CAREER: Data-Driven Models of Human Mobility and Resilience for Decision Making

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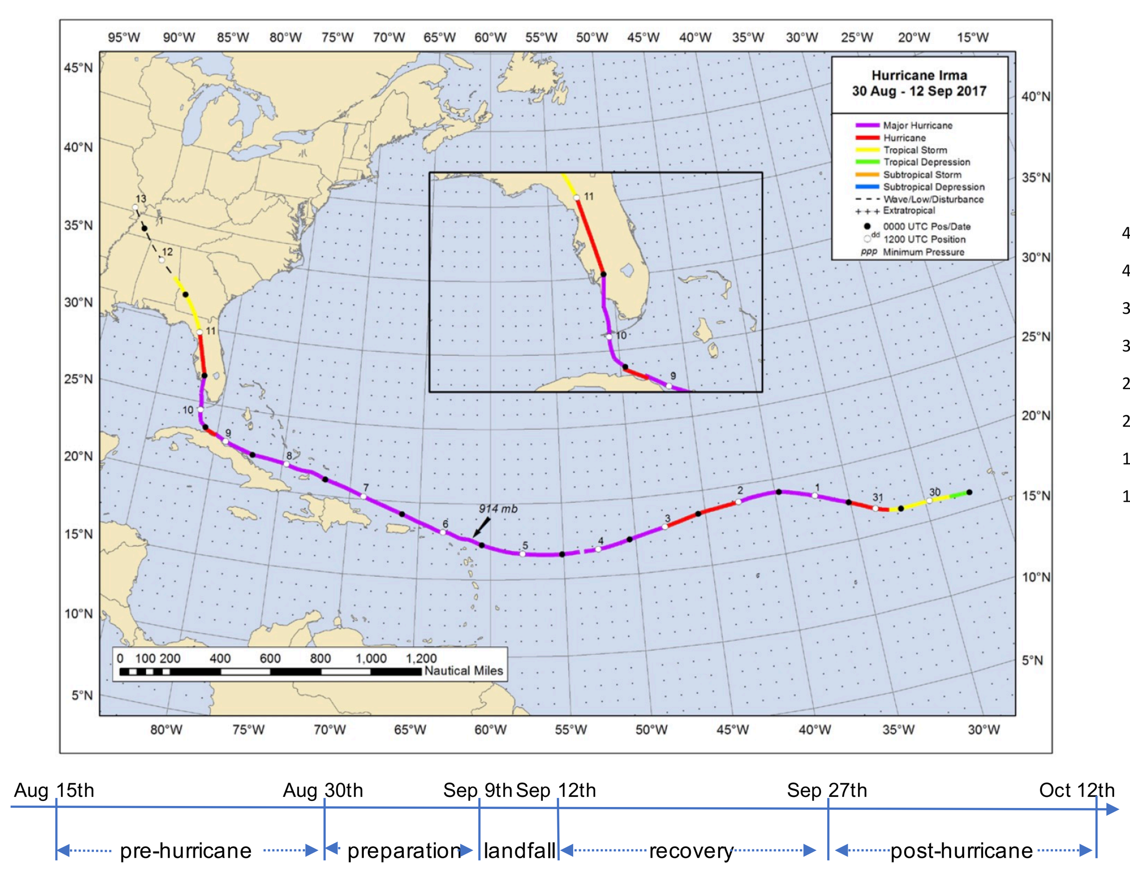
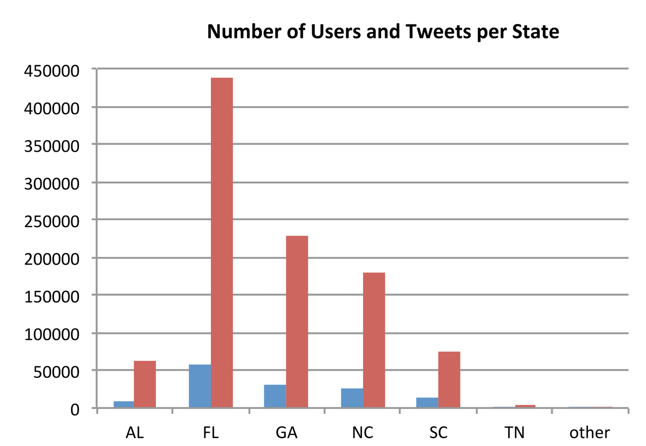
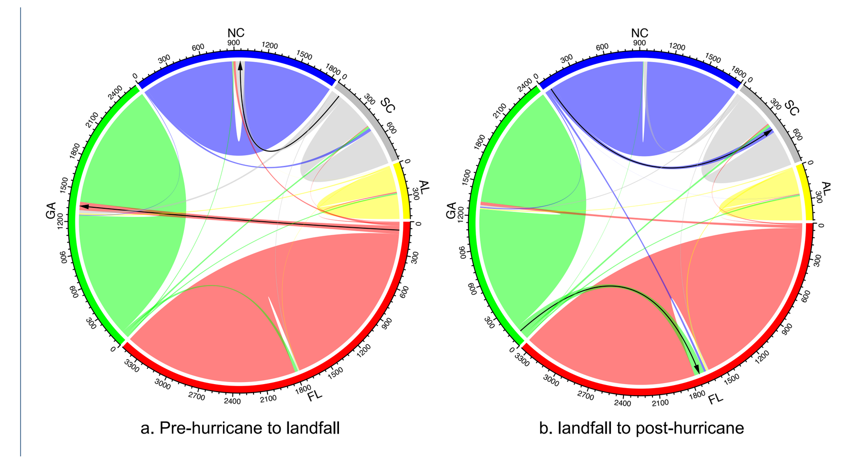
USING TWITTER DATA TO MODEL AND PREDICT EVACUATION BEHAVIORS DURING HURRICANES: THE CASE FOR IRMA

