

## Geoinformatics in Disaster Management

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Established in 1959 as a Post Graduate School  
 Catering for higher education in Asia

1,915  
14 COUNTRIES

22,789  
100+ COUNTRIES

81  
19 COUNTRIES

134  
13 COUNTRIES

30  
ACADEMIC PROGRAMS

450  
46 MILL

30,000  
200+ PARTNERSHIPS

## Contents

ACTIVITIES OF THE SENTINEL ASIA  
PROJECT IN 2018

BUILDING FOOTPRINT EXTRACTION  
FOR DISASTER RISK ASSESSMENT

POPULATION MAPPING USING  
DEEP LEARNING

Geoinformatics Center  
 Established in 1999

REMOTE SENSING & GIS

ENVIRONMENT

DISASTER MANAGEMENT

TRAINING

- Processing optical, radar & LIDAR data
- Unmanned Aerial Vehicles (UAV)
- Geospatial products combined with RS and GIS data





- Satellite imagery for environmental monitoring
- Landslide and landcover change mapping, biomass estimation, crop monitoring, yield forecasting, drought monitoring, coastal erosion mapping and modeling and urban environmental modeling.

- Floods, landslides, tropical cyclones, earthquakes and tsunamis
- Sentinel Asia - PDAN
- Emergency response data

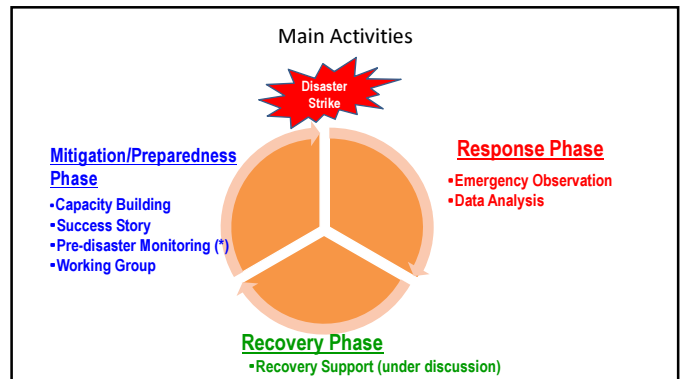
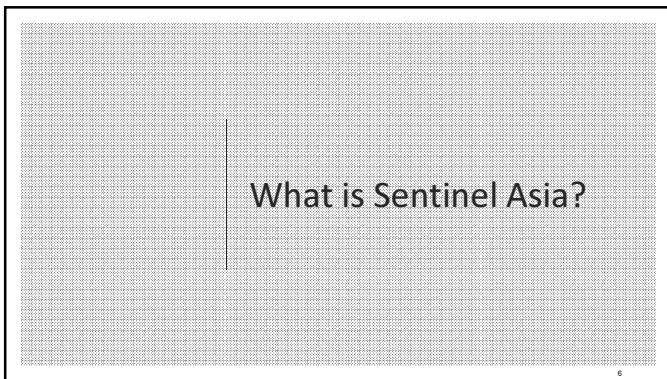
- GIC organizes a number of training courses in a variety of fields
- Practical courses led by experts

