ITU GeoAI Challenge

Location Mention Recognition from Social Media Crisis-related Text

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Organizers

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Social Sensing Data for Emergency Response

Social media informative posts during disasters

Name
@username

Saidapet is scary. The Bridge is flooding & it's bringing cylinders, fridges etc #ChennaiFloods #Chennairains

9:21 AM · Dec 2, 2015 · Twitter for Android

Bridge flooding

Name
@username

@ChennaiFloods: Ola opens temporary homes for residents - Times of India bit.ly/1NuIxt9

5:31 PM · Dec 4, 2015 · Buffer

Shelters available

Name
@username

these roads are closed for traffic. Pls pas
1.Sholinganallur to Siruseri closed
2.Thuraipakkam–AKDR Golf course to Toll Gate Closed

7:49 PM · Dec 1, 2015 · Twitter for Android

Closed roads

Name
@username

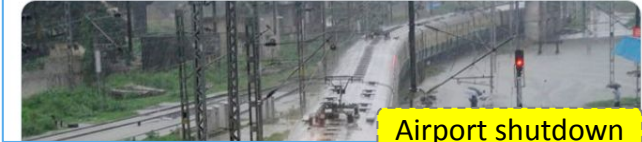Dear Friends, Pl help by sending boat to 54 and 58, Vivekananda Nagar Street, Nesapakkm, Chennai...

8:59 AM · Dec 2, 2015 · Twitter Web Client

Help request

Name
@username

Heavy rains continue to batter Chennai; Airport shut and trains diverted.

Airport shutdown

Name
@username

#ChennaiFloods
Guys I don't know if ts mi8 help.But Im willing 2 recharge ur mobile no if req. Pls msg back... my no 9952343236 -Karthi

3:03 PM · Dec 3, 2015 · Twitter for An...

Volunteering response

Social media informative posts during disasters

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Volunteering response

What Locations are Needed?

Coarse-grained

Countries, states, cities, counties, ... etc.

High-level Overview

Situational-awareness at country, state, city level

Relief

Deploy rescue activities at country, state, ..., level

Impact

Assessing impact during and after the disaster event
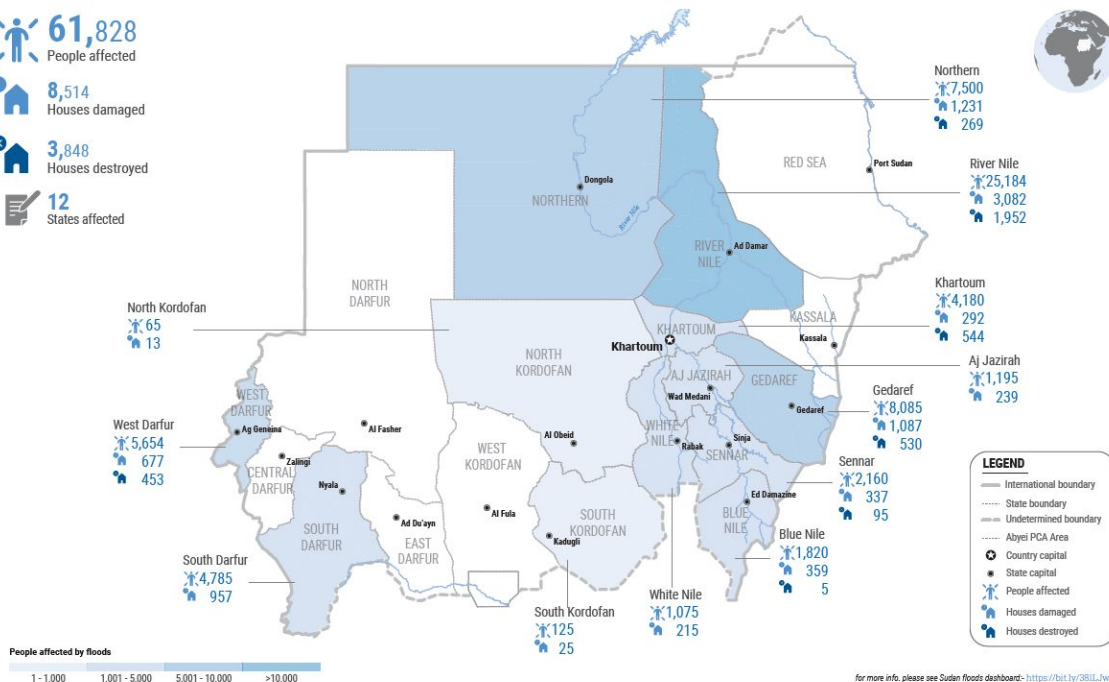
What Locations are Needed?

