

# Crisis Computing: Multimodal Social Media Content for Improved Emergency Response

## *Visionaries*

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# Motivation

## Using Twitter to Save a Newborn From a Flood

Search and rescue is evolving fast in the social-media age.

MARINA KOREN AUGUST 28, 2017

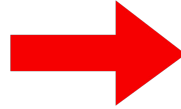


Kristen Painter  
@KristenPainter



River still rising: looking north on Pratt Pkwy in Longmont as St. Vrain gushes over. #cowx #coflood

4:59 PM - 12 Sep 2013



When phone networks crashed during the earthquake and tsunami in Japan in 2011, many people turned to Twitter, Facebook, Skype, and Mixi, a social-networking website in the country.



California wildfires hit home for Bills rookie Tanner Vallejo #Bills <https://t.co/GV4GooaAp6>

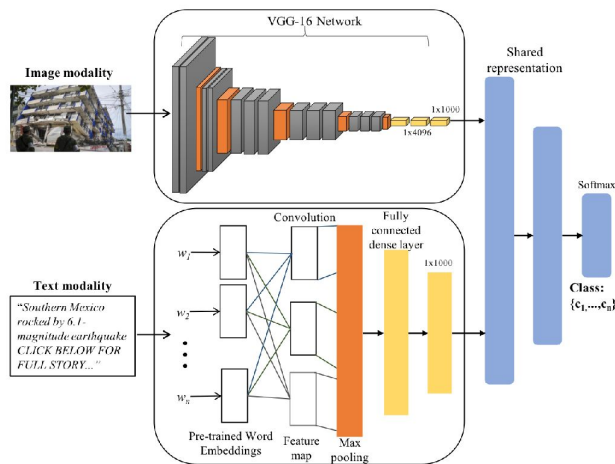
# Current Challenges and Limitations

- **Most** research on textual data only,
- Labeled data scarcity,
- CrisisMMD - first multimodal dataset (late 2018),
- Only a couple of papers use multimodal data (all of them recently published), models that use multimodal data outperform unimodal models

## CrisisMMD: Multimodal Twitter Datasets from Natural Disasters



**LABELS:** Disaster Type, Informative vs Not Informative, Humanitarian Categories, Damage Severity Assessment



Both use only  
“clean” subset of  
CrisisMMD

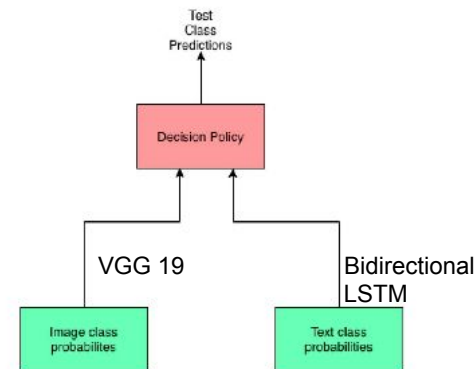
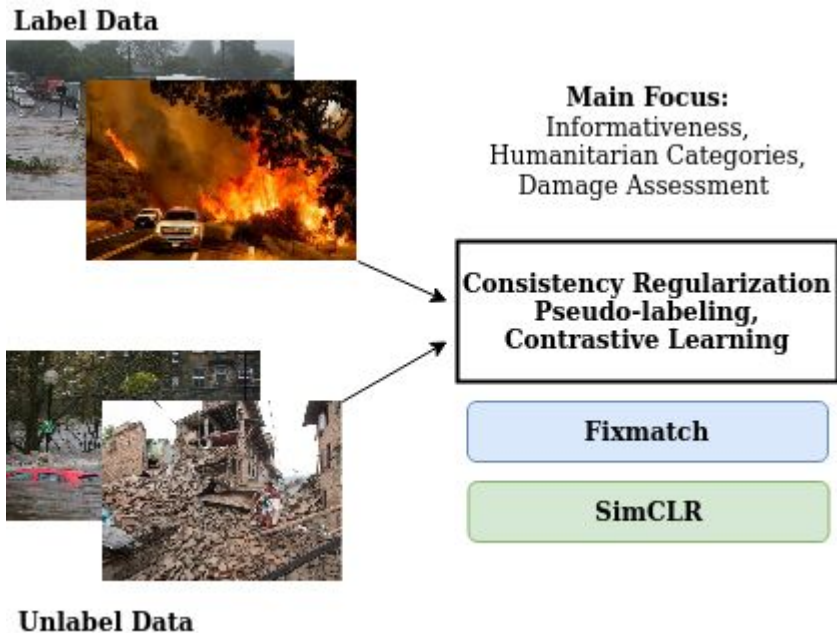