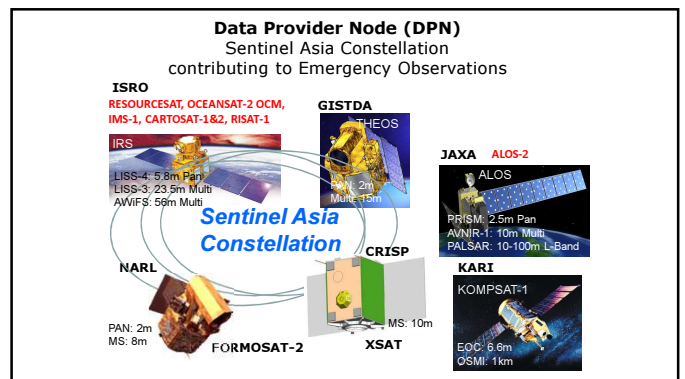
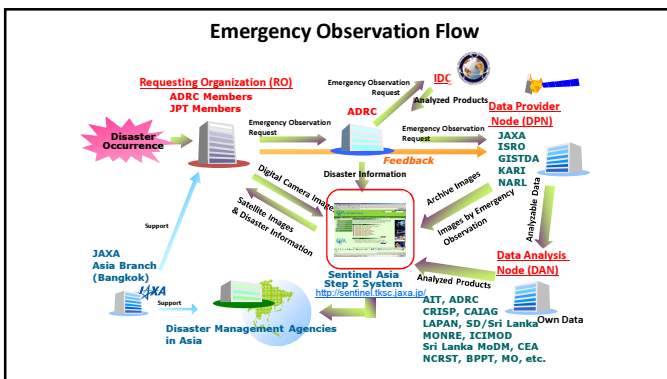
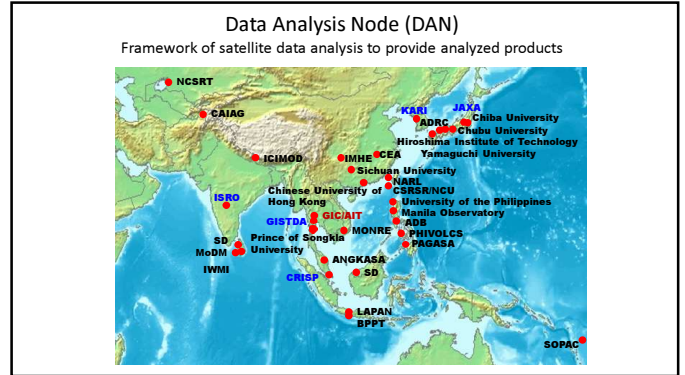
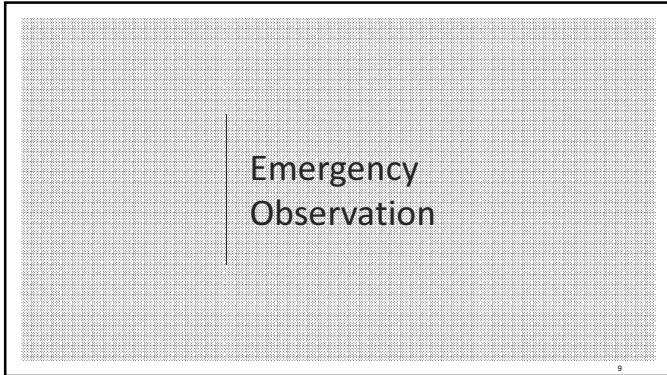


### Vision of Sentinel Asia

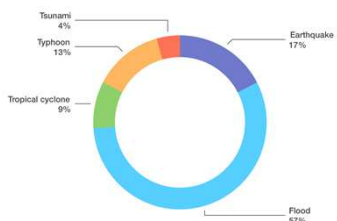
-  Sentinel Asia is an initiative proposed and supported by Asia Pacific Regional Space Agency Forum (APRSAF)
-  Contribution from space community (APRSAF) to disaster management in the Asia-Pacific region by applying space and ICT technologies
-  Collaboration between space agencies and disaster management agencies
-  Voluntary initiative by participating organizations for humanitarian purposes

7

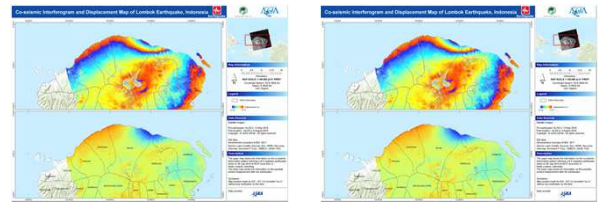




### Summary of SA Activation by AIT in 2018

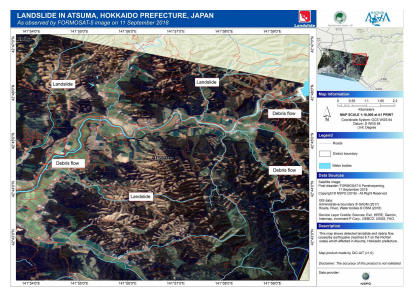
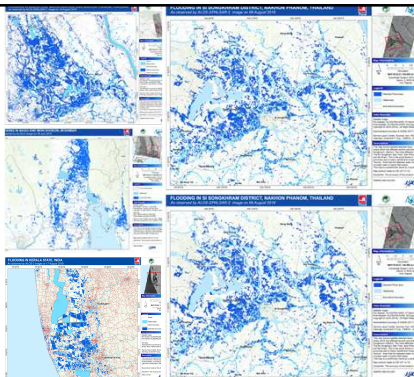


