

Data Visualization

Team Project Phase 3

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INTRODUCTION

Earthquake

Earthquakes can have significant social impacts, causing damage to buildings and infrastructure, displacing communities, and even leading to loss of life.

Studying earthquakes can help us understand how to mitigate their effects and improve our response to future disasters.

And as a Taiwanese, it is not a rare thing to encounter an earthquake, which becomes the reason why we are interested in this topic.

Questions

01

Where does the earthquake occurs most?

02

Is there any relationship between the location of the earthquake and depth?

03

Is there any relationship between the location of the earthquake and the magnitude?

04

Where does the earthquake with a magnitude greater than 7 occurs most?

05

Is there any relationship between the magnitude and the time?

06

Is there any relationship between the magnitude and the depth?

Dataset

World Earthquake

Source

Kaggle

Count

283,132

Size

49.07MB

data
preprocessing

Count

31,551

Size

5.038MB

About Data

Variable	Type	Description
time	String	Time of earthquake.
latitude	Float	The latitude of the earthquake.
longitude	Float	The longitude of the earthquake.
depth	Float	The depth of the earthquake.
mag	Float	The magnitude of earthquake.
magType	String	The type of earthquake magnitude.
nst	Float	Number of seismic stations which reported P- and S-arrival times for this earthquake.
gap	Float	A segment of an active fault known to produce significant earthquakes that has not slipped in an unusually long time.

About Data

Variable	Type	Description
dmin	Float	Horizontal distance from the epicenter to the nearest station.
rms	Float	The root-mean-square travel time residual.
id	String	The id of earthquake.
place	String	The position of earthquake.
type	String	The type of earthquake.
magNst	Float	The nst of magnitude.
Country	String	The (nearest) country where the earthquake occurs.
Continent	String	The (nearest) continent where the earthquake occurs.
On_the_sea	String	The sea where the earthquake occurs if it's on the sea.

Data Preprocessing

```
# Print the current API request number
tracker = tracker + 1
api_call_url = API_URL + "countryCodeJSON?" + "lat=" + latitude + "&long=" + longitude + "&username=" + API_USERNAME
API_JSON_DUMP = requests.get(api_call_url)
API_JSON_DUMP_DATA = API_JSON_DUMP.text
JSON_API = json.loads(API_JSON_DUMP_DATA)

#print(JSON_API)
if ('status' in JSON_API):#用来確認credit爆了沒
    if ('limit' in JSON_API['status']['message']):
        print(JSON_API['status']['message'])
    usernamescount=usernamescount+1
    if(usernamescount<len(usernames)):
        print('Switch to '+usernames[usernamescount])
        API_USERNAME = usernames[usernamescount]
        #然後再做一次前面的事
        api_call_url = API_URL + "countryCodeJSON?" + "lat=" + latitude + "&long=" + longitude + "&username=" + API_USERNAME
        API_JSON_DUMP = requests.get(api_call_url)
        API_JSON_DUMP_DATA = API_JSON_DUMP.text
        JSON_API = json.loads(API_JSON_DUMP_DATA)
    else:
        print('The accounts have all been used,take a rest.')
        break

if('countryName' in JSON_API):#如果有找到國家
    #scn=pycountry_convert.country_alpha2_to_continent_code(JSON_API["countryCode"]) #simple continent name
    #continent_name=get_continent_name(scn)
    if (JSON_API["countryCode"] == 'TL' or JSON_API["countryCode"] == 'AQ' or JSON_API["countryCode"] == 'EH' or JSON_API["countryCode"] == 'PN'):
        scn=JSON_API["countryCode"]
        continent_name='REQUIRE CHECKING'
    else:
        scn=pycountry_convert.country_alpha2_to_continent_code(JSON_API["countryCode"]) #simple continent name
        continent_name=get_continent_name(scn)
    #print(str(i+1),JSON_API["countryName"],scn,continent_name) #印出國家名、簡稱及洲
    #data = (
    #    (latitude,longitude,JSON_API["countryName"],scn,continent_name,"NO"),
    #)
    #for i in data:
    #    sheet.append(i)

    sheet.append([df.at[i,'latitude'],df.at[i,'longitude'],JSON_API["countryName"],scn,continent_name,"NO"])
wb.save('result.xlsx')
print('Data has been appended successfully'+ '#'+str(i+1))
else:
    #print("***** NOT A COUNTRY *****")

```

We use an api to get more location information about the earthquake from latitude and longitude. Including ocean(On_the_sea), continent(Continent) and country(Country).

