CDA 502 Database Management Systems

Google Data Analytics Project

Tsunami Data Analysis and Visualization

(Using Google Cloud Platform and Data Studio)

Ekamjot Kaur Khaira

Agenda

Inspiration for this Dataset

Indonesia Earthquake 2022- Taken more than 300 lives

Japan Tsunami 2011-Nearly 16000 people lost their life

One of the deadliest tsunamis which happened In 2004

Our Goal

We aim to:
Make an effort at a foundational level for more accurate and faster tsunami warnings by

- Finding the countries with highest magnitude of Tsunami.
- Finding the countries with highest death toll due to this catastrophe.
- Searching the nations which have borne most financial loss.
- Analysing the regions/ countries with least and highest houses destroyed.
- Understanding the regions with heaviest impact of Tsunami in the country which has suffered the most
- Analysing the patterns and frequency of Tsunamis in the different regions.

Overview of the dataset

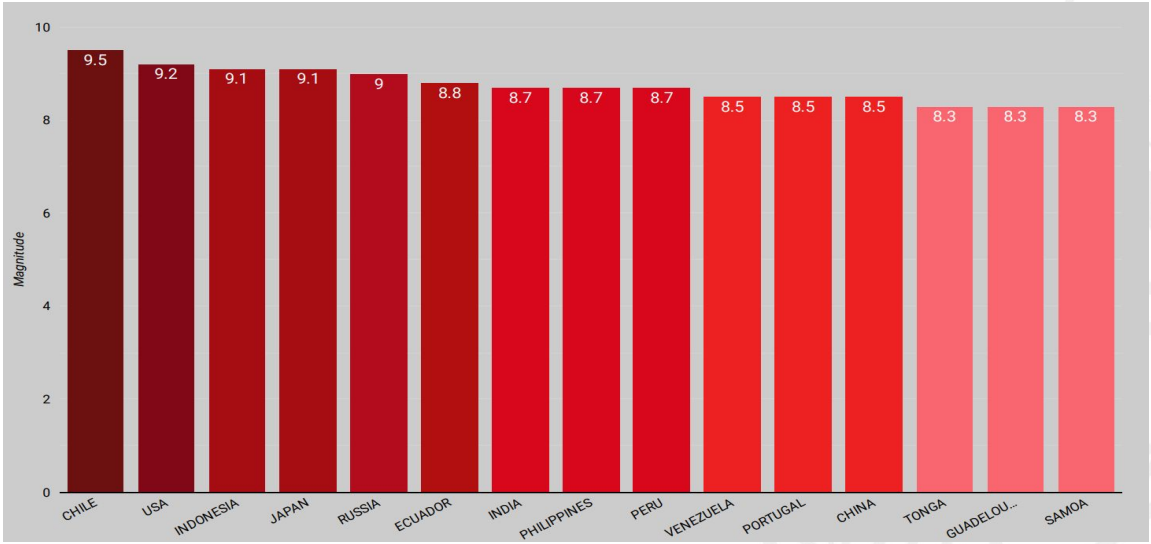
- Dataset is collected from The Global Historical Tsunami Database maintained by (NOAA) National Oceanic and Atmospheric Administration.
- Information of More than 2400 Tsunamis since 200 BC
- 2 Tables – Tsunami Source Event and Tsunami Run Ups
- Over 44 columns and 36 columns in each table.
- Null values have been omitted while querying the tables in order to get correct analyses.