- 28 activations (as April 2019) from 13 countries
- 5 types of disaster
- 43 VAPs

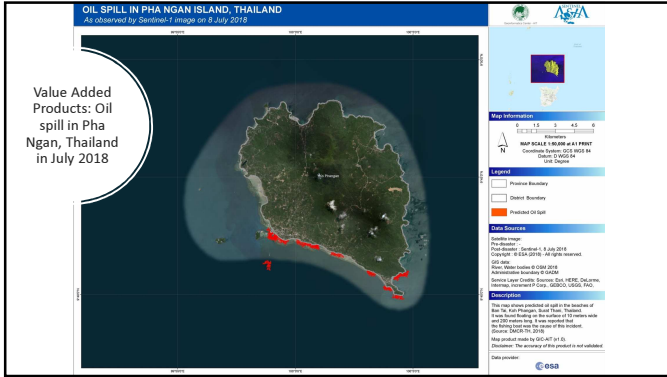


Value Added Products: Earthquake in Lombok, Indonesia in Aug. 2018

### Value Added Products: Flood



Value Added Product: Earthquake included Landslide in Hokkaido in Sept. 2018



**Earthquake in Sulawesi Indonesia, Sep. 2018**

- A 7.5 magnitude earthquake struck Sulawesi on 28 Sep, triggering a tsunami with 3m;
- At least 844 people lost their lives and displacing 50,000 people;
- The worst affected areas were the city of Palu with 300,000 inhabitants;

Home About Activations News Library English Login

**The International Charter Space and Major Disasters**

Providing satellite data to those affected by natural or man-made disasters and registered organisations, for use in monitoring and response activities.

How the Charter Works How to become a member

**International Charter 'Space and Major Disasters'**

Latest Charter Activations

- 14 NOVEMBER 2018 Fires in California
- 29 OCTOBER 2018 Flood in Russian

Recent Information

Sentinel Asia was activated on 28 Sep. 20 with a request to escalate to IDC

Earthquake and Tsunami in Indonesia

The screenshot displays a web interface with a table of activations and a detailed view for the 'Earthquake and Tsunami in Indonesia' event. The detailed view includes a map of Indonesia and the following metadata:

- Type of Event: Earthquake, Tsunami
- Category of Event: Earthquake
- Date of Charter Activation: 2018-09-29
- Name of Charter Activation: IDC
- Type Area of Charter Activation: (IDC-AS)
- Charter Requestor: ASJC at JAXA
- Activation ID: 027
- Project Management: 02

### Coordination for dissemination of VAPs

- Constant coordination with local partners (LAPAN, BNPB, Public Works, Poso Energy etc.)
- Product dissemination to local government (Governor, Indonesian Army etc.)

### Generate VAPs for large scale disasters -Sulawesi

60 VAPs were created:  
 - 22 VAPs for Sentinel Asia  
 - 38 VAPs for IDC

An ArcGIS online platform was develop for wider dissemination

### Mobile Phone App. for Crowd Sourcing

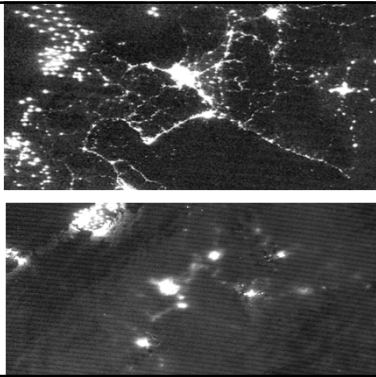
Developed a Mobile App for Survey using DRM Survey and Kobo toolbox



Night time light imagery (Suomi NPP/VIIRS)

- Spatial resolution: 750m
- Temporal resolution: daily
- Near-real time acquisition (1 day delay)

