

Microsoft Research

Summit 2022

Land Degradation & Sustainability Practices

Eduardo Rodrigues (MSR)

Roberto Santos (MSR)

Land Degradation: how to identify

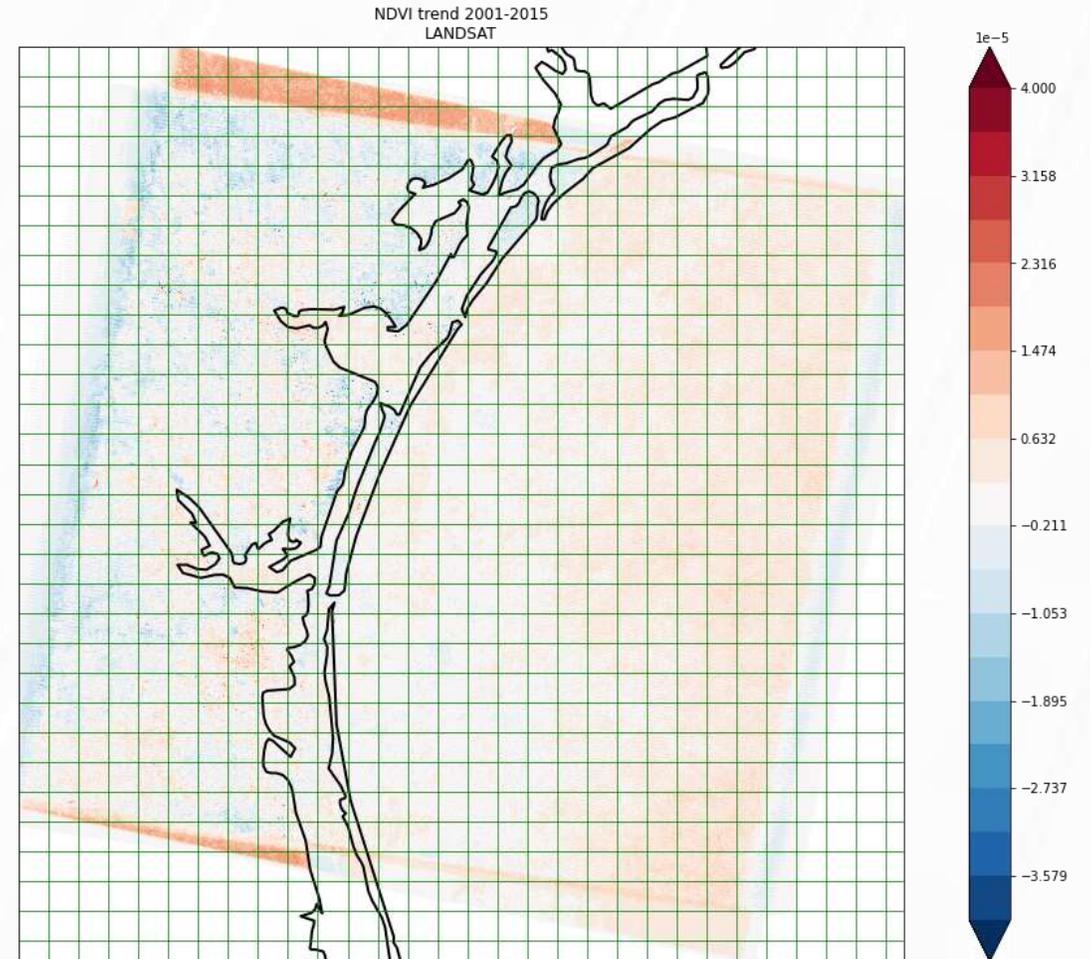
- Land degradation is a major issue. Halt and reverse it has become priority (UN Sustainable Development Goal)
- Identify regions with degradation is a first step towards fixing the issue
- Satellite images can be used to identify degraded regions

Linear Trends in NDVI

- Landsat (4,5,7, 8 and 9) images from 1982 to present (sensor from 30 to 120m resolution)
- Negative Linear Trends in NDVI as a proxy for Land degradation
- Changes in precipitation pattern must be accounted for in order to identify causes (in this tutorial we will be using Chirps)

Chunked computation

- Over long periods one cannot load all images into memory to run an operation over time
- In FarmVibes we can chunk data over time
- This has two benefits: (1) now it is possible to run an operation without exhausting memory, and (2) we can run the operation in parallel