Dataset Exploration

Features considered while doing the analysis

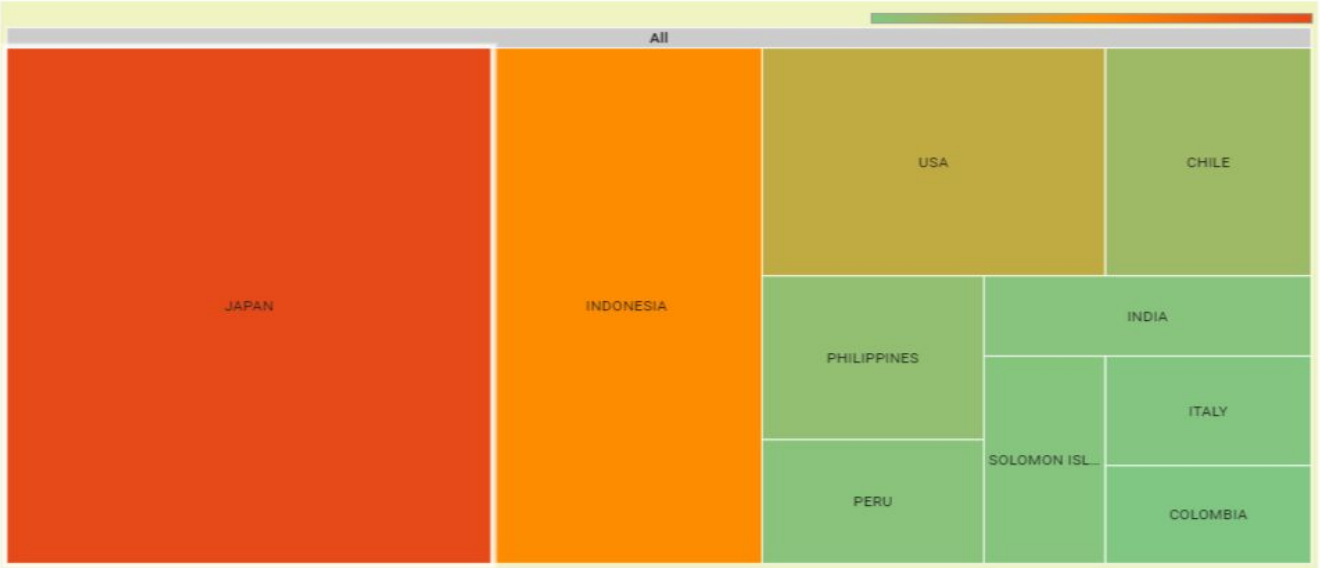
Year (Integer)	Latitude (Integer)
Location_name (String)	Longitude (Integer)
houses_damaged (Integer)	Timestamp (DateTime)
Country (String)	Soloviev (Float)
primary_magnitude (Integer)	State (String)
damage_millions_dollar (Integer)	Deaths (Integer)

Bar plot - countrywise magnitude



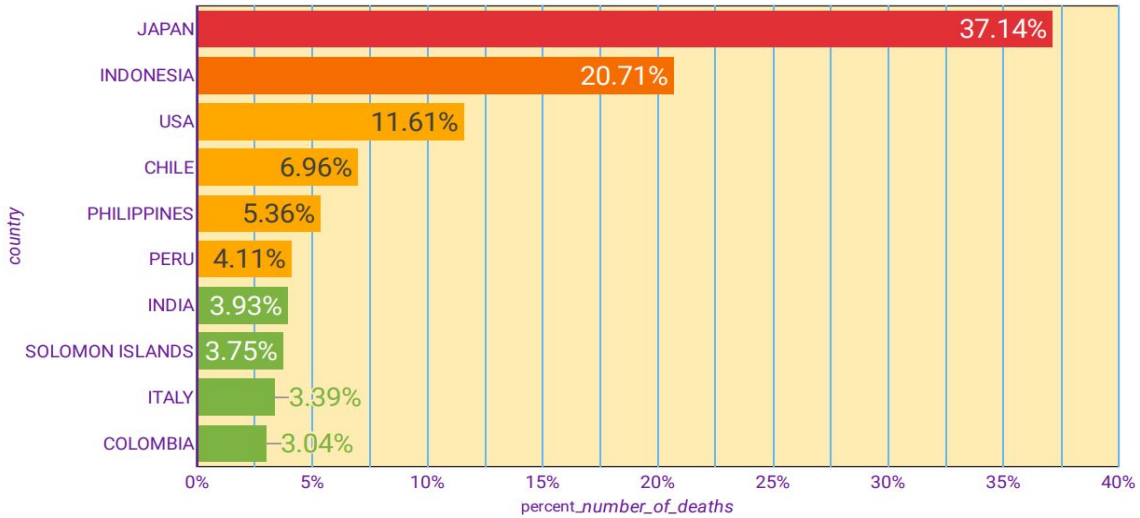
- Plotted highest magnitude of Tsunami witnessed in top 15 countries of the world
- In Chile, maximum magnitude of earthquake has been observed, followed by USA, Indonesia, Japan and so on

