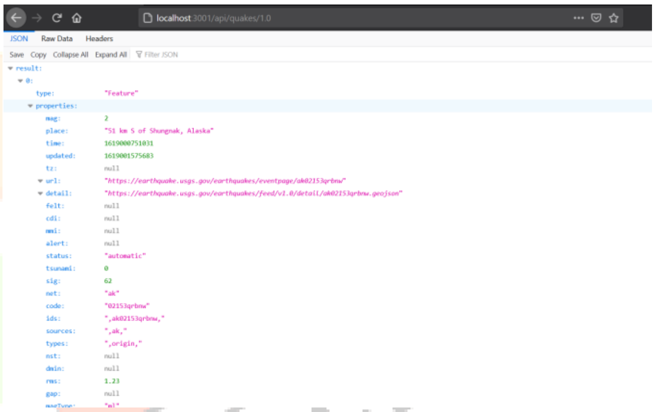


Fig.7 showing result of earthquake more than 1.5

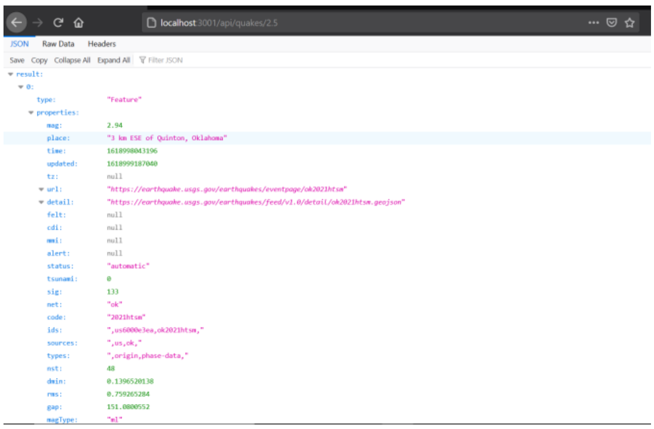


Fig.8 showing result of earthquake more than 2.5

V. CONCLUSION

We have come up with an application which feeds real-time data. That gives necessary information about the recent earthquakes and gives precise location of the earthquakes A very useful tool which will alert the people of sudden spikes and alert people for movement to a safer place. We have also planned to upgrade our application with email notifications or text message notifications in future so that a user get instant notification of quake happened nearby areas. On the other hand our application keep track of all the earthquake happenings around the world. Our data can be used for study or research as we store data in JSON format, it can be easily imported. Our application is easy to use compared to other tools available in market. Also helps user to get the details of every earthquake with magnitude, specific location, place name these kind of detailed information will help the user to get the data much easily even the user can filter the results according to the needs, the earthquake data will be updated every 2 hours in backend so that user can get the latest earthquake data immediately this helps the user to be alert and updated about what happening around them

ACKNOWLEDGMENT

THIS RESEARCH WAS DONE UNDER THE GUIDANCE OF DR SHIVI SHARMA. WE ARE GRATEFUL FOR HER ASSISTANCE THROUGHOUT OUR RESEARCH.

REFERENCES

[1] https://www.researchgate.net/profile/Shlomo-Bekhor/publication/305290269_A_personalized_GeoSocial_app_for_surviving_an_earthquake/links/57ac178908ae3765c3b7bb4f/A-personalized-GeoSocial-app-for-surviving-an-earthquake.pdfI.

[2] https://link.springer.com/content/pdf/10.1007/s00024-019-02337-7.pdf

[3] http://sslab.knu.ac.kr/pubs/i4cs.pdf

[4] https://developers.google.com/maps/documentation/javascript/earthquakes

[5] https://ieeexplore.ieee.org/abstract/document/7294490?casa_token=90GmJbiNnrUAAAAA:fIkm5MTukPAT0xC7kyjzcaFiujHWpVKCpr_6fGuK79prO5kFeD4JLz16XuHYs7QjyCnHzG66s7Uc

[6] https://www.sciencedirect.com/science/article/pii/S0098300414000788

[7] https://ieeexplore.ieee.org/abstract/document/8683688?casa_token=Q6wiZeqNpKYAAAAA:lQbqW13t8unwLEKV3P3r02vErwS7aYEA5HeJNQX3U688q6BNd4lMTyZldAuQQ-tQ8SEVAVkajV2b

[8] https://www.semanticscholar.org/paper/Application-of-time-series-based-damage-detection-Noh-Nair/c6cb94514bd43d0dc5693c482bc762708eeb84c3?pdf

[9] https://academic.oup.com/gji/article/200/2/1207/616885?login=true

[10] https://advances.sciencemag.org/content/1/11/e1501057.short

[11] https://library.seg.org/doi/abs/10.1190/geo2012-0050.1

[12] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011GL047947

[13] https://www.sciencedirect.com/science/article/abs/pii/S0267726110000679

[14] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011JB008750

[15] https://www.mdpi.com/1424-8220/19/3/542

[16] https://pubs.geoscienceworld.org/ssa/srl/article-abstract/91/4/2062/583161

[17] https://arxiv.org/abs/1803.09835

[18] https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2020GL089394

[19] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/jgrb.50242

[20] https://dl.acm.org/doi/abs/10.1145/1772690.1772777

[21] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2008GL036766