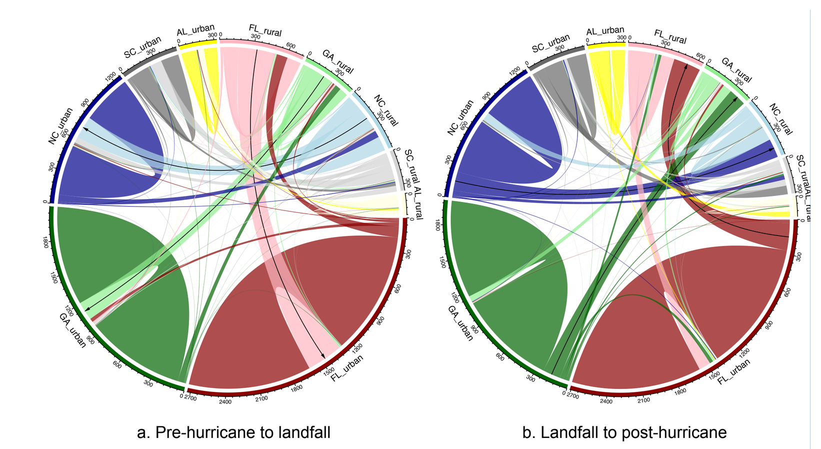
1. HURRICANE PHASES AND TWITTER POPULATION