Tree Map - Number of deaths countrywise



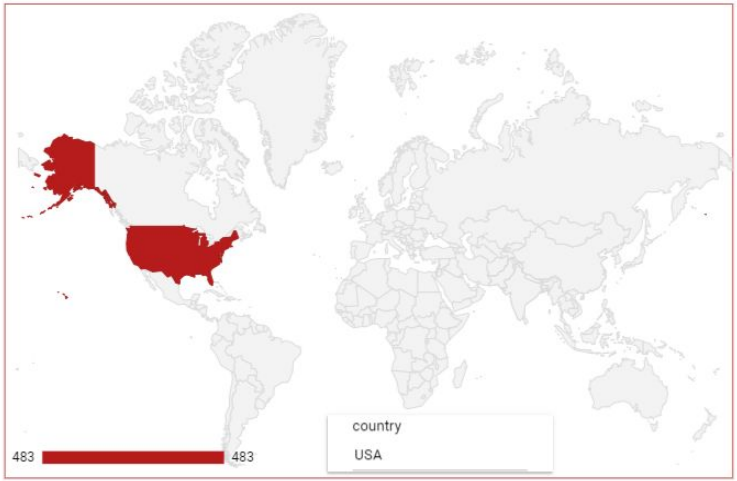
- It can be noticed that maximum human life loss happened in Japan when compared to all other countries. It is represented in Red
- The colour coding moves to green gradually representing countries with lesser casualties.

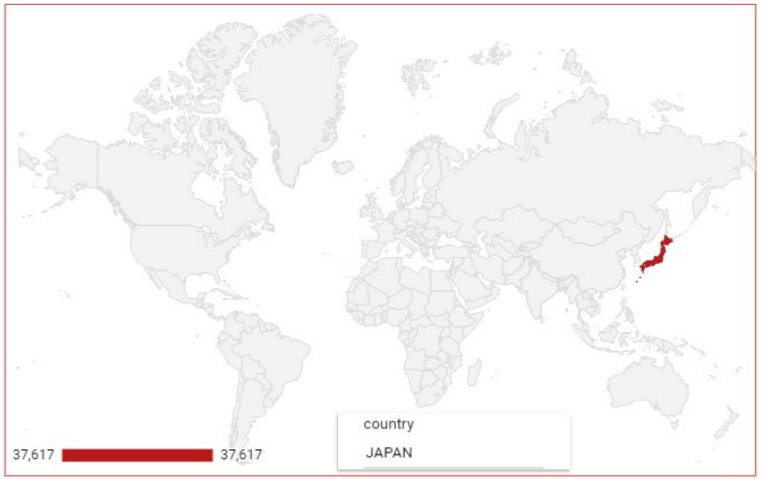
Horizontal racing bar chart - % number of deaths



- Similar to last slide, this chart represents the percentage of deaths happened due to Tsunami, country wise.
- It can be spectated that Japan has witnessed highest percentage(37.14%) of deaths of people as compared to other countries.