QuakeLens



QuakeLens

We present QuakeLens , a visualization system that can help user to explore the earthquakes.

Interface Overview



Interface Overview



Here's the map view. The earthquakes will be marked on the map as a red circle. The size of the circle indicates the scale(magnitude) of the earthquake.

Interface Overview

The filter allows the user to set the condition and search for the earthquake. Including Continent, Depth, Scale(magnitude), MagType and Time.

Select Continent

Worldwide

Depth

0km - 391km

Scale

6 - 8

MagType

mb mww others

Time

From

07/17/2019

To

02/08/2023

Search

Interface Overview

The filter conditions block shows the condition the user currently set.

Filter Conditions

Continent: Worldwide

Depth: 50-170 km

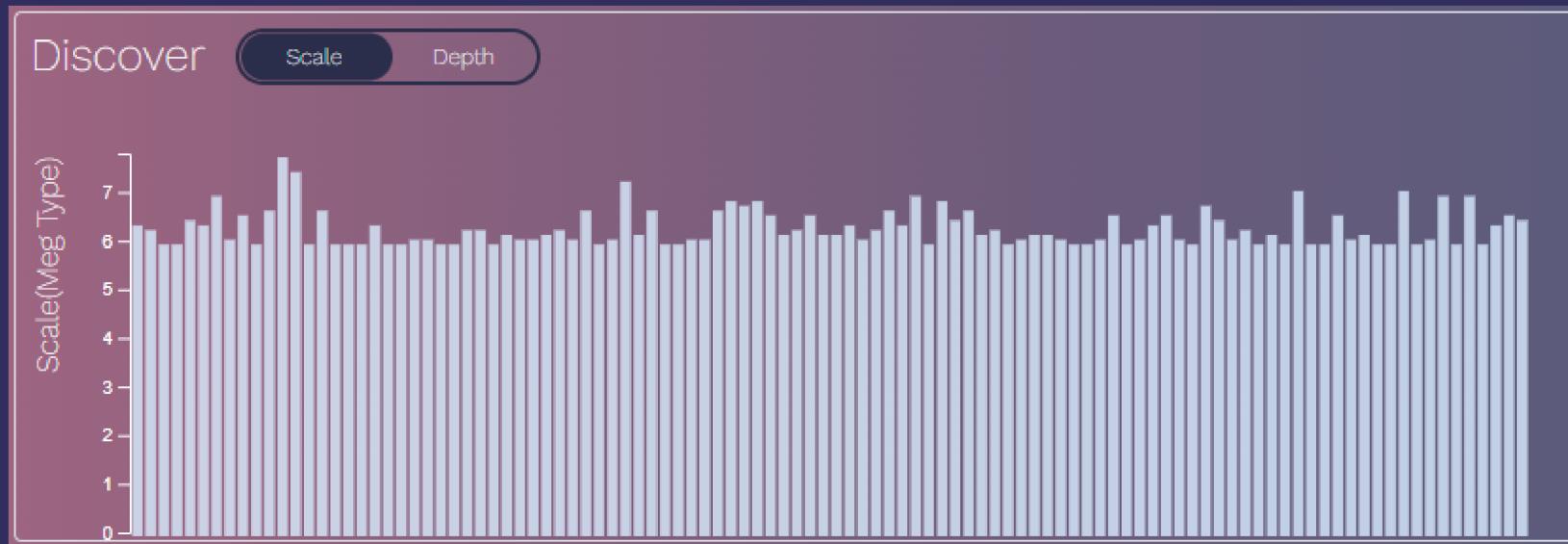
Scale: 5-6 mb/mww/others

Time: Mon Jul 01 2019

00:00:00 GMT+0800 (Taipei)

Interface Overview

The Discover block shows the Scale or Depth of the earthquakes user brushed on the map in bar chart.



