

## Next Generation Urban Emergency Management: When Human Emergency Mobility Modeling Meets Big Data

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**(1) Motivation:** The frequency and intensity of natural disasters has significantly increased over past decades and this trend is predicted to continue. Facing these possible and unexpected disasters, urban emergency management has become a big problem for governments across the world. To plan effective humanitarian relief, transportation scheduling, disaster management and long-term societal reconstruction, modeling, understanding and accurately predicting human *emergency behavior and mobility* will play a most important role for the next generation of urban emergency management. This research aims to understand what basic laws govern human behavior and mobility following emergency events by mining big and heterogeneous data, to develop deep and powerful models for human emergency mobility prediction and simulation.

**(2) Approach:** In this study, we collect big and heterogeneous data, and develop several deep and powerful models (Song et al., 2015, 2014, 2013) for human emergency mobility prediction and simulation, and implement the key modules of intelligent system for next-generation urban emergency management.

**(3) Significance:** It is well known that hurricanes, earthquakes, and other natural disasters cause immense physical destruction, loss of life and property around the world. This research is of great significance in the frontier big data application field, and has the potential for enormous societal and economic impacts by minimizing the economic loss, transportation disorders, and business closures after major disasters or emergency events (e.g. traffic accident, fire, extreme weather, etc.).

### 4) Novelty and characteristics:

- Big Data and heterogeneous data source:** Our research will be built on big and heterogeneous data sources, e.g. GPS trajectory data (millions of users), natural disaster data, urban traffic accident data, CDR data, news reporting data, emergency events data, etc. To the best of our knowledge, there is no existing research has been carried out to understand human mobility at such kind of data size.

- Deep models of human behavior and mobility:** Our developed models will discover deep knowledge of human emergency behavior and mobility. To the best of our knowledge, this is the first attempt that applies deep learning approaches

for human mobility modeling. Furthermore, the predictive or simulation models are general models that can be applied to all people, in all countries and for all disasters.

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### 6) Reference:

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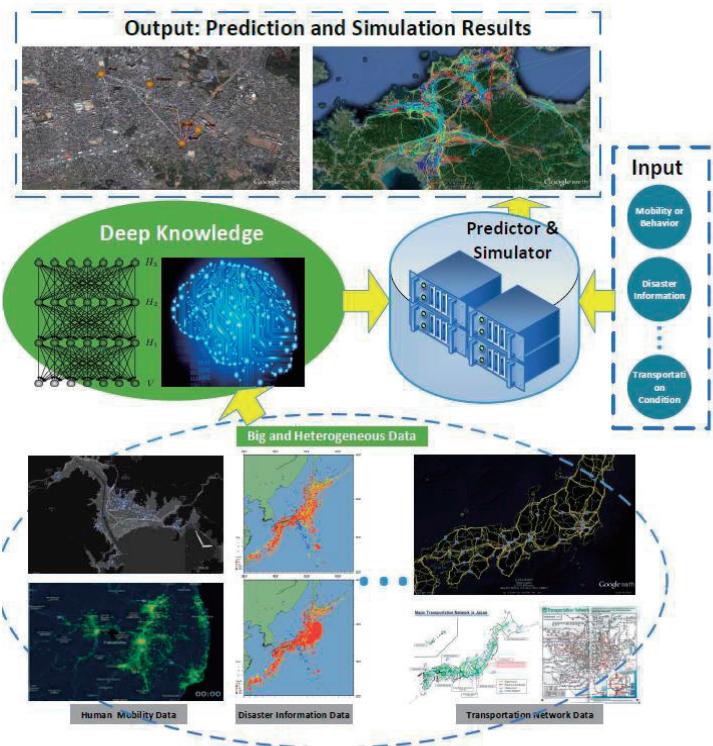


Figure 1: Deep Models and Big Data for Human Mobility Understanding