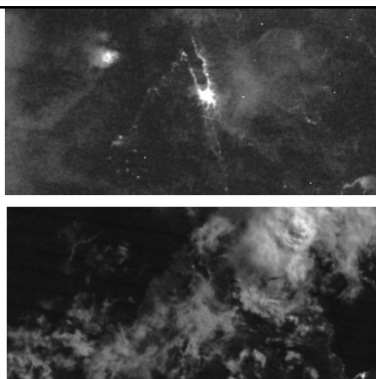
Hokkaido in Japan in Sep. 2018



Pre-event

Post-event

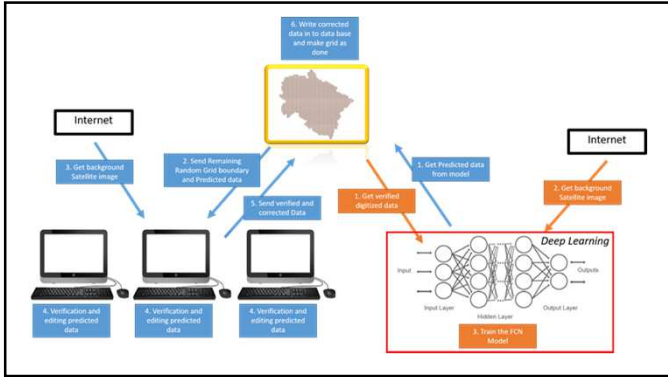
Earthquake in Indonesia in Sep. 2018



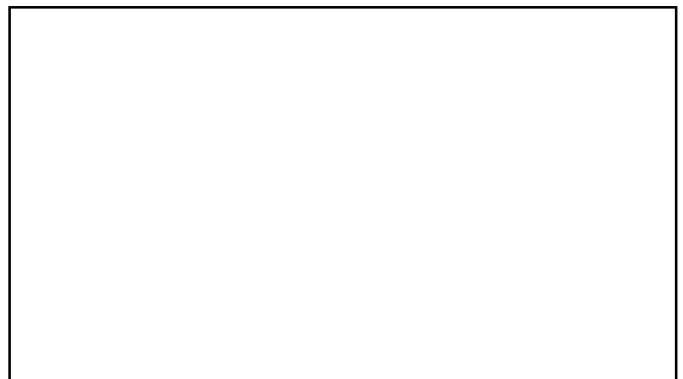
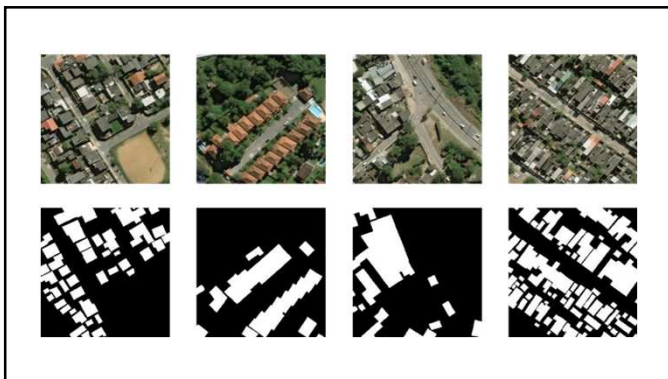
Pre-event

Post-event

Building footprint extraction for disaster risk assessment



# Population Mapping Using Machine Learning

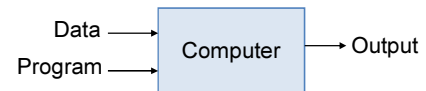




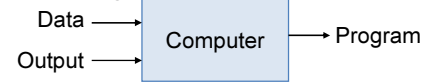


- Machine learning, a branch of artificial intelligence, concerns the construction and study of systems that can learn from data.

- Traditional Programming



- Machine Learning



## Machine learning is....

- Machine learning is to let computer predict something, unknow things or events.



## Magic?

No, more like gardening

- **Seeds** = Algorithms
- **Nutrients** = Data
- **Gardener** = You
- **Plants** = Programs

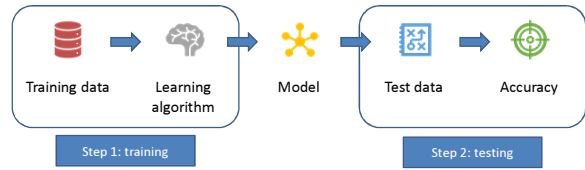


### Steps involved in Machine learning



### Supervised learning

Supervised learning is the machine learning task of inferring a function from labelled training data



