Special Topics in Applications (AIL861)
Artificial Intelligence for Earth Observation
Lecture 27
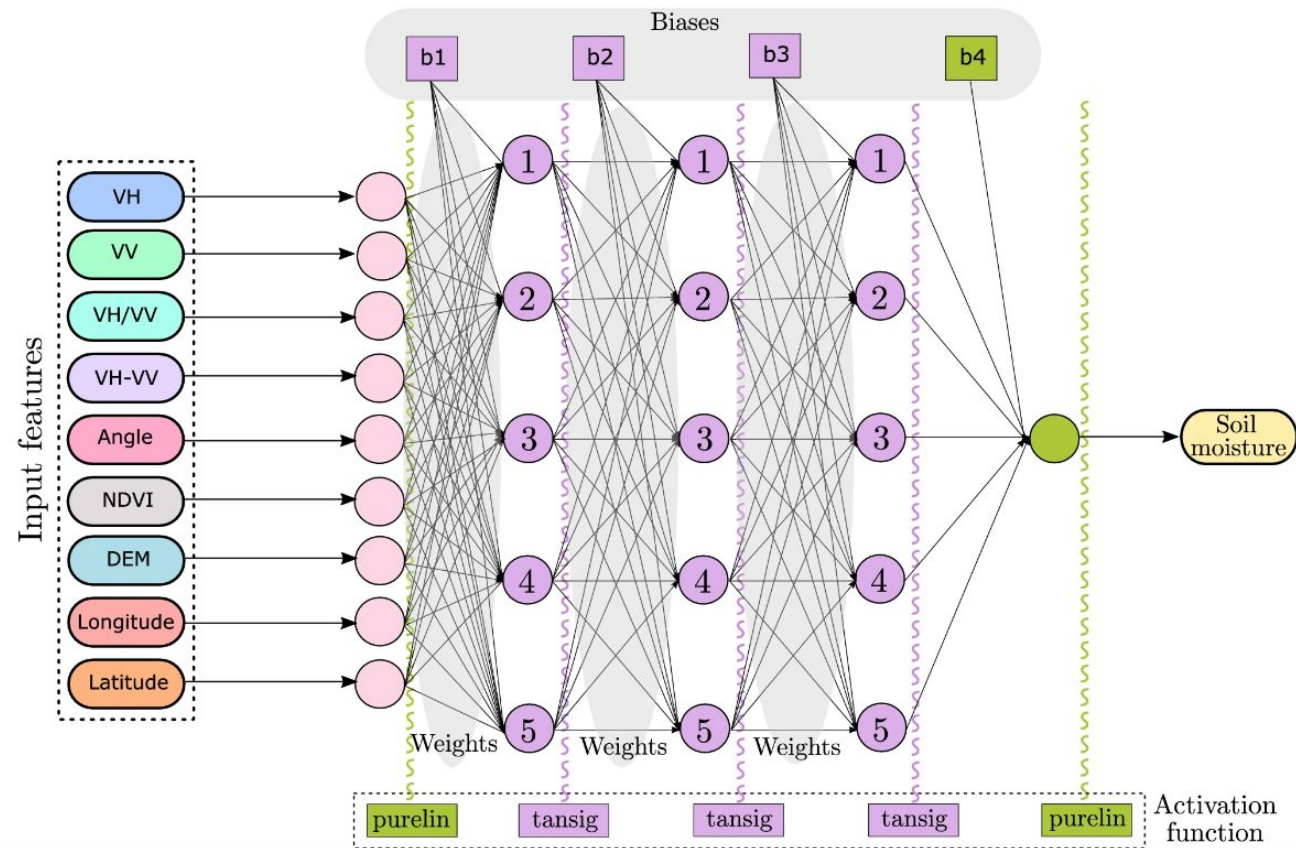
Instructor: Sudipan Saha

Assessing vegetation from non-Optical modality

Substituting NDVI by SAR

✔ Motivation?

✔ Potential methodology?

✔ Additional task?

Assessing soil properties

Mainly focus on how different input modalities are used together

Deep learning and data fusion to estimate surface soil moisture from multi-sensor satellite images, 2023

Biodiversity

Which Trees Would be Best?

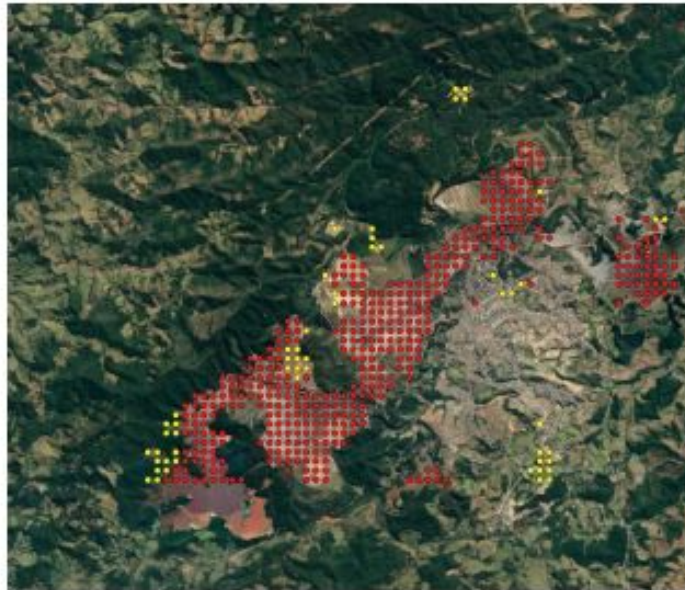Biodiversity evolution over time as a function of trees planted

Non-Urban Non-Agricultural Non-Climate Applications

Mining Sector

Mining

- ✔ Large mines

- ✔ Small mines

Mining

(a) Large mine: red indicating presence of mine with potential high environmental impact

(b) Small mine: yellow indicating presence of mine with potential low environmental impact

Mining and Tailings Dam Detection In Satellite Imagery Using Deep Learning, 2020

Mineral exploration

✔ Finding previously unknown reserves of minerals.

✔ Which type of images?

Tailing Dams

✔ Tailings : waste from mining.

✔ Tailing dam : used to store water and waste that come as by products from the mining process.

✔ Most common waste disposal methods for mining companies

✔ 2019 Brazil incident: More than 240 people died in Brazil when a tailings dam collapsed, unleashing a torrent of mud and mining waste on the countryside and the small town of Villa Ferteco, a kilometer away.

Marine Sector

Ship Detection

✔ Type of problem?

Oil Spill Detection

✔ Identify severity of oil spill

✔ Determine oil type

✔ Predict oil spill spread direction and flow rate

Whale Detection

✔ A two-step method is proposed in [#]

✔ First step, a CNN is trained for binary output, where there is whale present or not in the scene.

✔ Second step (for the scenes where whale is present), target detection and counting.

Whale counting in satellite and aerial images with deep learning, Nature, 2019

Satellite Altimetry

Satellite altimetry is a remote sensing technique for monitoring dynamic ocean conditions, including surface currents and local wind speed. Satellite altimetry measures sea surface heights, providing data on major ocean currents.