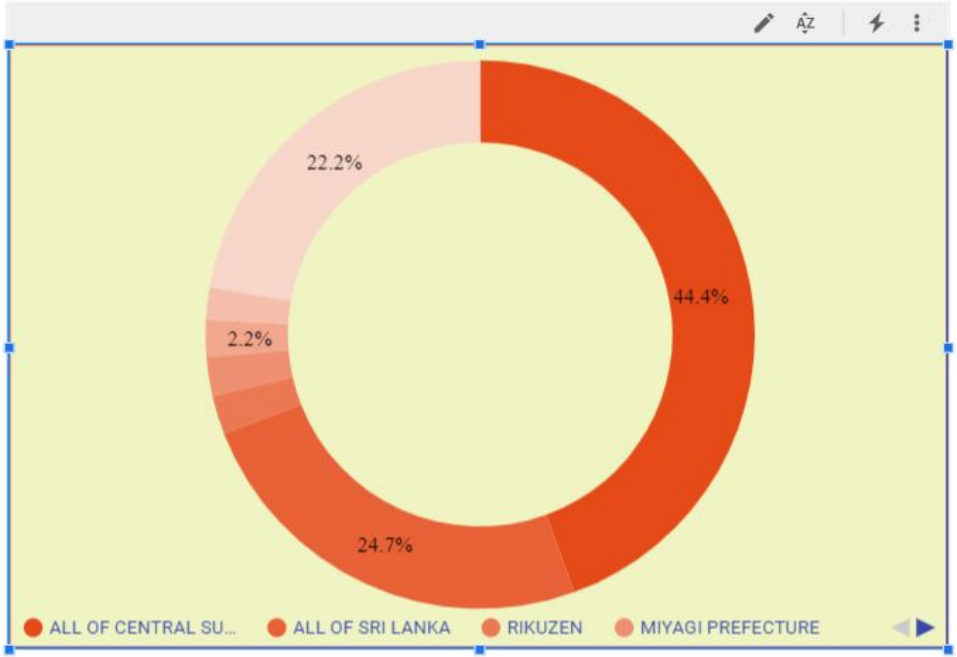
Number of houses damaged – Filled Map





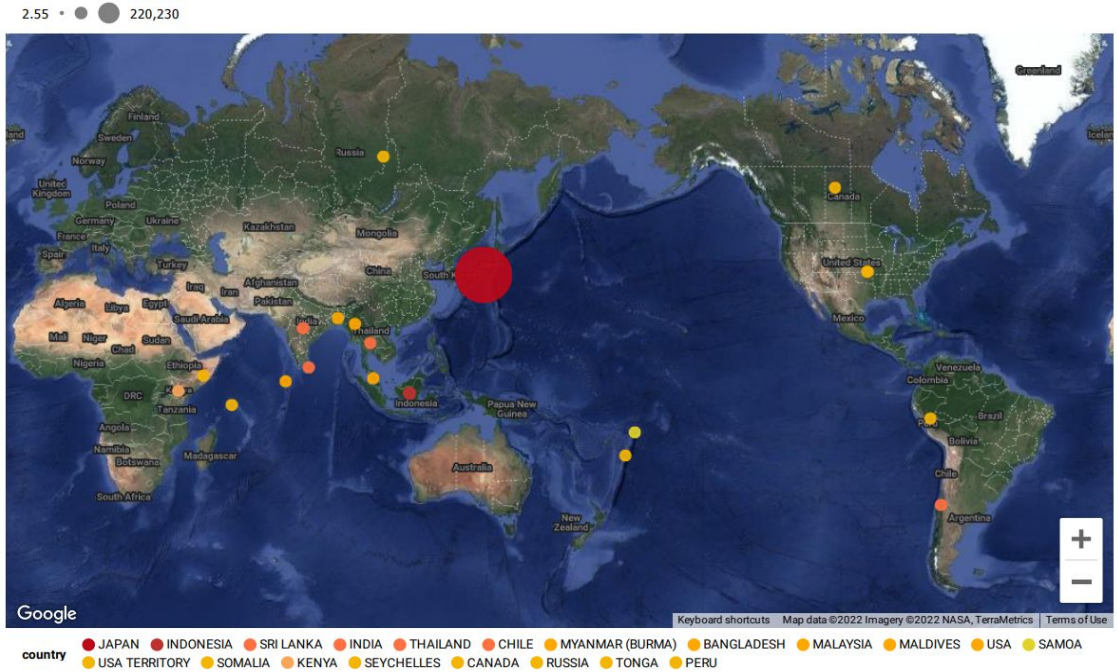
- USA has the least number of houses destroyed due to Tsunami.
- On the contrary, Japan has lost maximum real estate on the basis of the Dataset.