### Types of machine learning

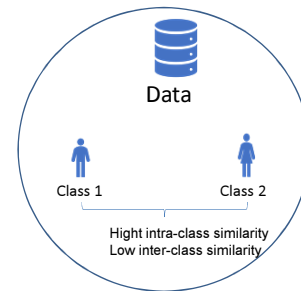


Supervised learning



Unsupervised learning

### Unsupervised learning

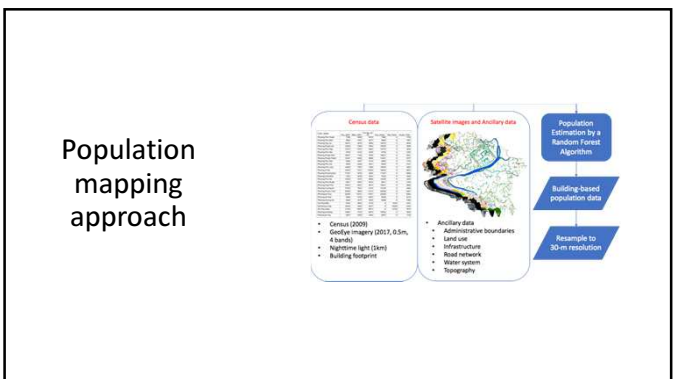
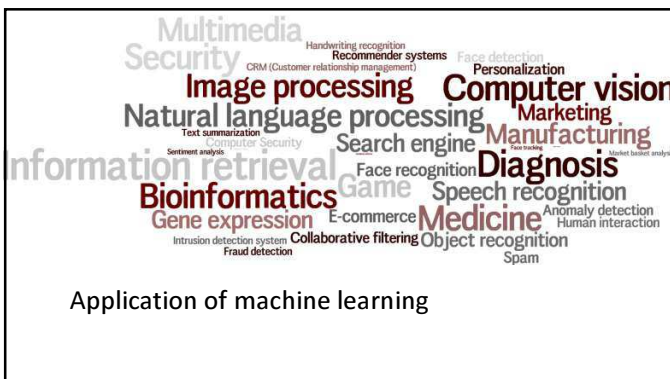


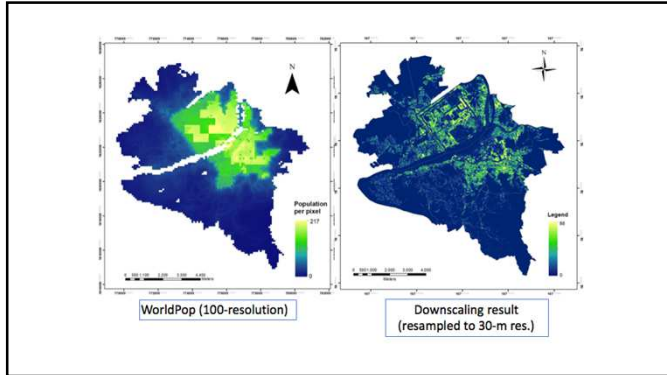
### Reinforcement

- Learning from mistake


### Summary

- Machine learning can solve many problems ... but is no panacea
- Methods and results **strongly depend** on *quantity + quality of input data*







### Concluding remarks




Develop an automated building detection system using deep learning.



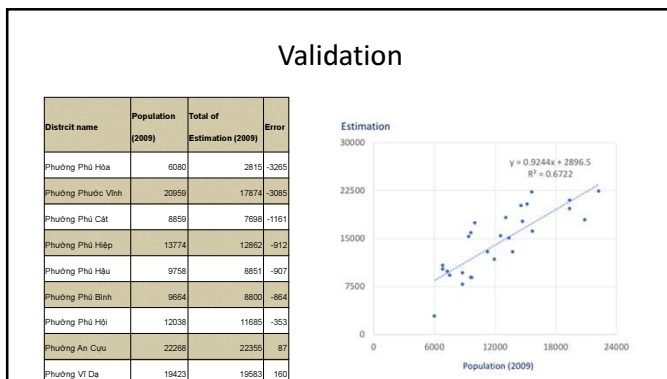
Potential extension to automated damage mapping for rapid responses (collapsed building, landslide,...)




National scale mapping is ongoing




Strengthening mapping capacity by automation and newly growing data resources



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