Notebook

2017



2021



Microsoft Research
Summit 2022

Sustainability Practices

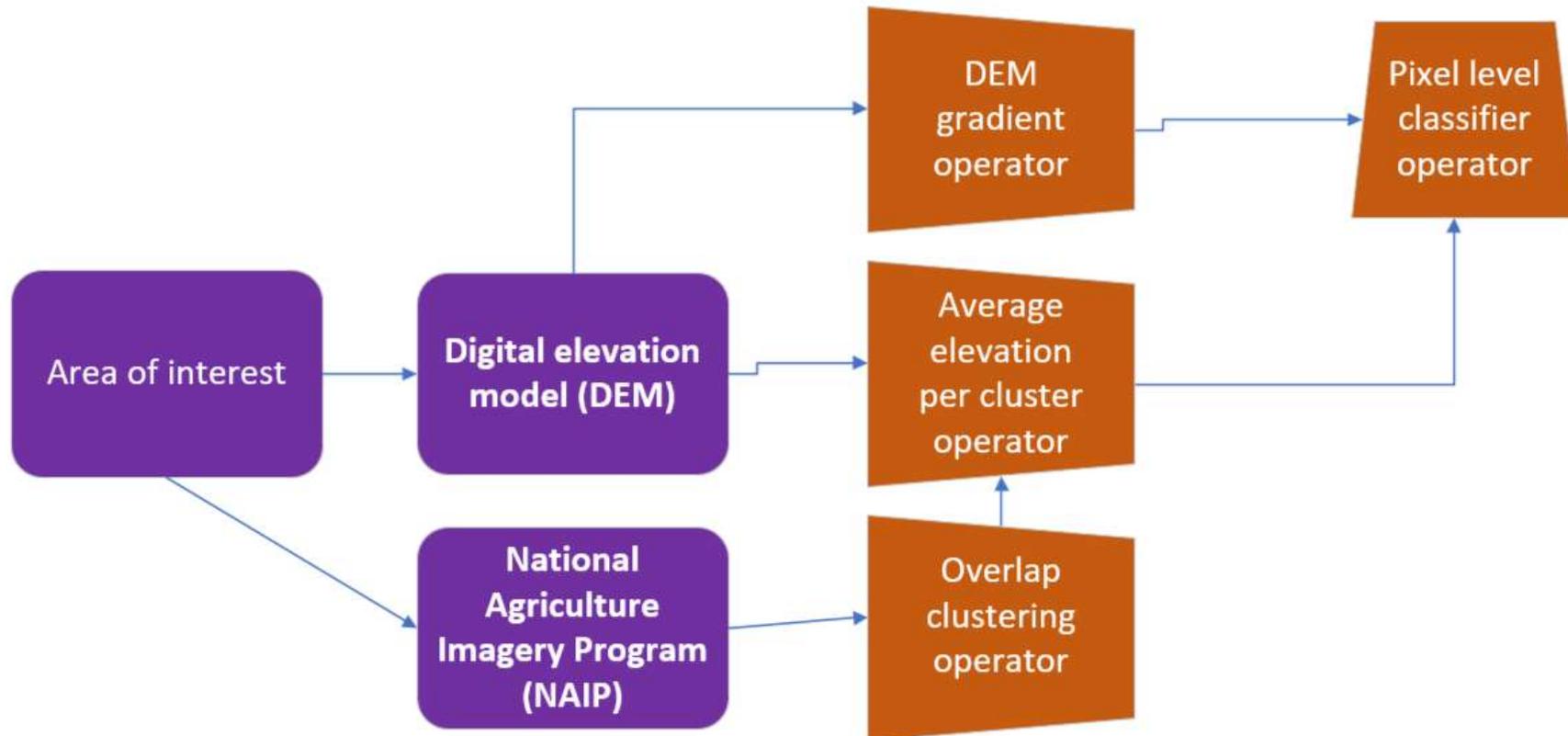
Roberto Santos (MSR)

