Digital Typhoon TV: Toward Real-time Emergency Information Platform

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GIT4NDM 2010
Typhoon MEGI
Flood of Information in Emergency Situations

How could I use all the information?
Three Modes of Information

- Current Information
- Past Information
- Future Information

- Sensor
- Database
- Simulation
Digital Typhoon Project
http://www.digital-typhoon.org/

- Integrate heterogeneous sources in near real-time.
- Search and rank natural phenomena to use the past data for the present.
- Design e-science platform for scientists and citizens.

One of the most famous typhoon information Website. 1 million PV in a day at max.
Search by Situation

Satellite image
Find similar cloud patterns in the past.

News article
Find similar news or events in the past.

Rain pattern
Find similar rain patterns in the past.
Heterogeneous Data Collection

- Geostationary meteorological satellite image (Himawari series) (1978-)
- Tropical cyclone images (162,000 images)
- Typhoon best track (1951-)
- AMeDAS observation (1976-)
- News articles (2003-)
- Disaster information (1951- or 1971-)
- Social streams (2004-)
- Weather forecast GPV data (2002-)
Tropical Cyclone Image Collection

Northern Hemisphere

Southern Hemisphere
Search by Image Similarity

- Given an image as a query, search similar images in the database.
- Only based on image features (cloud patterns).
Search by Time Series

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Search by Track Similarity

- Using dynamic time warping for evaluating similarity between tracks.
Text Processing

- An image is worth thousand words, but..
- Text is a convenient media to describe the situation and represents opinions.
- Apply NLP (natural language processing).

Philippine President Benigno Aquino is crediting careful preparation for a relatively low death toll and rapid emergency response after a devastating typhoon swept across the northern Philippines and turned toward China.

Authorities Tuesday confirmed at least 13 people were killed after Typhoon Megi flattened parts of northern Luzon island with winds of up to 225 kilometers per hour.

Many areas are in ruins in Isabella province, the most populated in Luzon's Cagayan Valley. The storm uprooted trees, tore roofs from houses and destroyed crucial rice crops.
NLP-based Geocoder

1. Geocoder for Japanese (ongoing)
2. Geocoder for English, etc. (future)
News Keywords and Rankings

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Sensor Data Processing

- Ranking of rainfall to evaluate rarity.
Automatic Alert Generation

Historic Ranking

1h Precipitation

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<th>Number</th>
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Mapping

Notification

@AMeDASRain

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Social Typhoon
http://www.eye.tc/

- Using social media / participatory media.
- Aggregate / disseminate with blogs or micro-blogs.
- Create communities of people.
- Perform interactive exhibition.
Typhoon Front

http://front.eye.tc/

Orange dots represent blog entries about the coming typhoon.

Trackbacks should be done by users.
Viewpoint and Media

First-person Media

* @twiphoon
* @ReTwiphoon

Second-person Media

* @TyphoonNow

Third-person Media

* @DigitalTyphoon
* @DigitalTyphoonE

Egocentric  Egocentric  Exocentric

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Highest water level around Ise Bay by the storm tide of Typhoon Vera (195915), the most deadliest typhoon in Japan.

Visualize the water level in real height (max 4.5m) to experience the fear of hazard and raise awareness.

Photographic hazard map
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Pull vs. Push

**Pull Media**

Present Web
- You can dig into resources you are interested in.
- You need to search resources with an appropriate query.

**Push Media**

Present TV
- You can receive resources with minimal actions.
- Available resources are limited and optimized for mass.

**Normal situations**

**Emergency situations**
Real-time Media

Archive (Pull)

Weblog, etc.

Bayesian TV

Visual

Textual

Radio transmission TV

Real-time (Push)
Reinvent TV in the Web era!

- Message recommendation based on news value and user preference (Bayesian model).
- Management of topical channels (hyperchannels / microchannels).
- Automatic editing of news stories from subscribed streams.
- Information visualization using data representation language.
Summary

- **Digital Typhoon**: multimedia data collection such as imagery, text and sensor observation.
- **Social Typhoon**: aggregate and disseminate with social media.
- **Future work**: integration of push/pull media to design a media for emergency information through the “reinvention” of TV.
Related URLs

• **Digital Typhoon**

• **Social Typhoon**
  - [http://www.eye.tc/](http://www.eye.tc/)

• **Typhoon Front**
  - [http://front.eye.tc/](http://front.eye.tc/)

• **Other information : personal page**
  - [http://agora.ex.nii.ac.jp/~kitamoto/](http://agora.ex.nii.ac.jp/~kitamoto/)