Features Overview

Select Continent

Worldwide

Depth

0km - 391km

Scale

6 - 8

MagType

mb mww others

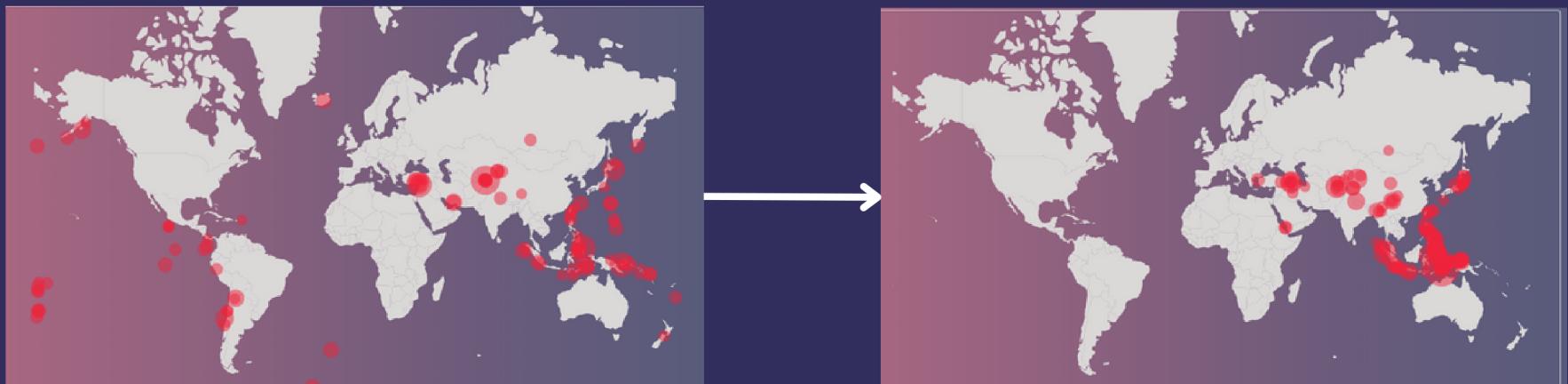
Time

From

To

User sets the filter and press the search button.

Features Overview



The map will respond to the user's search.

Features Overview

There's no data that matches the condition you set.

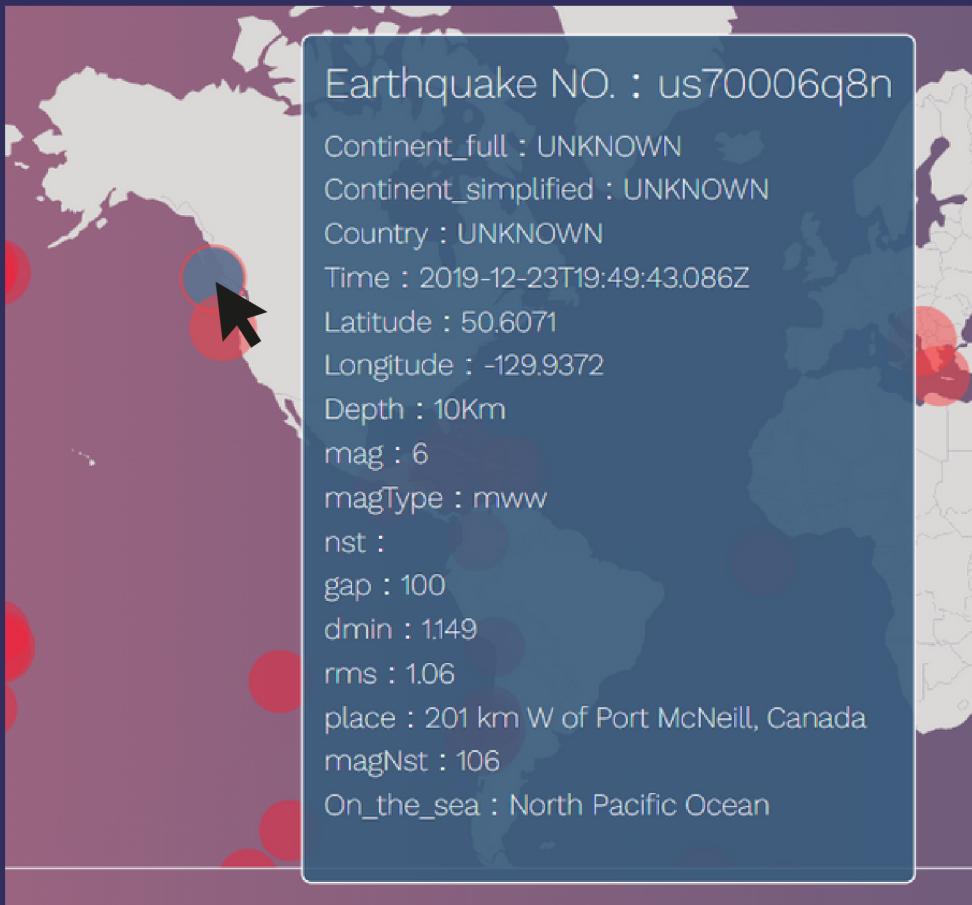
Try adjusting the filter.