Terraces

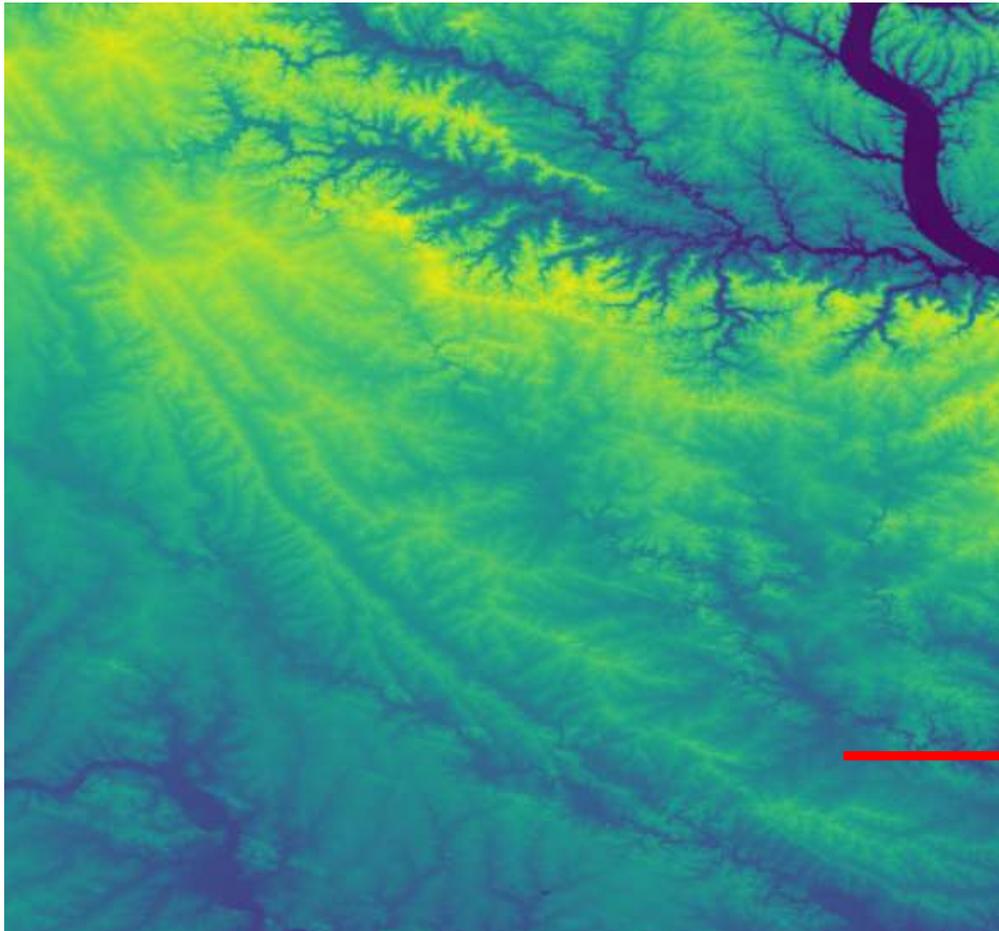
- Terraces are an essential agricultural conservation practice.
- Existing techniques are labor-intensive and highly subjective.
- Our platform combines state of the art in land cover mapping and computer vision ML.