Fine-grained
streets, buildings, natural & human-made POI, ...

Detailed reports
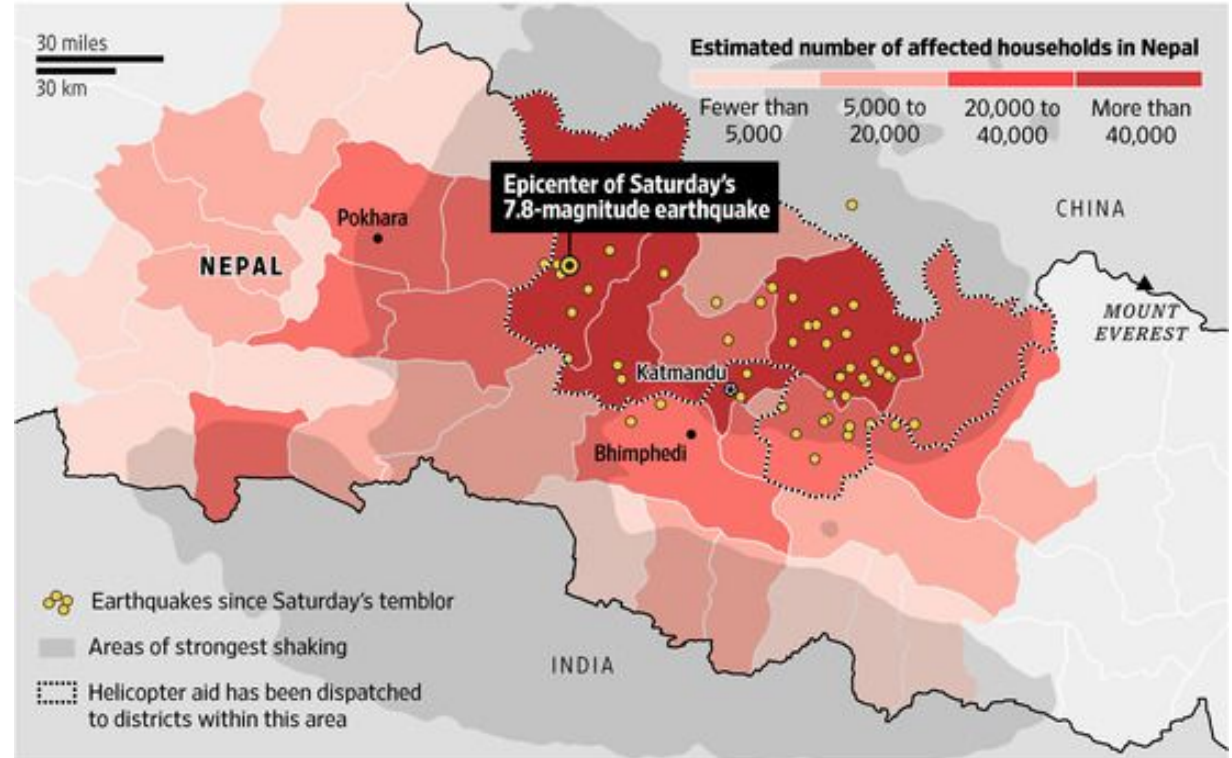Situational-awareness at low-level granularity

Relief
Deploy rescue activities at incident level

Resources
For locating incidents, resources, casualties, etc.

Damaged roads, landslides and heavy rains are hindering recovery efforts in Nepal after Saturday's earthquake, despite an influx of international aid. Many of the affected areas are rural and only accessible by helicopter.

30 miles
30 km

Estimated number of affected households in Nepal

| Fewer than 5,000 | 5,000 to 20,000 | 20,000 to 40,000 | More than 40,000 |

Epicenter of Saturday's 7.8-magnitude earthquake

Pokhara

NEPAL

CHINA

MOUNT EVEREST

Katmandu

Bhimphedi

INDIA

Earthquakes since Saturday's temblor
Areas of strongest shaking
Helicopter aid has been dispatched to districts within this area

Sources: USGS (earthquakes); U.N. OCHA (households); Nepal's Home Ministry (aid)

THE WALL STREET JOURNAL.

