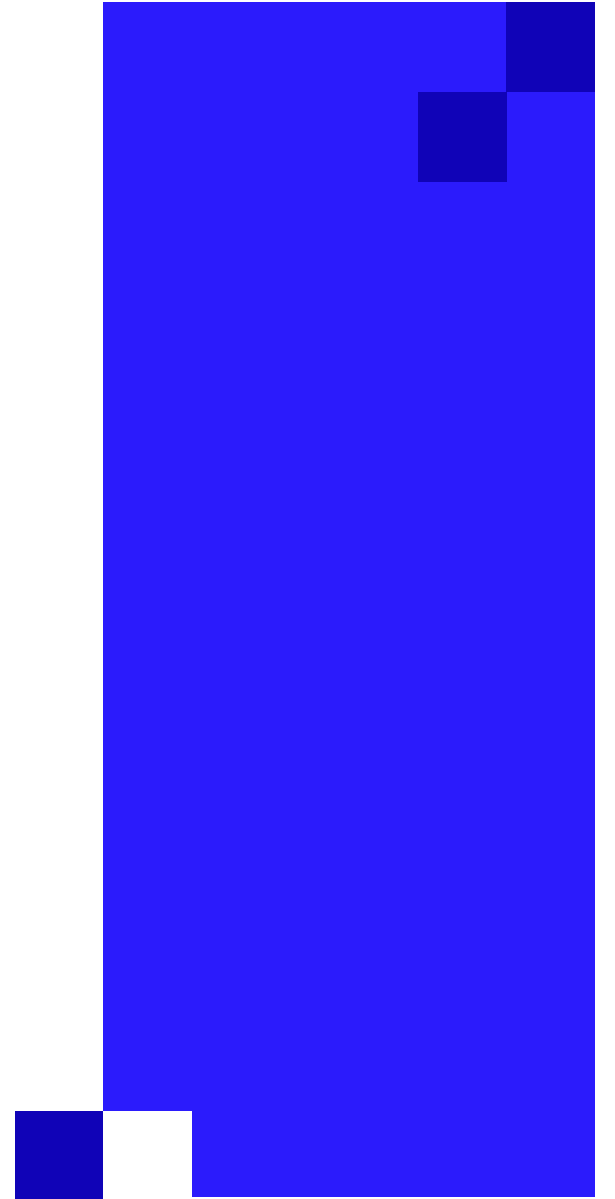# Remote Sensing Project

Applied Deep Convolutional Neural Networks for image analysis especially to solving the remote sensing problem.

Ilham Mulya Rafid
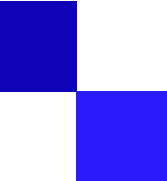
Agenda

Introductions

Remote Sensing Foundation

Remote Sensing 101

According to the Centre for Remote Imaging, Sensing and Processing (CRISP) at NUS

"We perceive the surrounding world through our five senses. Some senses (touch and taste) require contact of our sensing organs with the objects. However, we acquire much information about our surrounding through the senses of sight and hearing which do not require close contact between the sensing organs and the external objects. In another word, we are performing Remote Sensing all the time.

Generally, Remote sensing refers to the activities of recording/observing/perceiving (sensing) objects or events at far away (remote) places. In remote sensing, the sensors are not in direct contact with the objects or events being observed. The information needs a physical carrier to travel from the objects/events to the sensors through an intervening medium. The electromagnetic radiation is normally used as an information carrier in remote sensing. The output of a remote sensing system is usually an image representing the scene being observed. A further step of image analysis and interpretation is required in order to extract useful information from the image. The human visual system is an example of a remote sensing system in this general sense.

In a more restricted sense, remote sensing usually refers to the technology of acquiring information about the earth's surface (land and ocean) and atmosphere using sensors onboard airborne (aircraft, balloons) or spaceborne (satellites, space shuttles) platforms."

Remote Sensing Techniques

Optical and Infrared Remote Sensing

Optical remote sensing makes use of visible, near infrared and short-waveinfrared sensors to form images of the earth's surface by detecting thesolar radiation reflected from targets on the ground.