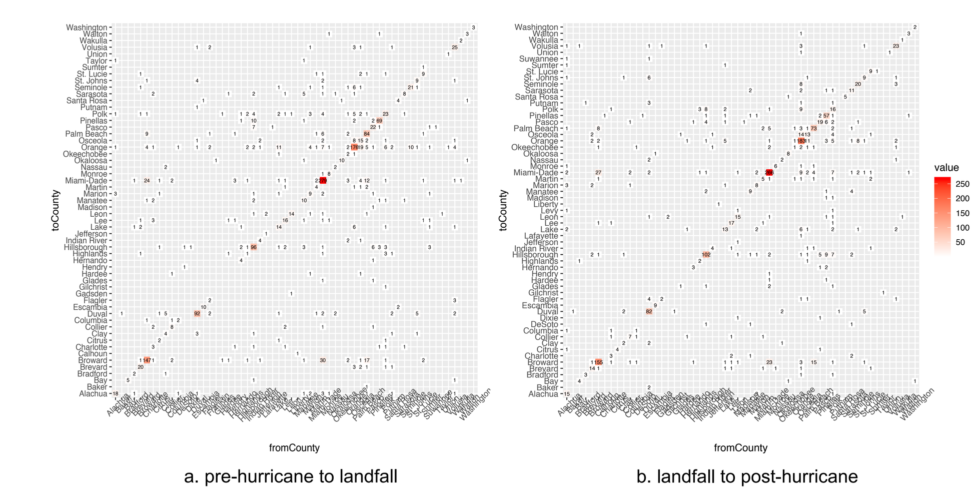




2. EVACUATION FLOWS AT STATE AND COUNTY LEVEL

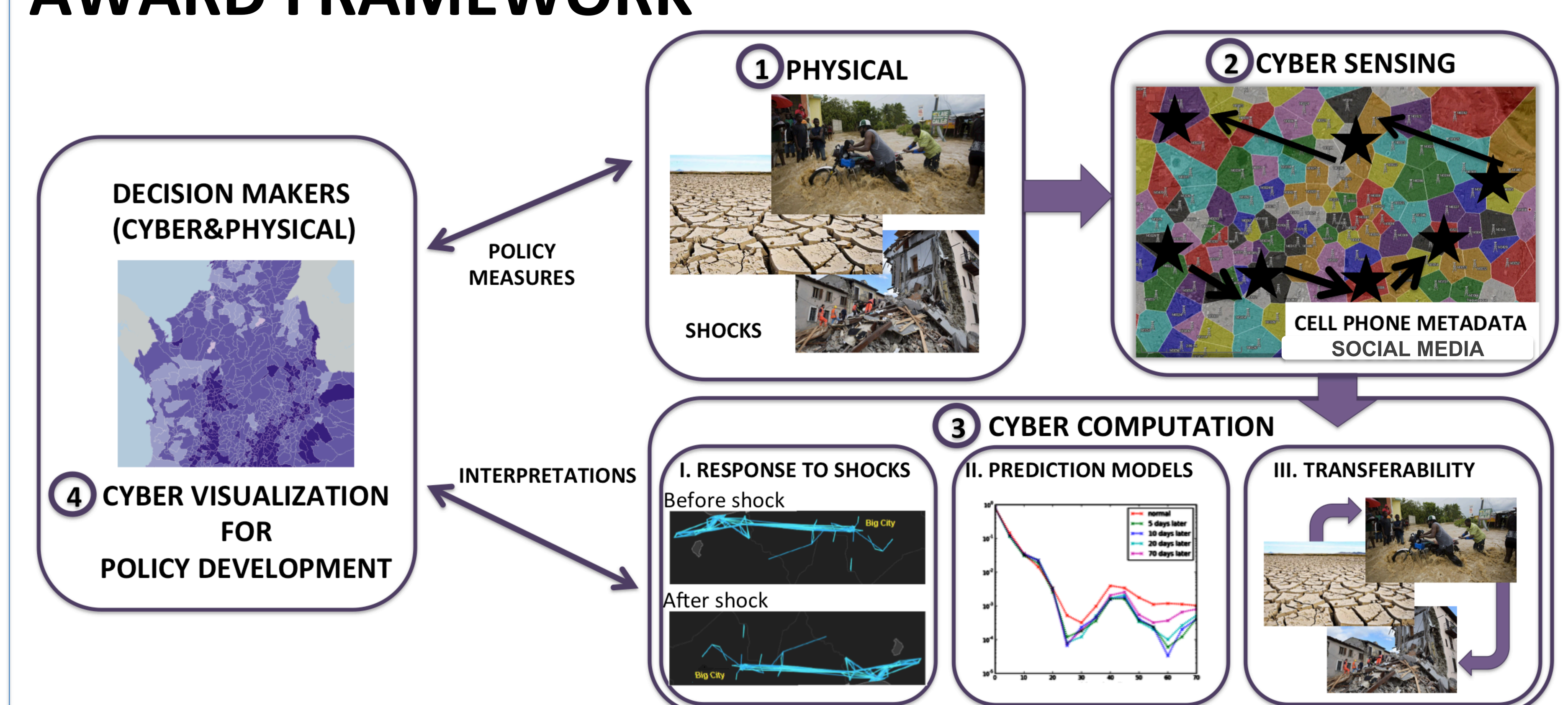






-Most people stay in state
-Rural to urban migrations to seek refuge
-In-county displacements are predominant

