TRIC³DEC

Collaborative, Complex and Critical
Decision-Support in Evolving Crisis

Big Data and Software Architecture Meet Geophysics and Crisis Management

Data Analytics for BIG Data

Z A Sabeur *et al*

TRIDEC Townhall Session, 08th April 2013, EGU2013- Vienna

EGU General Assembly 2013

SEVENTH FRAMEWORK PROGRAMME

- To enable and adopt best possible scientific, social and business added values

- To extract knowledge and values which increase our context and situation awareness during engineering operations

- To increase our real-time knowledge during crisis management operations.

- To optimise our responses to crises and also for mitigation measures and recovery

The BIG Data Avalanche is a challenge for Decision-making

- Are the information and data values of the synergetic processes available to everyone in real-time?

BIG Data Cloud?

Stock Markets

- Emails
- Text messages
- Tele-conferences
- News, media
- Public opinions
- Economics

Finance

Critical Management

- Crisis dynamics
- Sensory channels
- Mitigation/recovery
- Public and media management
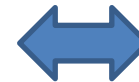
Disaster Event

Real-time Risk analyses

- Finance reports
- Asset values
- Planning
- regulations
- Economics

- Morning reports
- Sensory channels
- Planning
- Team-shifts

Human resources and Operations

Assets management

The BIG Data Avalanche is a challenge for Decision-making

BIG Data… is made of structured, semi-structured and non-structured data that large in **Volumes, Velocities and Versatility**
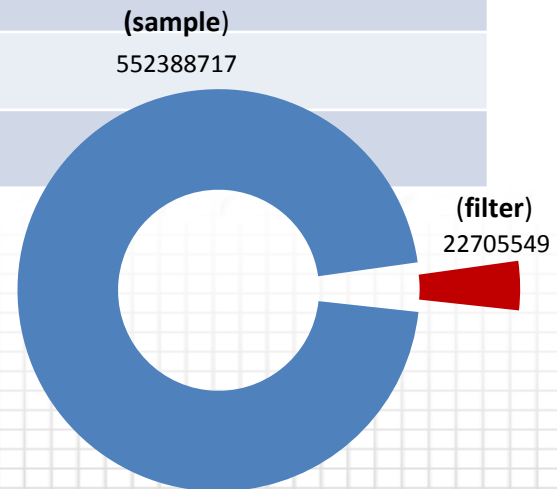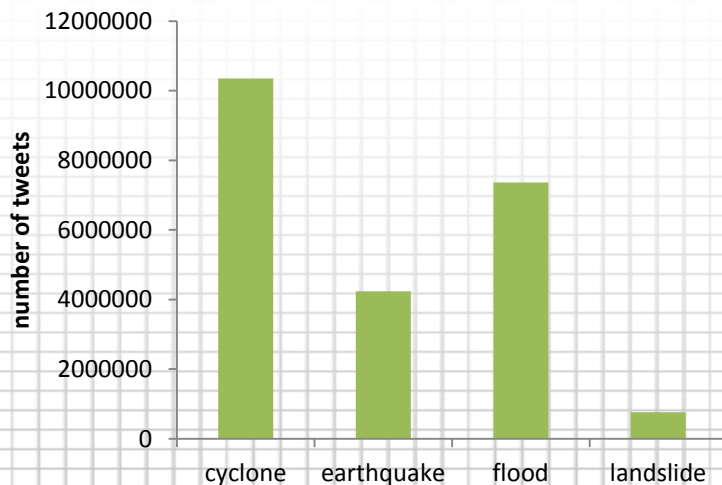

15%

85%

"More than **85%** of all business **valuable information** exists in the form of e-mails, memos, notes from call-centres, news, user groups, chats, reports, web-pages, presentations, image-files, video-files, marketing material and news."

