Team Disaster

Disaster Relief Budgeting Model

Problem Space

- Applying Machine Learning methods to predict future disaster risk, resource allocation, and financial impact for an optimized disaster relief.
  - Identifying patterns based on features such as the type of disaster, the time, and the region where it happened to predict future disasters.
- Using this data we will assist in creating a better budget for public and privatized disaster relief organizations.
  - Resource Allocation
  - Financial Impact

The Data – EM-DAT Dataset

- Nearly 16,000 entries classifying disasters from 2000 to 2024
  - Classification -> Disaster group, Subgroup, Type, Subtype
  - Location -> Country, Region, Subregion
  - Financial impact -> Gov't Response, Aid Contribution, Total damage, Insured Damage
  - Loss of Life -> Total deaths, Number injured, Number homeless, Number affected
- Outside datasets further validate spending as a result of the disaster.

Approach

- Initial Methods
  - Time Series: forecast when and where a disaster may occur based on historical data.
  - Regression: Predict financial impact based on features such as the type of disaster, the region, and the number of people affected.
  - Neural Network: Make location based predictions and identify long-term dependencies between features.
  - Random-Forest and Decision Trees: Map out different features of past disasters to identify how many resources where needed.
  - Support Vector Machines: Identify which disasters are outliers, to plan for the need of resources more effectively.

Stretch Goals and Model Comparison

- Optimally allocating disaster relief aid to countries with lower GDP
  - Integrating global GDP datasets to determine which countries are most in need
- Comparing different organizations (public and private) to determine where contributions are best spent and how organizations are most effective.
- Examining climate change impacts on disaster frequency
- Models used in researched studies: clustering algorithms, Bayesian optimization, feature selection, dimensionality reduction, KNN, neural networks, random forests, etc.