Donut Chart Indicating houses_damaged by location



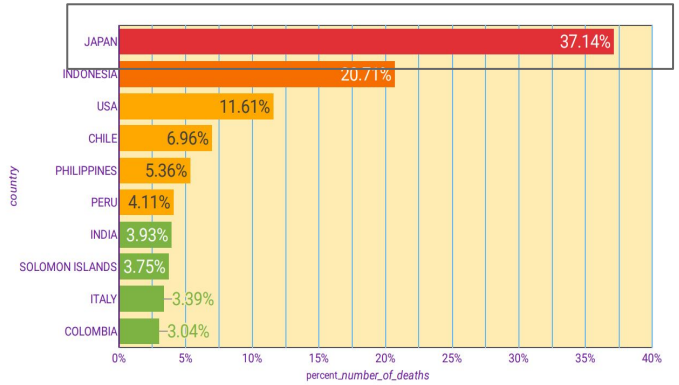
- This Chart represents percentage of house destroyed location wise globally.

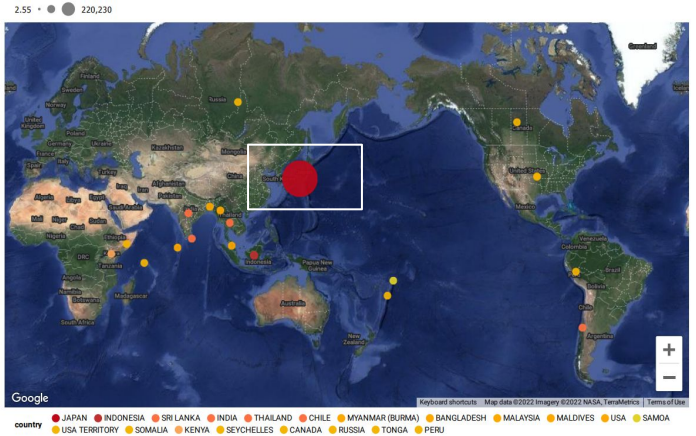
Loss of capital per country - Bubble chart



- It is conspicuous from this map that Japan witnessed the most loss financially due to this catastrophe.

Delving Deeper



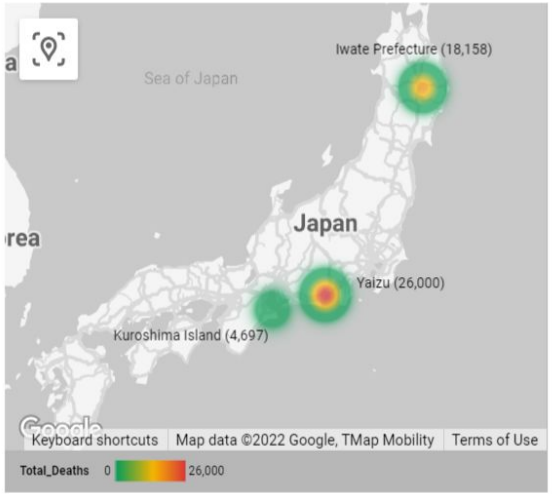


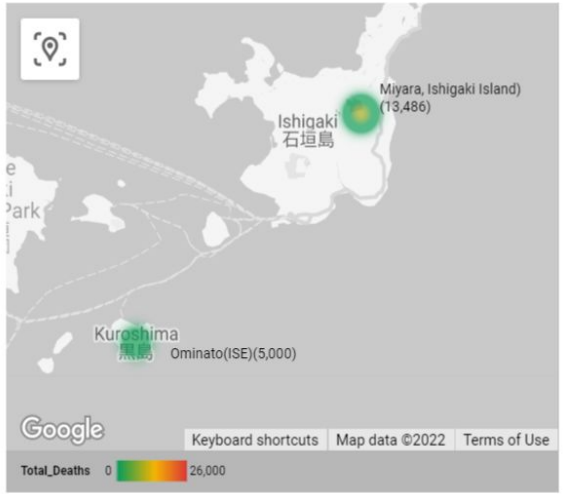
Further- Narrowing down our Approach to regions of Japan-