Problem Statement

Location Mention Recognition (LMR)

Disaster-related Twitter stream

@MarinHumane is helping w/animal rescue in Butte County. @marinij @adrianrrodri marinij.com/2018/11/20/mar...
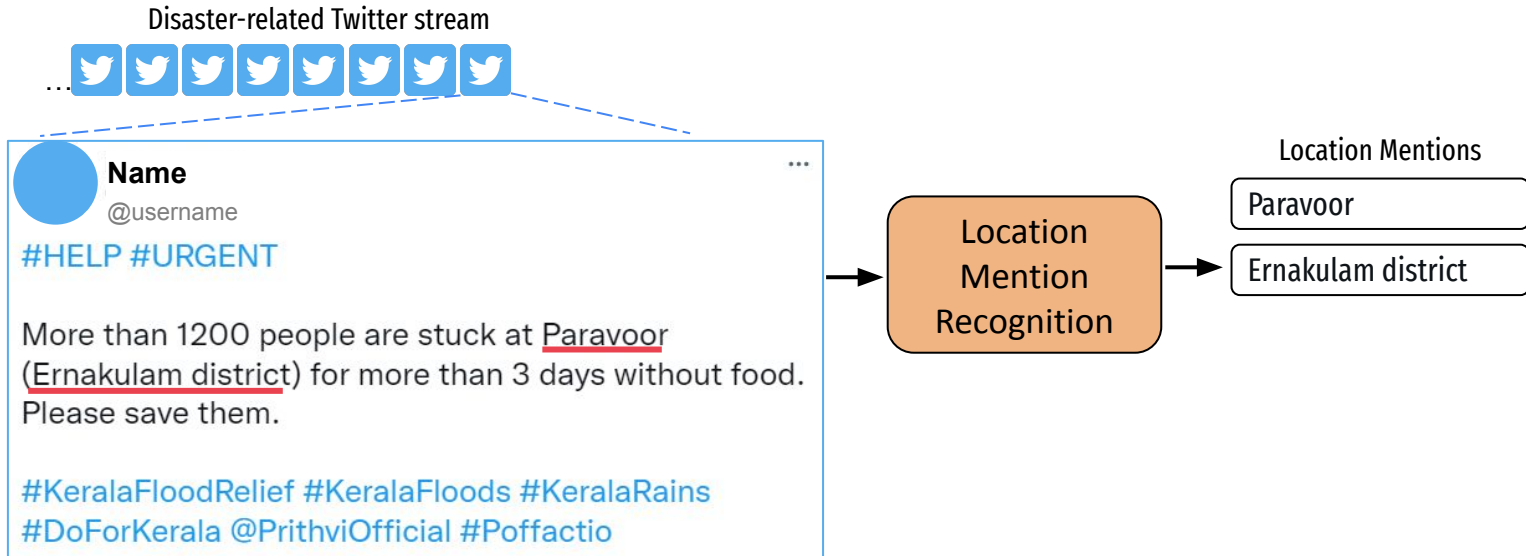
Name
@username