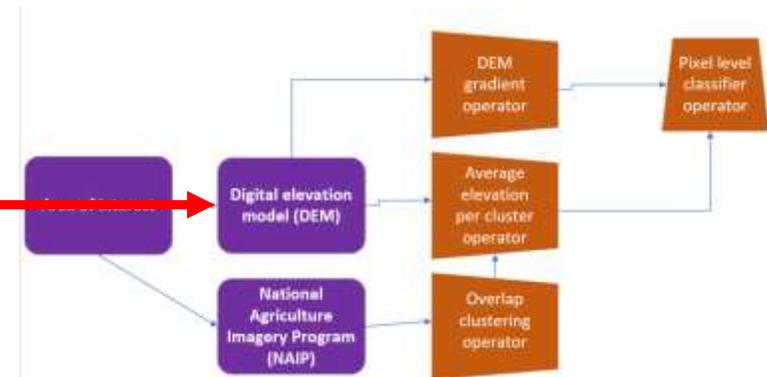
High level vision of the workflow



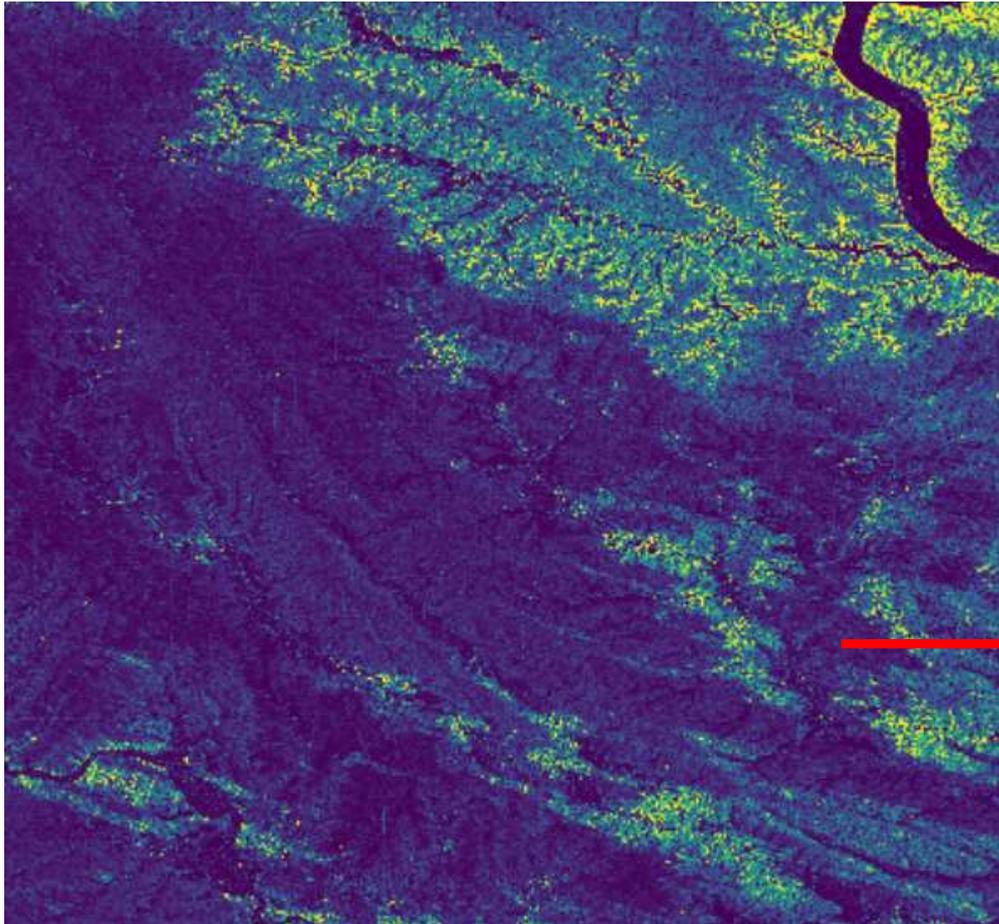
Digital Elevation Model (DEM)



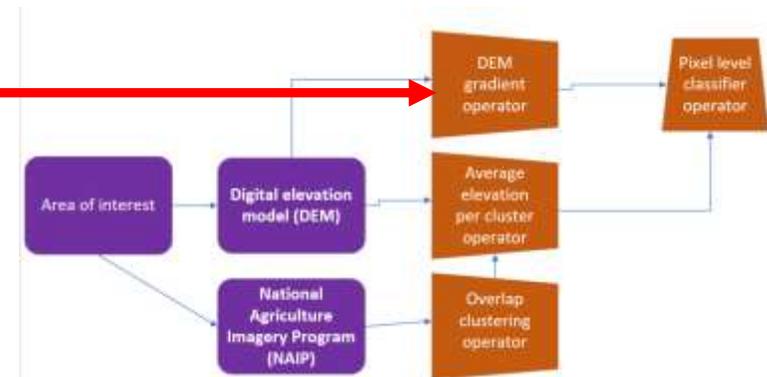
- U.S.-wide digital elevation data at horizontal resolutions ranging from one to sixty meters.



DEM gradient



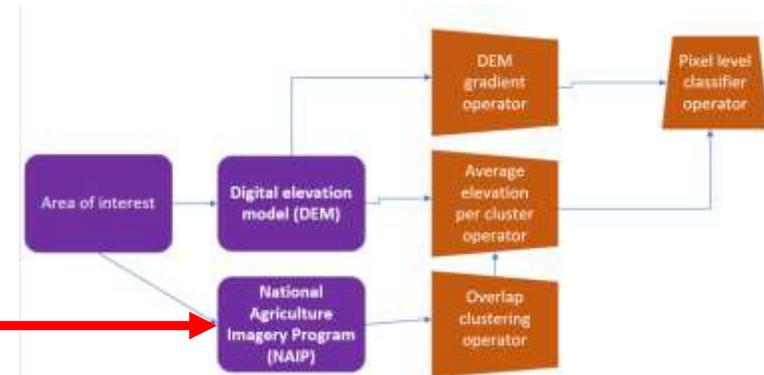
- We calculate the DEM gradient to identify the variation in the elevation data.