- Which suffered with highest number of casualties
- Which witnessed heaviest Loss in Economy

5 Regions with most Casualties in Japan- Table, Heatmap

location_name	Total_Deaths	Total_Tsunamis ▾
YAIZU	26,000	4
OMINATO (ISE)	5,000	3
IWATE PREFECTURE	18,220	2
KUROSHIMA ISLAND	4,697	1
MIYARA, ISHIGAKI ISLAND	13,486	1



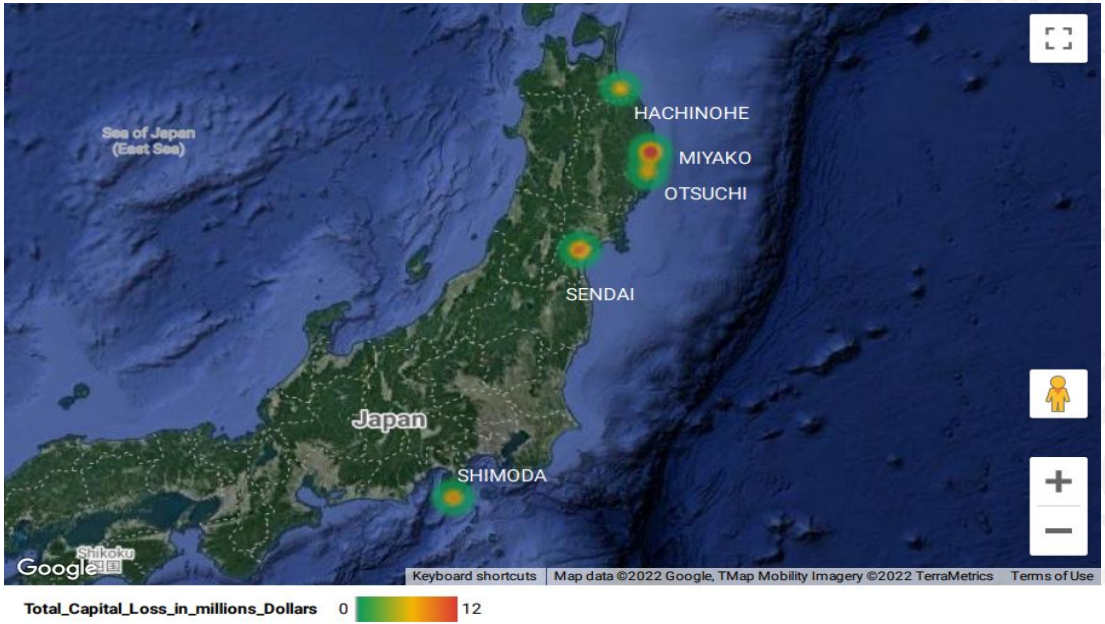


Since Yaizu has the highest death toll, delve deeper into pattern of Tsunami Occurrence in Yaizu-

Time_of_Tsunami
August 10, 2009 20:07:09
June 10, 1996 04:03:35
May 22, 1960 19:11:17
September 20, 1498 00:00:00

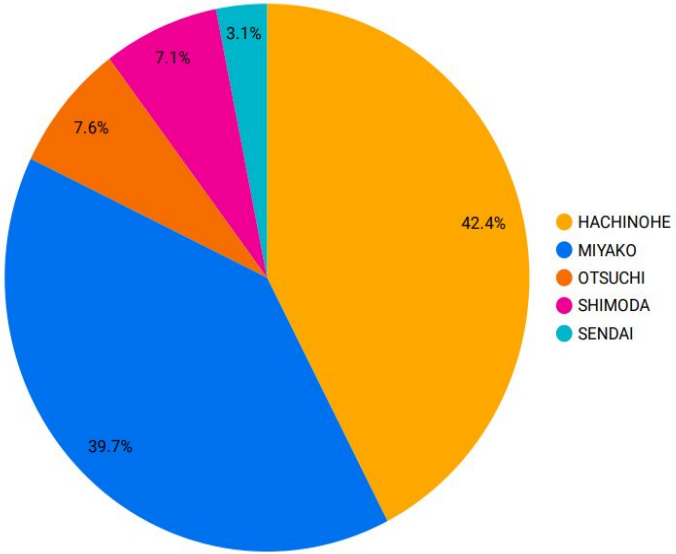
- Tsunami might occur after a period of 10-25 years in Yaizu
- Probability of occurrence of Tsunami in Spring and Summer is very likely