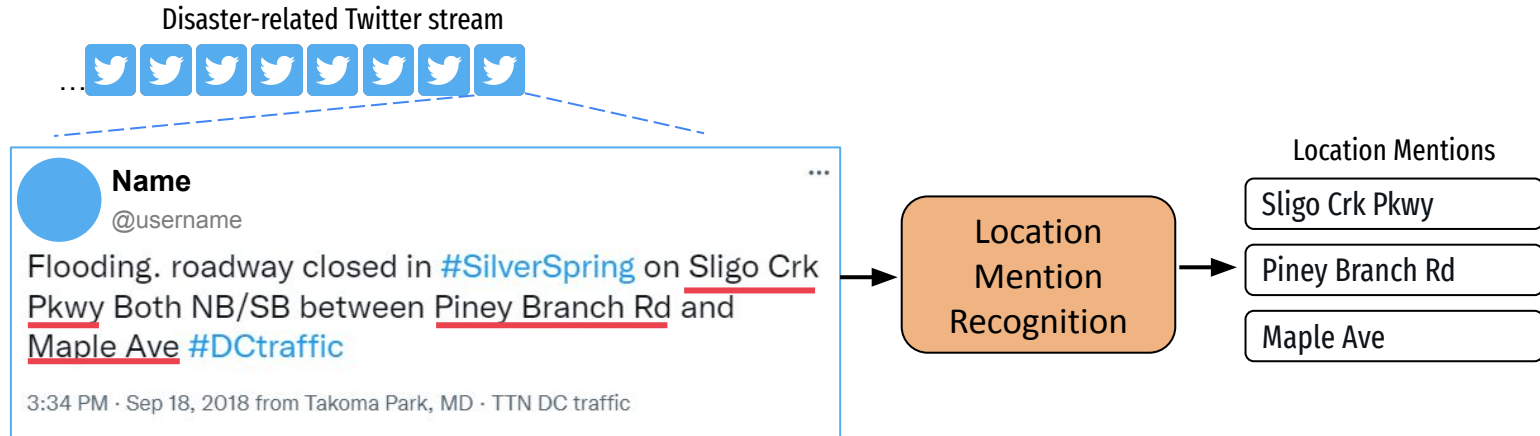7:07 PM · Nov 21, 2018 · Twitter Web Client

Location
Mention
Recognition

Location Mentions

Butte County

Location Mention Recognition (LMR)

Disaster-related Twitter stream

...

Name
@username

#HELP #URGENT

More than 1200 people are stuck at Paravoor (Ernakulam district) for more than 3 days without food. Please save them.

#KeralaFloodRelief #KeralaFloods #KeralaRains #DoForKerala @PrithviOfficial #Poffactio

Location Mention Recognition

Location Mentions

Paravoor

Ernakulam district

Location Mention Recognition (LMR)

Disaster-related Twitter stream

Name
@username

Flooding. roadway closed in #SilverSpring on Sligo Crk Pkwy Both NB/SB between Piney Branch Rd and Maple Ave #DCtraffic

3:34 PM · Sep 18, 2018 from Takoma Park, MD · TTN DC traffic

Location Mention Recognition

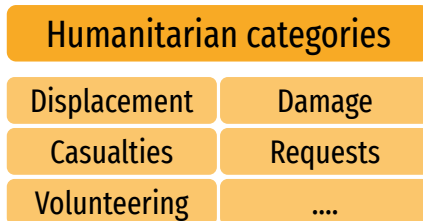Location Mentions

Sligo Crk Pkwy

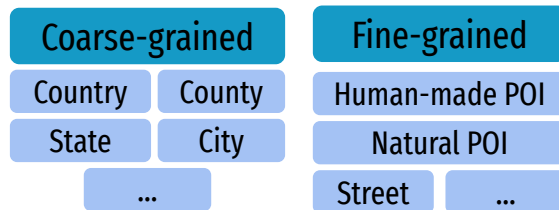Piney Branch Rd

Maple Ave

Evaluation

Dataset: IDRISI-R

Data collection

We need a dataset labeled
for Humanitarian categories:
→ humAID dataset

Annotation Types

1. Location span in tweet text
2. Location types

Dataset Annotation

- Human-labeled → appen
- 3+ annotators for reliability

Humanitarian categories

Displacement	Damage
Casualties	Requests
Volunteering	….

Coarse-grained

Country	County
State	City
…	

Fine-grained

Human-made POI
Natural POI
Street …

Download

github.com/rsuwaileh/IDRISI

Dataset: IDRISI-R

Large in size: 20,514 *English* tweets collected during different disaster events happened 2016-2019

Contains 19 disaster events: 6 hurricanes, 5 earthquakes, 4 floods, 3 wildfires, and 1 cyclone events.

Information types: caution and advice, displacement, damage, casualties, missing or found people, requests, rescue volunteering or donation effort

Download
github.com/rsuwaileh/IDRISI/

Happened in 14+ countries: United States, Italy, Canada, Ecuador, Mexico, New Zealand, Sri Lanka, India, Mozambique, Malawi, …

21,879 location mentions: Country, State, Province, District, County, City, Neighborhood, street, Natural POI, human-made POI, Island & Others

Standard splits: 80% training 10% development 20% test Per disaster event

Evaluation Measures

Precision (P)

$$\frac{TP}{TP + FP}$$

True Positives (Hits)

False Positives (false alarms)

Recall (R)

$$\frac{TP}{TP + FN}$$

True Negatives (correct rejection)

F1 score

$$\frac{2 \cdot P \cdot R}{P + R}$$

Download eval script

! Eval measures are computed per entity per tweet per event.