Microwave Remote Sensing

A microwave imaging system which can produce high resolution image of the Earth is the synthetic aperture radar (SAR). The intensity in a SAR image depends on the amount of microwave backscattered by the target and received by the SAR antenna.
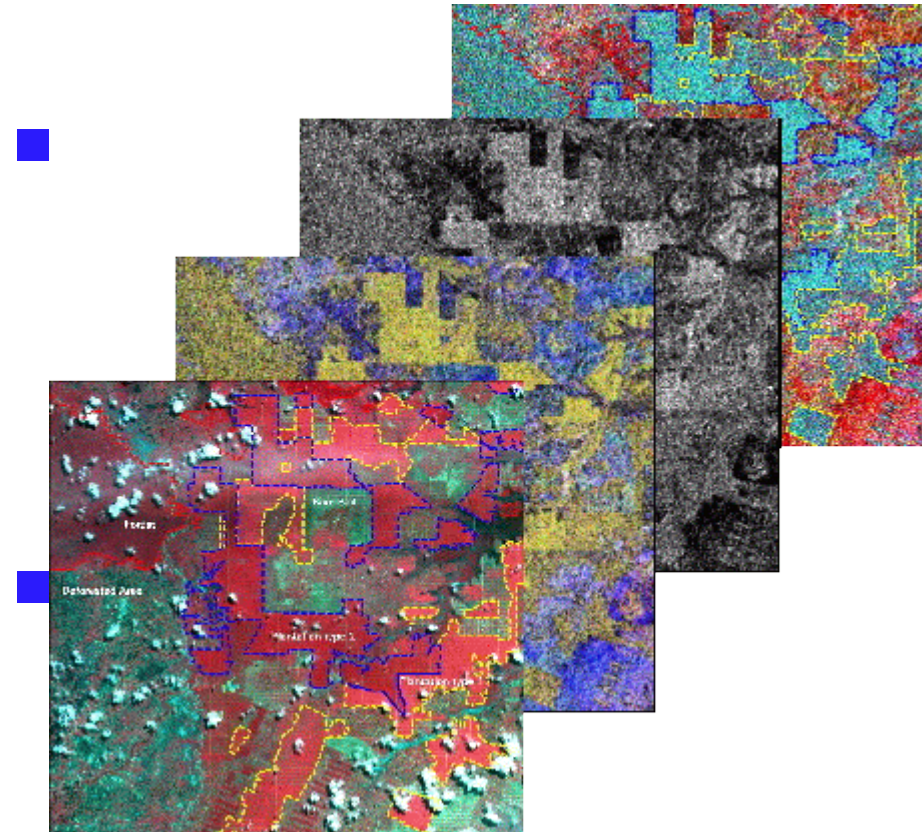
Well known Remote Sensing Satellite

■ Copernicus Sentinel 1

Sentinel-1 represents the next evolution of Europe's radar-equipped satellites, building upon the foundations of its precursors. The capabilities of the radar instrument on the Sentinel-1 satellites make them able to support a wide variety of applications such as monitoring the oceans, including shipping lanes, sea ice, and oil spills; mapping changing land cover, ground deformation, ice shelves, and glaciers; and supporting emergency response to disasters like floods and humanitarian relief efforts during crises.

■ Copernicus Sentinel 2
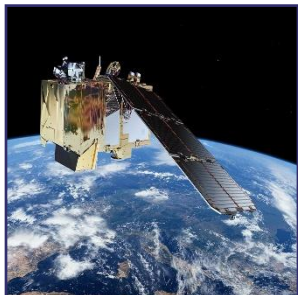
Data products from Sentinel-2 satellites are used for a wide variety of applications, including precision farming, water quality monitoring, natural disaster management and methane emission detection. Sentinel-2 provides particularly useful information for monitoring natural ecosystems, as it can differentiate between vegetation types and measure biophysical variables such as leaf area index, leaf chlorophyll content, and leaf water content.

■ LAPAN A3
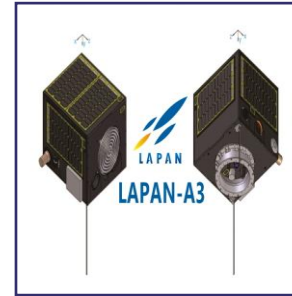
LAPAN-A3/IPB, also referred to as LISat, is a cooperative remote sensing microsatellite project between LAPAN (National Institute of Aeronautics and Space of Indonesia) Jakarta and IPB (Bogor Agricultural University or Institute Pertanian Bogor) located in Bogar, Indonesia. The objective of the demonstration mission is to monitor food resources in Indonesia and to provide environmental monitoring. The real goal of LAPAN-A3/IPB is to provide actual, frequent and accurate data for observing and predicting the condition of the Indonesian archipelago.

Sand Mining in Indonesia

Explore the current landscapes about sand mining activities that is Illegal in Indonesia

Sand Smuggling / Mining

"Pasir Laut" / "Sedimen" is the specific common word / terminology that can be used in Indonesia to represent "Beach Sand" or even the land part of one Island according to the article that is written by Universitas Gadjah Mada. [1] This activity however, undeniably spark the controversies. In Indonesia itself this activity have been legalize through "PP No.26 Tahun 2023" that clearly stated there are several conditions that make this activity legal yet, this it faced a great backlash amongst Indonesian Citizen. While some of them are pro with the regulation, not a small number of citizen are strictly against it.

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References :
[1] https://geologi.ugm.ac.id/pasir-laut-dan-sedimen-menelaah-pemanfaatan-dampak-ekologi-dan-urgensi-regulasi/

Indonesia's Landscape

Sand Smuggling / Mining in Indonesia led to various environmental problems that can affect the ecology or even the economic itself. According to the "Walhi" one of the NPO in Indonesia, this activites can accelerate the decrement of the coastline such as in Bali [2] or even disappearance of several island due of being drowned such as in Batam [3]

References :
[2] https://www.walhi.or.id/masyarakat-dan-perempuan-pesisir-bersama-walhi-melawan-pertambangan-dan-ekspor-pasir-laut
[3] https://money.kompas.com/read/2024/09/13/141245926/sejarah-kelam-ekspor-pasir-laut-pulau-ri-hilang-singapura-makin-luas?page=all