Map showing total capital loss in millions dollars- Heat Map



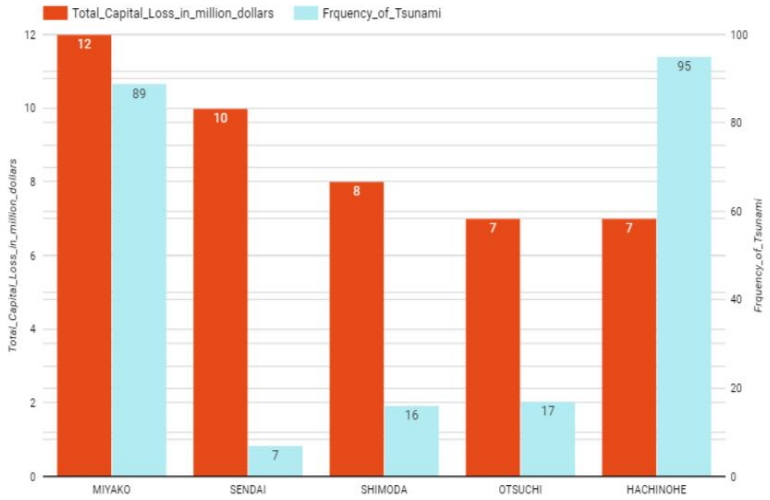
- Miyako is the region with highest impact on capital i.e. 12 Million Dollars

Frequency of Tsunamis in the regions bearing most loss of capital-Pie Chart



- It can be inferred that frequency of Tsunamis in Miyako and Hachinohe is a lot more than other regions of Japan.

Stacked Bar Chart showing total capital loss and frequency of Tsunamis- Stacked Bar Chart



- It is shocking to see the frequency of Tsunamis in Miyako is 89! Which has led to whopping loss of 12 Million Dollars.

Since Miyako has witnessed highest loss in capital, delve deeper into pattern of Tsunami Occurrence in Miyako-

location_name	Time_of_Tsunami
MIYAKO	February 16, 2015 23:06:27
MIYAKO	April 01, 2014 23:46:26
MIYAKO	March 11, 2011 05:46:24
MIYAKO	March 09, 2011 02:45:20
MIYAKO	January 13, 2007 04:23:21

-Tsunami occurs so frequently in Miyako that there's a chance of its occurrence every other year!

-Probability of occurrence of Tsunami in first quarter is very likely

-Infrastructure near sea shore should be built in such a way that it defends the impact

Future Scope and Conclusion

As we discussed for the inspiration part at the beginning we can expand the current work to various disasters happening around the world. We aim at developing a alert system where we can notify specific areas based upon the danger zones which they lie in. This would be really helpful for the government bodies as well as the citizens to be aware of. It also reduces the risk of loss of capital and the damage caused by this natural disasters.

Acknowledgement

We would like to express our profound gratitude to honourable **Professor Charles Border** for the invaluable guidance throughout the course of this subject. Thank You for all the motivation and enthusiastic encouragement in assisting in order to abide by the schedule of the course

References

- https://www.ngdc.noaa.gov/hazard/tsu_db.shtml
- https://datastudio.google.com/u/0/reporting/1rBC8woDruwE-f_gsheY7kwlx0BPtgzEn/page/c2P1
- https://datastudio.google.com/u/0/reporting/17Yq6eVJSSEM1mCtkB9lnZ2bjOROZBBU1/page/QzYj
- https://en.wikipedia.org/wiki/Tsunami
- https://www.cloudskillsboost.google/focuses/5538?parent=catalog