Fig. 5: Decision level fusion technique

# Methods and Experiments I

- Employ machine learning methodologies like transfer, contrastive and semi-supervised learning to propagate labels to unimodal datasets

## Step 1: Labels Propagation Images

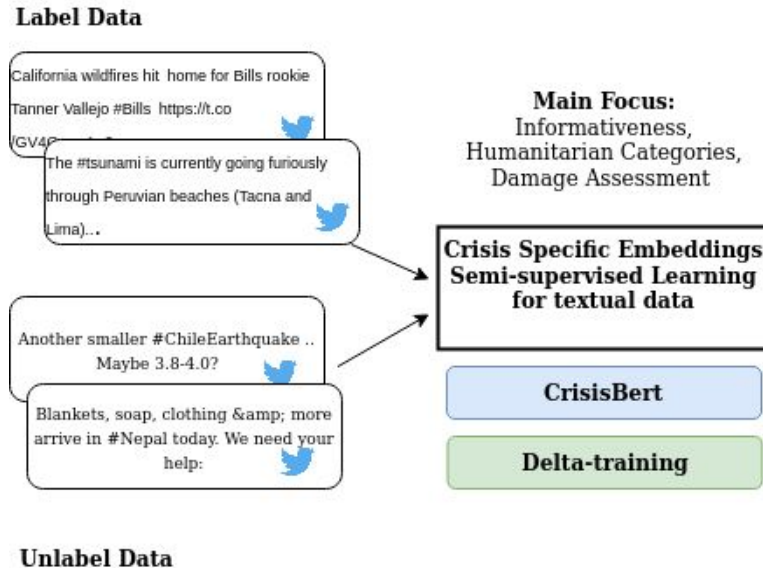


[FixMatch: Simplifying Semi-Supervised Learning with Consistency and Confidence](#)  
[A Simple Framework for Contrastive Learning of Visual Representations](#)

# Methods and Experiments II

- Employ machine learning methodologies like transfer, contrastive and semi-supervised learning to propagate labels to unimodal datasets

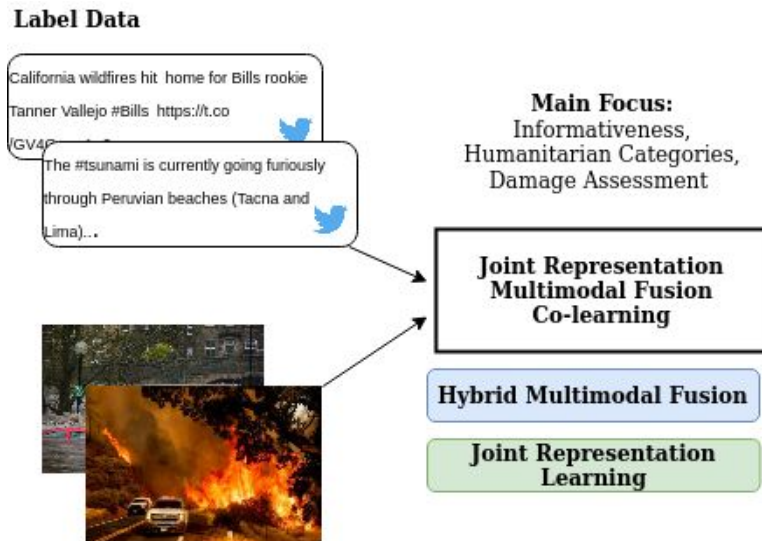
## Step 1: Labels Propagation Text



# Methods and Experiments III

- Use the enriched dataset to train multimodal model. Explore techniques like joint representation learning, fusion and co-learning.