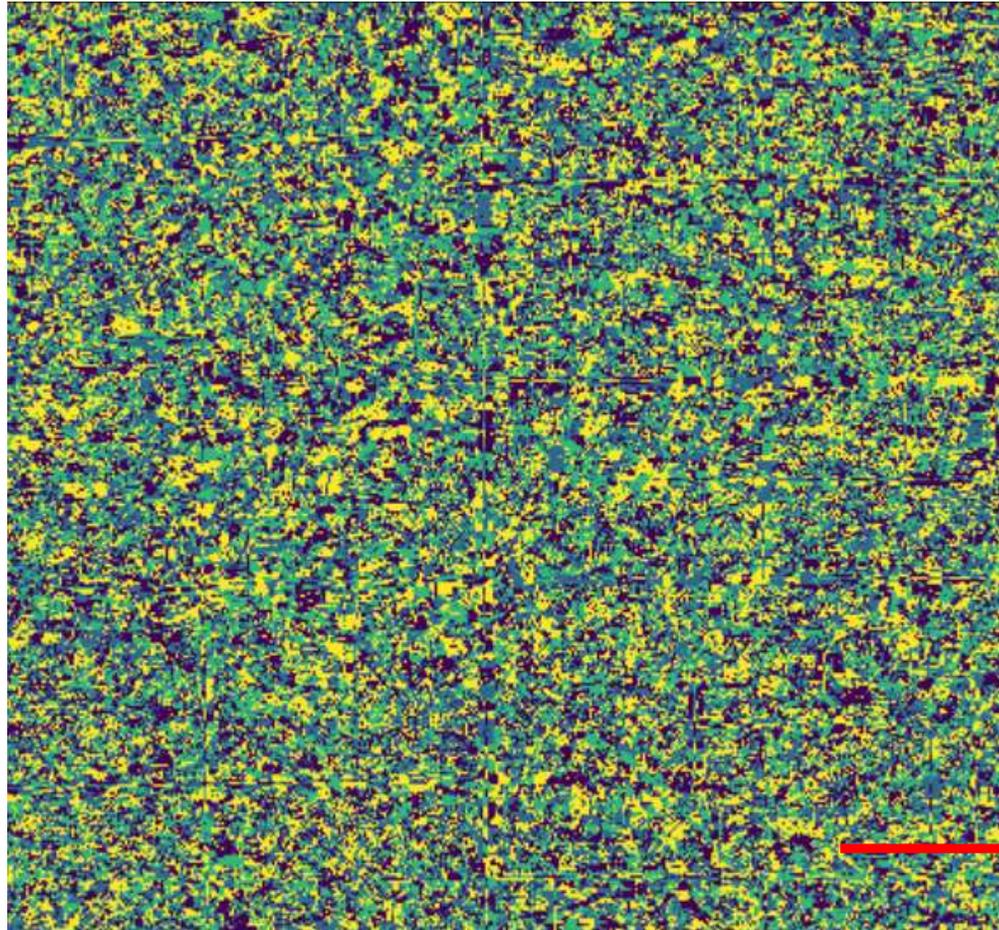
NAIP



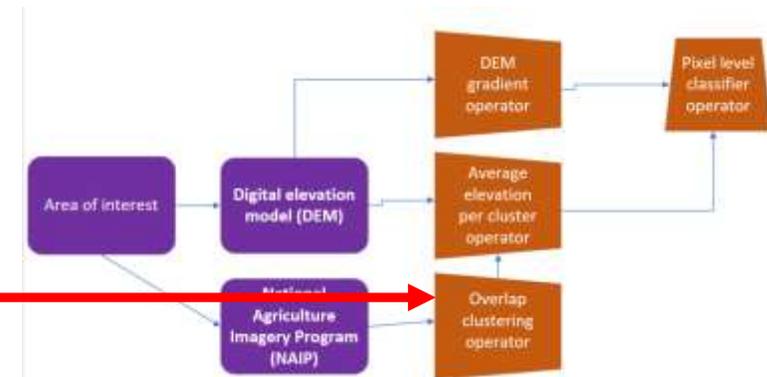
- The National Agriculture Imagery Program (NAIP) provides US-wide, high-resolution aerial imagery, with four spectral bands (R, G, B, IR).