AWARD FRAMEWORK



AWARD OBJECTIVES

I. Context-aware Human Response to Shocks:
- Mobility Patterns and Resilience

II. Prediction of Human Behaviors during Shocks:
- Human Mobility and Resilience Prediction

III. Transferability of Behavioral Patterns:
- Across types of shocks, data, space, time

3. PREDICTION OF EVACUATION FLOWS

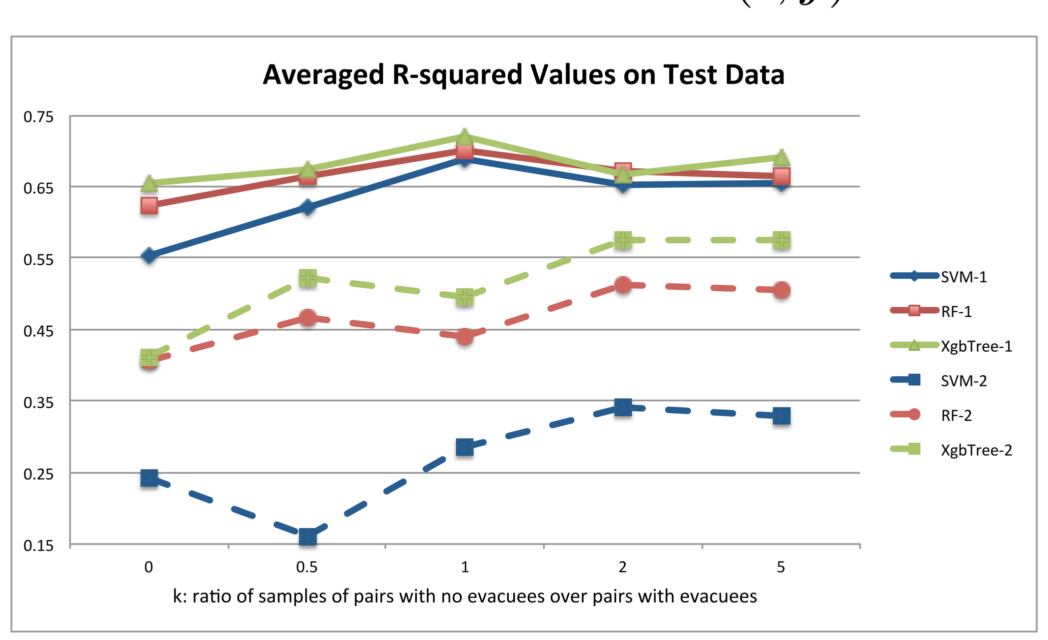
3.1 FEATURES (Ui):

A. Meteorological Factors
B. Flooding Information
C. Census (population,poverty)
D. Evacuation Policy
E. FEMA Assistance Data

$$U_i = \{u_{i,1}, u_{i,2}, \cdots, u_{i,N}\}$$

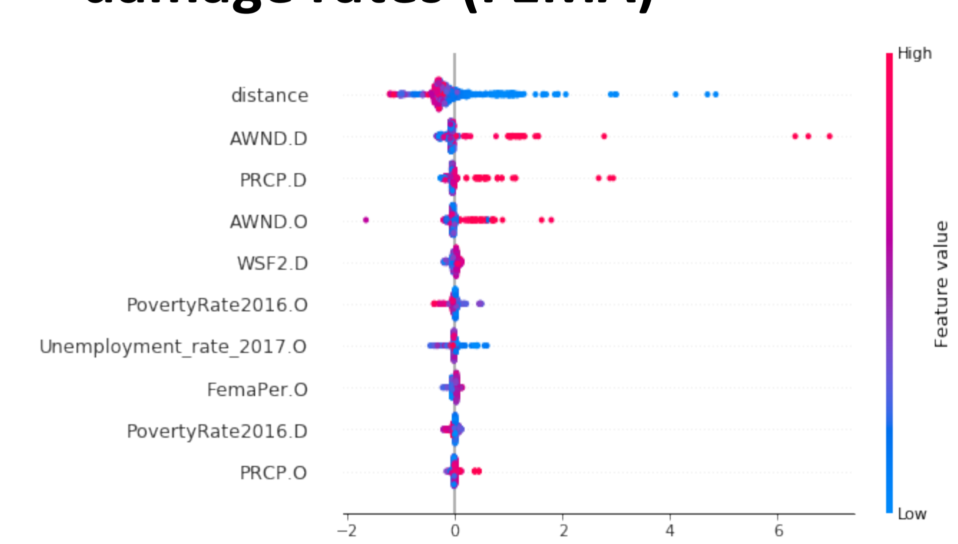
3.2 MACHINE LEARNING MODEL:

-ML models are used to predict evacuation flows from origin to destination county using Ui features
- Features are modeled joint for each O-D pair (Wi) $w_k = \frac{U_{i,k} \cdot U_{j,k}}{dist^2(i,j)}$



3.3 RESULTS:

--Filtering out zero-flow pairs does not improve results in unnormalized approach
-XGBoost offers best results (72%)
-Best predictors: distance, socioeconomic features and damage rates (FEMA)



4. BROADER IMPACTS

- Workshop with UN partners on the use of social media to model and predict evacuation flows

URBAN COMPUTING LAB

Award ID#: 1750102