## Step 2: Multimodal Learning



[Multimodal fusion for multimedia analysis: A survey](#)

[Learning Joint Multimodal Representation with Adversarial Attention Networks](#)





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## Editorial

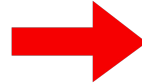
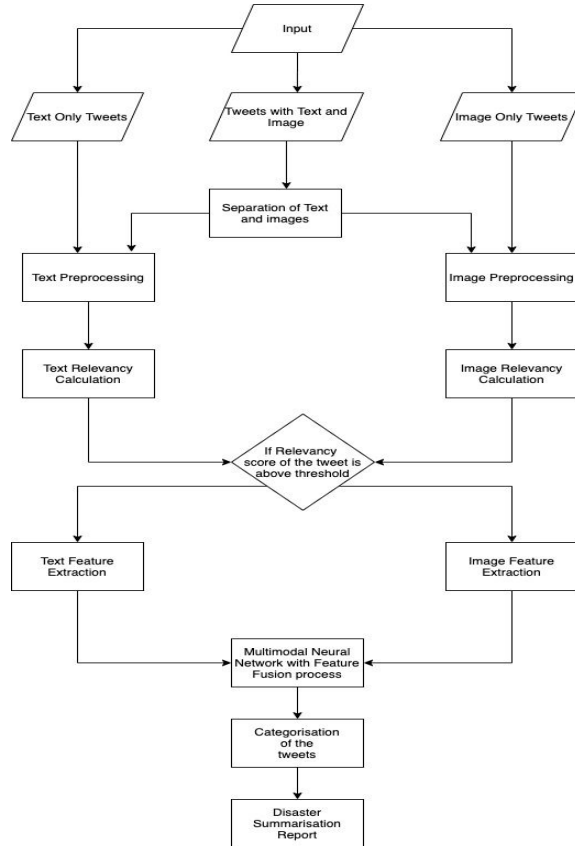
### Using AI and Social Media Multimodal Content for Disaster Response and Management: Opportunities, Challenges, and Future Directions



Muhammad Imran <sup>a</sup>✉, Ferda Ofli <sup>a</sup>✉, Doina Caragea <sup>b</sup>✉, Antonio Torralba <sup>c</sup>✉

**Narrative summarization:** There has been significant progress in image captioning (Bai and An, 2018; Hossain, Soheli, Shiratuddin, and Laga, 2019; Liu, Xu, and Wang, 2019) and narrative summarization of image collections (Chatterjee and Schwing, 2018; Liu, Fu, Mei, and Chen, 2017; Zheng, Li, and Wang, 2019). In light of these advancements, SM images collected during disasters can be analyzed to automatically generate a coherent summary report about an emergent event that can be distributed across different humanitarian organizations and emergency response agencies. Such summaries can also help with indexing and archival of collected SM images. However, similar to previous challenges, existing models need to be adapted to disaster context via large-scale annotated datasets and transfer learning techniques.

# Automatically generating summaries of a developing crisis from online postings.



## Location: Avenor, Accra – Ghana

Look to the left of the picture, one of the houses affected by the blast, notice the water mark on the top part of building painted blue, near to the ceiling ? That's how high the water rose. Now just imagine what they have left.

Our eyes and ears on the ground: "It was quite over whelming today with the stench of death, petrol, burnt items...people have lost everything, only thing they have left is hope

We'll be distributing care packages soon, if you are interested in assembling them with us email [ghanafloodrelief@gmail.com](mailto:ghanafloodrelief@gmail.com). We will also let you know how to donate soon

To donate and for further enquiries kindly contact Naa Aklerh on +233549093487