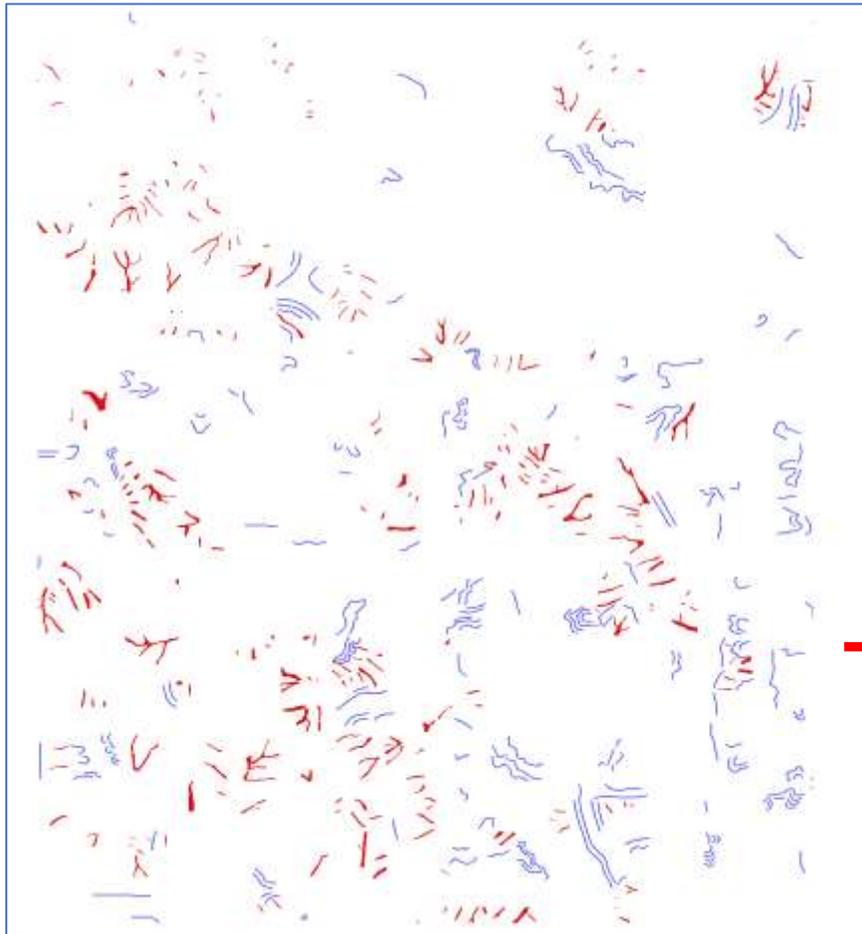
NAIP cluster



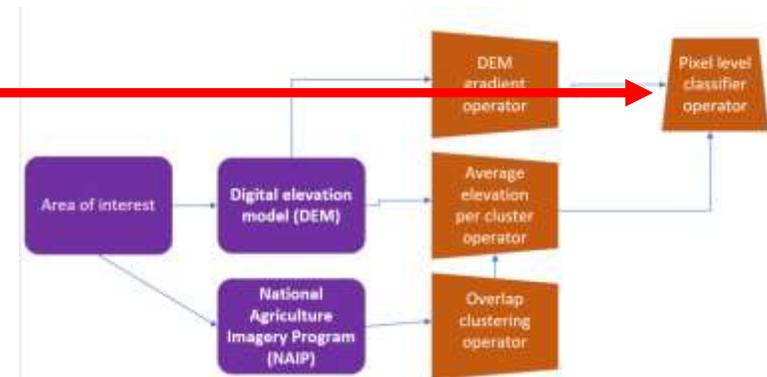
- We calculate the NAIP cluster to identify elevation variation across landcover classes.



Model output



- Model output shows terraces (blue) and grass waterways (red).



Microsoft Research
Summit 2022

Thank you