Baselines: BERT-based

Disaster-related Twitter stream

...

> **Name**
> @username
>
> Flooding. roadway closed in #SilverSpring on Sligo Crk Pkwy Both NB/SB between Piney Branch Rd and Maple Ave #DCtraffic
>
> 3:34 PM · Sep 18, 2018 from Takoma Park, MD · TTN DC traffic

Location Mentions

Sligo Crk Pkwy

Piney Branch Rd

Maple Ave

Download LMR models

Suwaileh, R., Imran, M., Elsayed, T., & Sajjad, H. (2022) When a Disaster Happens, We Are Ready: Location Mention Recognition from Crisis Tweets. International Journal of Disaster Risk Reduction (IJDRR).

Suwaileh, R., Imran, M., Elsayed, T., & Sajjad, H. (2020). Are We Ready for this Disaster? Towards Location Mention Recognition from Crisis Tweets. In Proceedings of the 28th International Conference on Computational Linguistics (pp. 6252-6263).
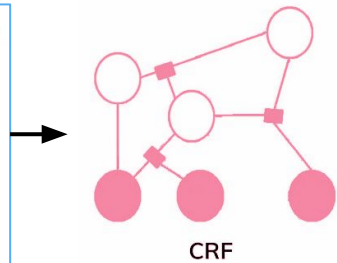
Baselines: CRFs-based

Disaster-related Twitter stream

Name
@username

Flooding. roadway closed in #SilverSpring on Sligo Crk Pkwy Both NB/SB between Piney Branch Rd and Maple Ave #DCtraffic
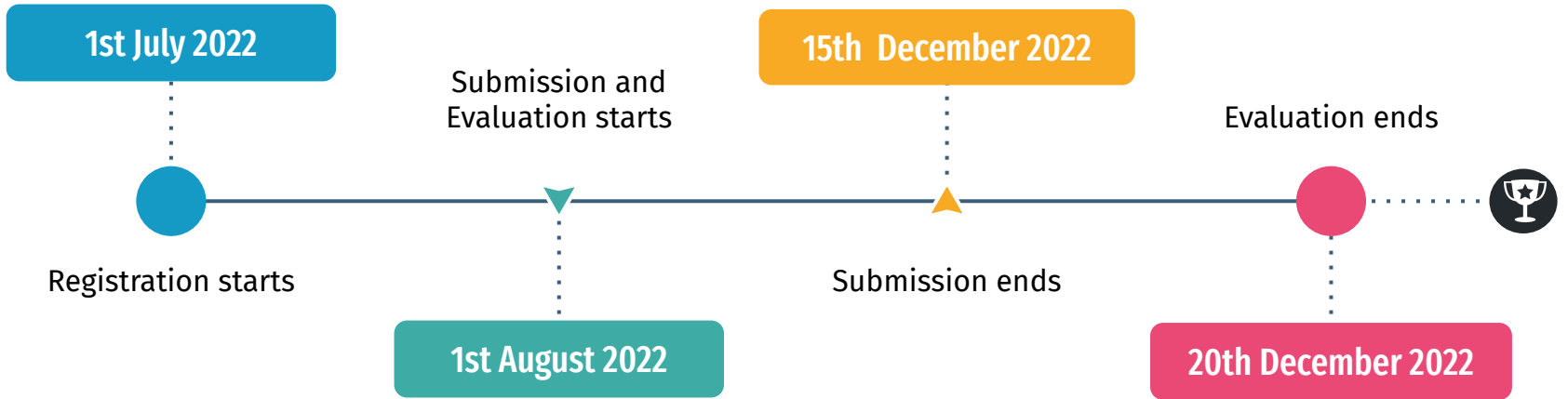
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CRF

Location Mentions

Sligo Crk Pkwy

Piney Branch Rd

Maple Ave

Check out examples

Timeline

1st July 2022

Registration starts

Submission and
Evaluation starts

1st August 2022

15th December 2022

Submission ends

Evaluation ends

20th December 2022

Thank you!

GeoAI LMR Website

https://bit.ly/3HVb1NE