Extending the range is recommended.



A notification will pop up if there's no earthquake that matches the condition.

Features Overview



If the user hovers over the dot, additional information will be presented.

Features Overview



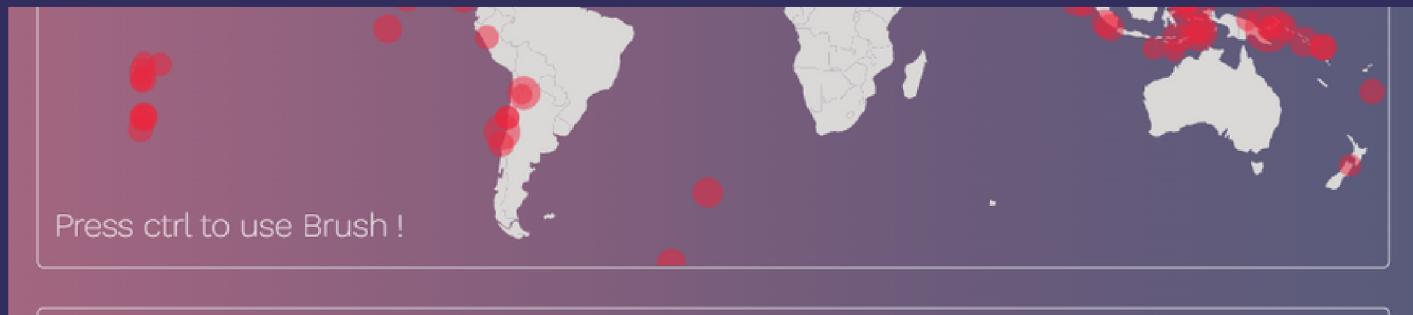
The map can be moved by dragging.

Features Overview



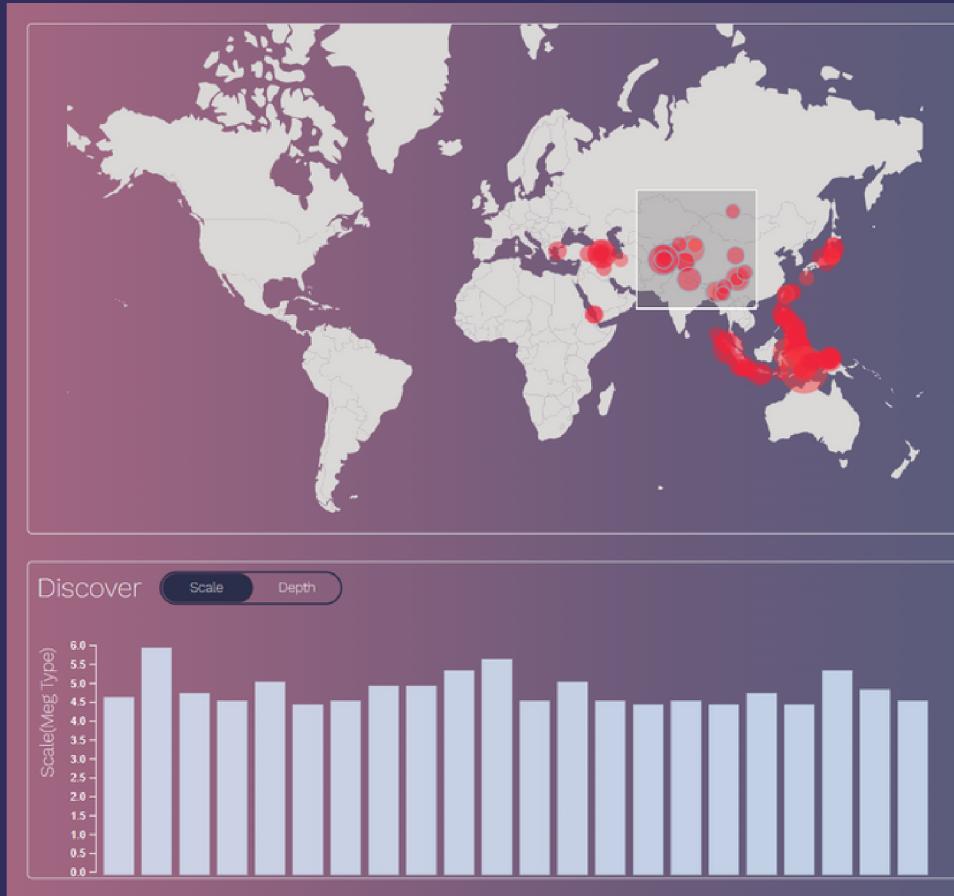
Pressing Ctrl allows the user to use the brush for selecting the area they're interested in.

