Multimodal Data Analytics and Integration for Effective COVID-19, Pandemics and Compound Disaster Response and Management

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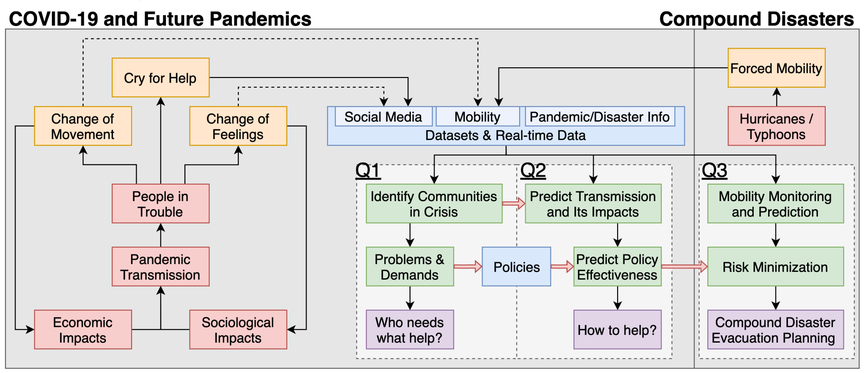
Community-Identified Problems



Intellectual Merit

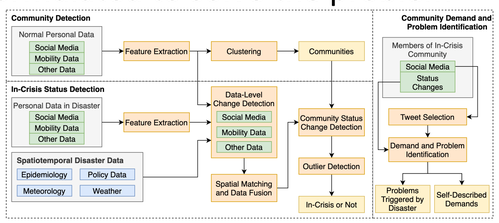
Build a first-of-its-kind framework to understand the pandemic and compound disaster situation for the preparation and recovery of communities, including the minority and low-income population.

1. automatically identify the communities in crisis during the emergency along with their problems and demands
2. collect, analyze, and visualize the mobility and social media data to understand the impacts of pandemic and support decision making for pandemic management
3. utilize the mobility and social media data for natural disaster preparation and planning in the context of COVID-19 and future pandemic

Project Activities

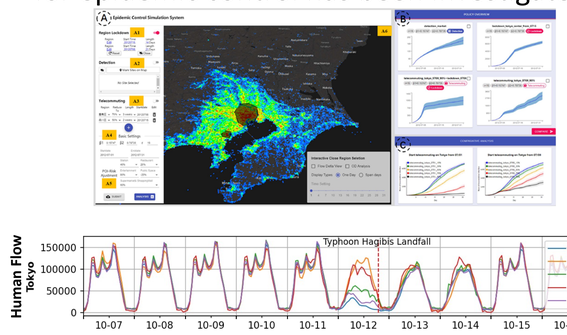
1. In-Crisis Community Detection

- Build data integration pipeline for combining multi-source and multi-modal data in a unified spatiotemporal resolution and dimension
- A three-stage approach has been proposed and formulated to solve the problem



2. Economic and Sociological Impact Prediction

- A data visualization platform for mobility data along with potential human mobility restrictions for epidemic control has been investigated



3. Compound Disaster Evacuation Planning

- A mobility prediction model under hurricane, pandemic, and compound disasters has been developed based on both past mobility and social media data
- A decision-making support system based on deep reinforcement learning has been investigated to facilitate evacuation planning in the context of compound disasters

4. Community Engagement

- Regular Zoom meetings between US and Japan teams
- Regular meetings with community partners
- Held workshops to involve broader communities

Immediate Broader Impacts

- **Florida and Greater Tokyo Area Communities**: benefiting the government agencies and the public in the regions by assisting the decision making and policy design for disaster management with the produced tools and results
- **Machine Learning (ML) Techniques:** evaluating current ML methods for disaster management and expanding its boundaries

Lasting Broader Impacts

- **Benefiting Broader Communities**: applying and transferring techniques developed in this project to other states, regions, and countries
- **Societal and Economic Impacts:** utilizing the developed techniques to prevent unexpected losses by avoiding inappropriate policies
- **International Collaboration**: fostering the collaborations between US and Japan teams

Next Steps

1. Develop techniques to identify in-crisis communities
2. investigate the impacts of COVID-19 on economics and public sentiment using data-driven approaches
3. Continue our research to develop a decision-making support system for evacuation planning
4. Consider data imbalance for vulnerable communities
5. Disseminate research findings to the communities and stakeholders via various channels

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