

Project Title: Natural Disasters and their Economic Impact

Project Summary: This project analyzes the relationship between natural disasters and economic indicators. The platform we intend to create will allow its users to explore how various types of disasters affect economic factors such as GDP, inflation, unemployment, education, and housing prices over time. Our web-based platform will allow users to visualize and compare economic impacts of disasters using data visualizations, historical trends, and predictive analytics. By leveraging real-world data sources, this platform will give policymakers, researchers, and other curious parties insight into the connection between natural disasters and economic trends, helping inform disaster preparedness and recovery strategies.

Project Description:

Natural disasters cause economic disruptions, yet there is no centralized platform to visualize their impact. Current resources like EM-DAT, FEMA, and World, provide data, but they require manual analysis.

With this application, users will be able to:

- Centralize disaster and economic data.
- Search for the economic impacts of specific natural disasters.
- Visualize trends over time.
- Provide a predictive model for forecasting future disaster impacts.
- Gain insights into the impacts of different policies implemented due to the natural disaster

Governments, businesses, and researchers should be able to use this application to find what historically has worked and what has not worked so as to mitigate the negative impacts of natural disasters.

Creative Component:

- Customized visuals using drop-down menus to demonstrate a specified natural disaster's effect on a specified economic indicator.
 - Dynamic Filtering: Users could compare two or more disasters, filtering by type and economic impacts
- Predictive Model: Using regression models, we will predict potential economic impacts based on historical data

- The model will predict the estimated GDP loss, changes in unemployment rates, and inflation fluctuations after a natural disaster based on historical data trends

Usefulness:

- Policy: Government agencies can use this platform to assess economic vulnerabilities and prepare strategies to combat them
- Researchers: Students can use this tool to get a greater understanding of disaster economics
- General Users: Provides a user-friendly way for people to explore the data and its implications

Similar Applications

- EM-DAT (Emergency Events Database): Provides information about disasters, but not necessarily economic impact
- OpenFEMA Data Sets: Has cost estimates, but doesn't provide any interactive visualization to support various economic indicators

Realness (Data Sources):

Specific disaster data - <https://www.ngdc.noaa.gov/hazard/>

- This site holds multiple datasets in TSV format for each disaster (Tsunamis, Earthquakes, Volcanoes, Wildfires, DMSP Special Projects (nighttime lights, fire detection, and power outages), Geothermal Energy, Storm Events (National Weather Service data))
- Each row in a natural disaster dataset represents an event of the disaster type and holds further data such as the following for the tsunami dataset: (Location Name, Maximum Water Height, Intensity, Deaths, Missing, Damage Description, Total Houses Destroyed, etc.)

Direct economic impacts - Link:

<https://www.drought.gov/data-maps-tools/billion-dollar-weather-and-climate-disasters>

- This CSV dataset contains the amount of damage caused by the following disasters—drought, flooding, freeze, severe storm, tropical cyclone, wildfire, and winter storm—for each U.S. territory (54 rows), quantified in millions of dollars in property damage.

Economic indicators -

<https://datatopics.worldbank.org/world-development-indicators/themes/economy.html>

- This site also contains multiple datasets related to various economic indicators. A key indicator of the impact of natural disasters on economic conditions is the annual growth of the agricultural industry.
- These datasets are provided in CSV format. The agricultural annual % growth dataset includes 69 columns (Country Name, Country Code, Indicator Name, Indicator Code, and years from 1960 to 2023) and 266 rows, representing 266 countries and territories.
- Other datasets on the site follow a similar format but track metrics such as GDP, manufacturing, services, exports, and imports.

Functionality of the Web Application:

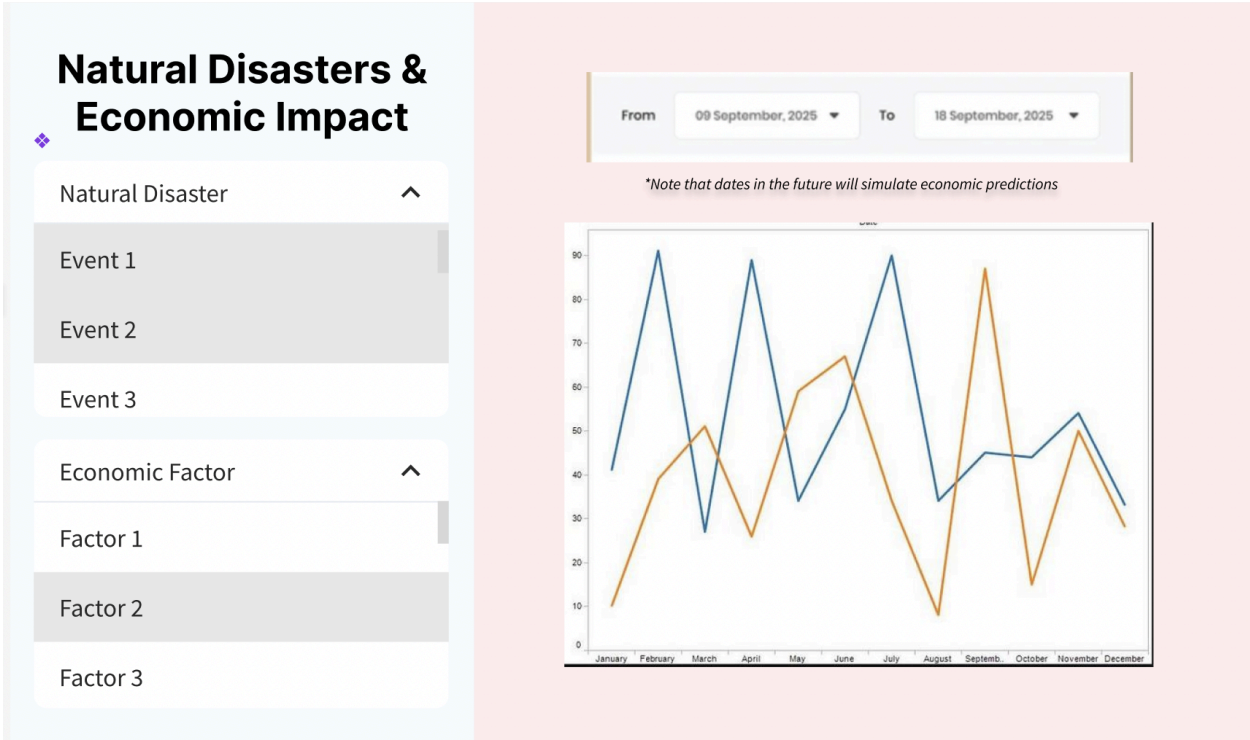
CRUD

- Create: Users can create custom reports by selecting filters
- Read: Users can view disaster impact data visualizations
- Update: Users can adjust filters to update visualization in real time
- Delete: Users can remove selected data from the visualization dashboard

User Flow:

- Home Page: Users can search by disaster type, year, or location.
- Data Visualization Page: Users select economic indicators to generate charts.
- Comparison Page: Users compare multiple disasters' economic effects side-by-side.
- Predictive Insights: Users input disaster details (type, magnitude) to predict economic impact.
- Export Report: Users download findings in PDF or CSV format.

A low-fidelity UI mockup



Project Work Distribution

| Task | Role |
|------------------------------------|---------------|
| Data Collections and Preprocessing | Smriti |
| Backend Development (APIs, DB) | Sneha, Aarul |
| Frontend Development | Sneha, Smriti |
| Data Visualization/ML Projections | Abhi, Aarul |
| Report Generation | Abhi |