Source: Merrill Lynch 2012

There are ways of extracting knowledge from BIG Data and provide added value for decision-support
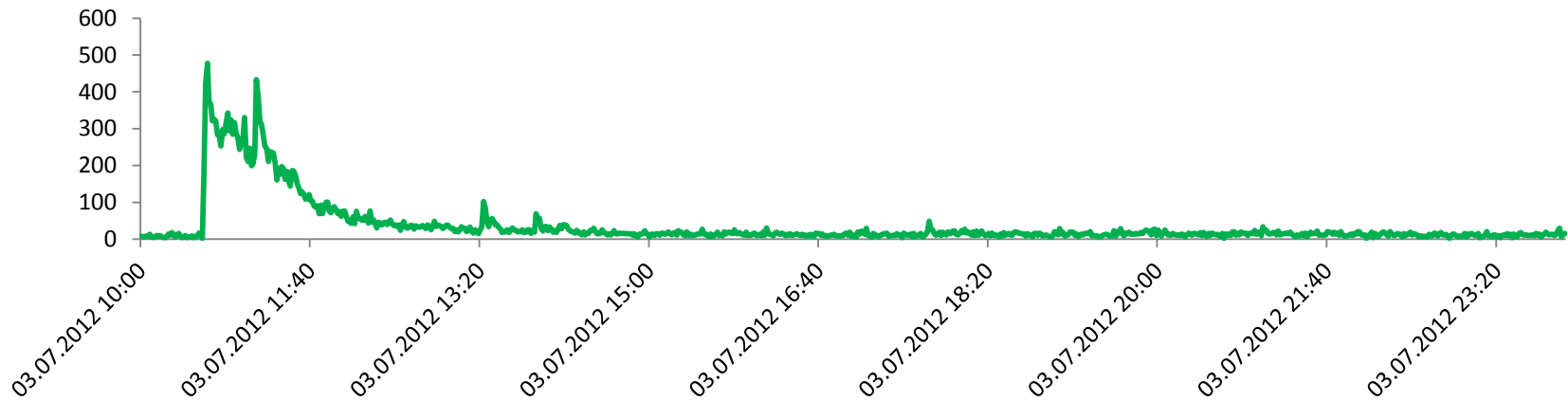
BIG Data… extracting knowledge for learning → **Data Analytics**

label	keywords
flood	flood, flooding, flooded, tsunami
cyclone	cyclone, hurricane, typhoon, blizzard, gale, twister, tornado
landslide	landslide, mudslide, avalanche
earthquake	earthquake, quake
sample	Sample of all tweets (baseline)

(sample)
552388717

(filter)
22705549

There are ways of extracting knowledge from BIG Data and provide added value for decision-support

BIG Data… extracting knowledge from unstructured data with discovery and learning → **Data Analytics**

- NZ July 3rd 2012 @ 10:36, 0 fatalities
  - Additional peaks due to renewed interest (time-zones?)
  - Half life ~380s
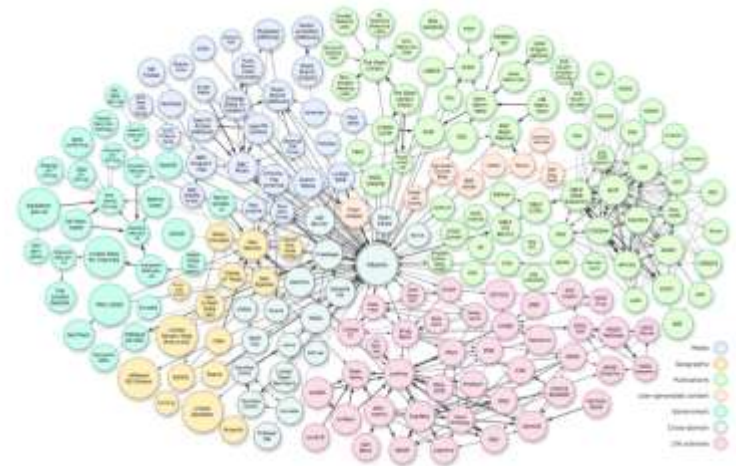- Delay from earthquake to discussion was ~3mins

BIG Data Analytics… → Pre-process **All type of Data**

- Aligning data and native knowledge semantically
  - Multi-lingual issues reconciliations
  - Multi conflicting formats reconciliations
  - Bridging semantic gaps
- Aggregation of Data and alignment of temporal, spectral and spatial framework
  - Fusion of multispectral data
  - Multi conflicting formats
  - Filling gaps

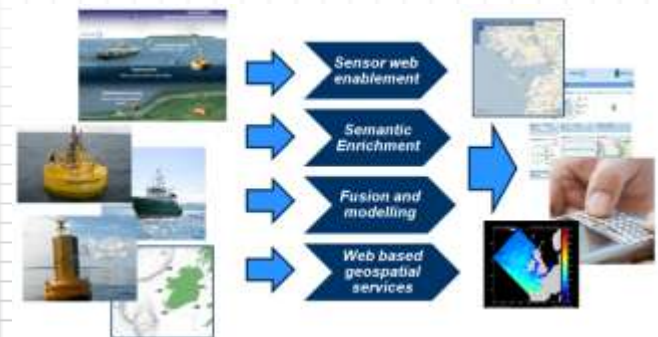BIG Data Analytics… → Detection of trends and notification of events in real-time

- Mining and Machine Learning

  – Data clustering and Mining

  – Operation state detection

  – Event detection

- Visualisation and the Future!

  – Enable the navigation of linked BIG Data

  – Mash-up BIG Data application

  for decision support

Data Analytics for BIG Data

Thank you.

For further details, please contact:

University of Southampton IT Innovation Centre

Dr Z A Sabeur   zas@it-innovation.soton.ac.uk