Features Overview



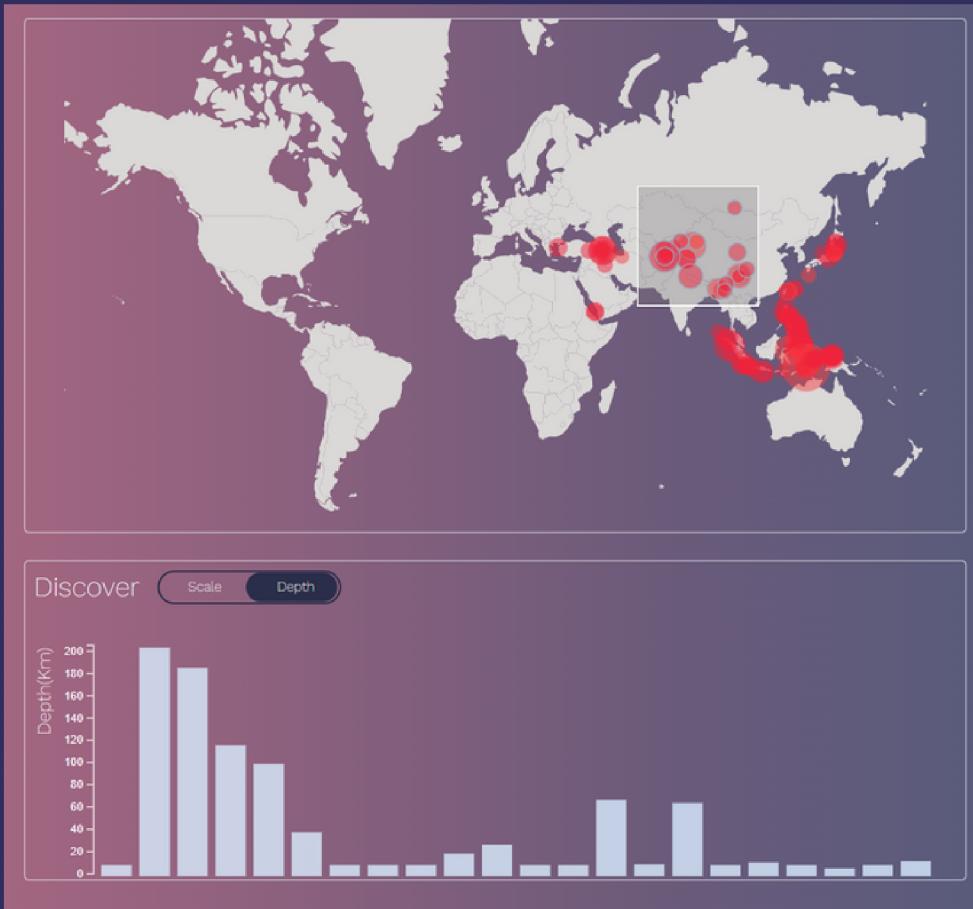
A notification will pop up if the user is dragging the map.
Indicating how to use the brush.

Features Overview



The Discover block will show the Scale or Depth information (which can be switched by pressing the button next to the "Discover" text) about the earthquakes in a bar chart after brushing, sorted by longitude.

Features Overview



The Discover block will show the Scale or Depth information (which can be switched by pressing the button next to the "Discover" text) about the earthquakes in a bar chart after brushing, sorted by longitude.

Features Overview



Scrolling allows user to zoom in or out.

Features Overview



Hovering on the bar or dot will highlight the corresponding earthquake in other charts. Additional information will also be presented.

Video Demo



Video Link
<https://youtu.be/3uoYPpKjlhs>

About us and Contribution



黃宛婷

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World map Designing
Video Editing
Fixing bugs



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User Interface Designing
Video recording
Fixing bugs



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Data preprocessing
Translation
Slides editing
Fixing bugs



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Filter Designing
Video script
Slides designing
Fixing bugs



REFERENCE

Relevant data

World Earthquake Data From 1906-2022

Source:

The dataset is from Kaggle, which contains 300,000 recorded locations, magnitudes, and depths, curated from the USGS website.

The background features abstract, organic shapes in shades of purple and white against a dark navy blue. These shapes resemble stylized liquid droplets or cells, with some having small white circular highlights.

**THE
END**