OVERVIEW

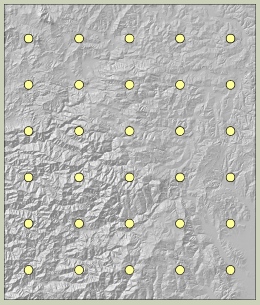
- Short introduction to research
  - predictive forest vegetation mapping
- Introduction to Google Earth Engine (a different kind of GIS software)
- Step through analysis of delineating forest stand boundaries and attributing them with forest measurements

CURRENT RESEARCH

- Spent 20 years developing and applying a method of predictive forest vegetation mapping called Gradient Nearest Neighbor (GNN)
- We now have 33 years of predictions (1985-2017) for all forested land in Washington, Oregon, and California
- Newest release of data will be coming this spring

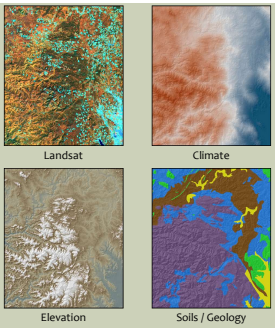
SETTING FOR FOREST MAPPING USING NEAREST NEIGHBORS

- Gridded sample of forest inventory plots with measured forest attributes (live and snag trees, down wood, shrub/forb cover)
- Not spatially complete

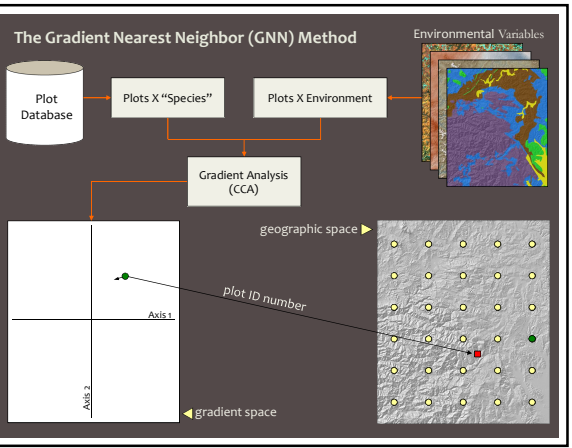


SETTING FOR FOREST MAPPING USING NEAREST NEIGHBORS

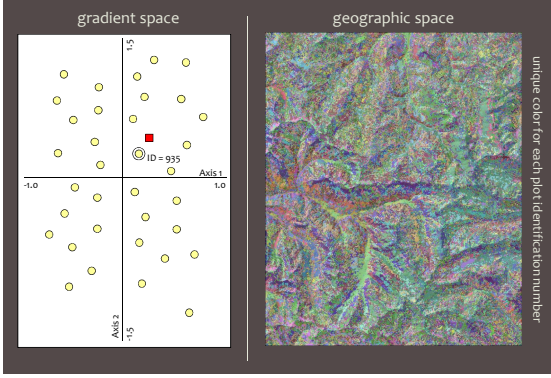
- Set of remote sensing and GIS data layers that relate to forest composition and structure
- No direct information about actual forest vegetation



The Gradient Nearest Neighbor (GNN) Method

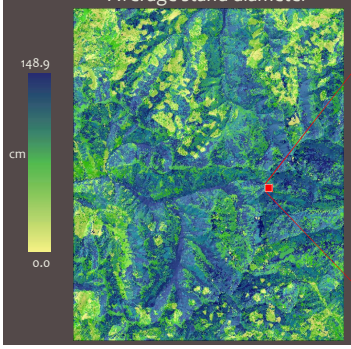


SPATIAL PRODUCTS IN GNN – NEIGHBOR IDS



SPATIAL PRODUCTS IN GNN – NEIGHBOR ATTRIBUTES

Average stand diameter

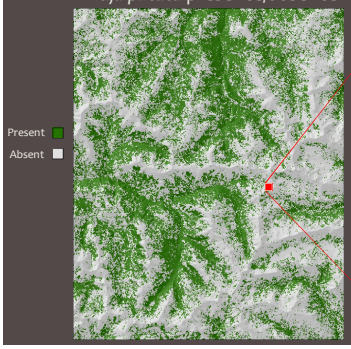


plot attribute table

Plot ID number	30465
Conifer basal area	60.4735
Hardwood basal area	0.0547
Total basal area	60.5282
Total tree density	291.8136
Average stand diameter	60.6797
Large snag density	13.121
Large down wood volume	0.00
Canopy cover	76.7616
Thuja plicata basal area	15.1642
Vegetation class	10

SPATIAL PRODUCTS IN GNN – NEIGHBOR ATTRIBUTES

Thuja plicata presence/absence



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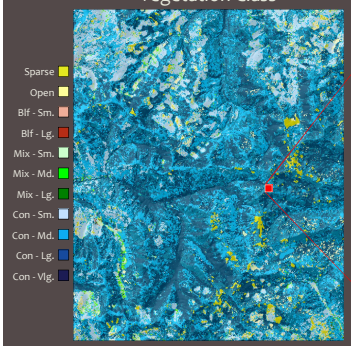
SPATIAL PRODUCTS IN GNN – NEIGHBOR ATTRIBUTES

Vegetation Class



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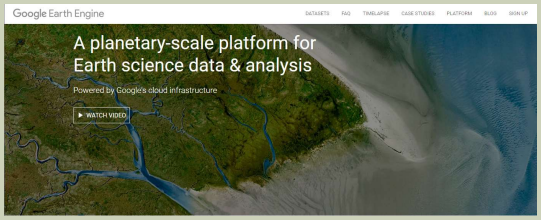
GOOGLE EARTH ENGINE

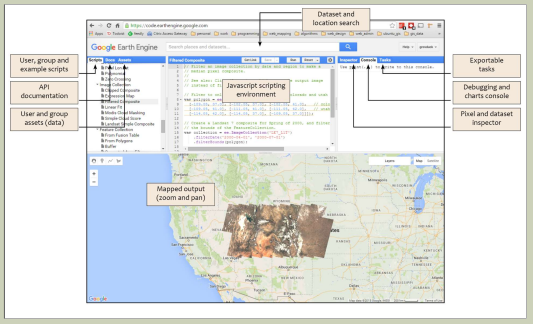


Homepage: https://earthengine.google.com/

ENTER GOOGLE EARTH ENGINE

- What is Google Earth Engine (GEE)?
  - Platform for petabyte-scale scientific analysis and visualization
  - **DATA**: Repository for complete collection of many satellite datasets including Landsat, MODIS, and NAIP
  - **COMPUTING POWER:** Analysis environment is massively parallel network of computing nodes – Google's infrastructure
  - **EASE OF USE:** Javascript and Python APIs
  - Free for research, education and non-profit use

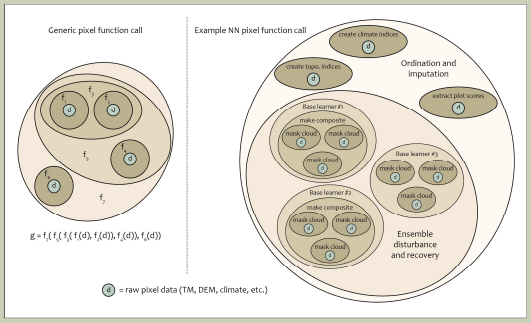
GOOGLE EARTH ENGINE PLAYGROUND



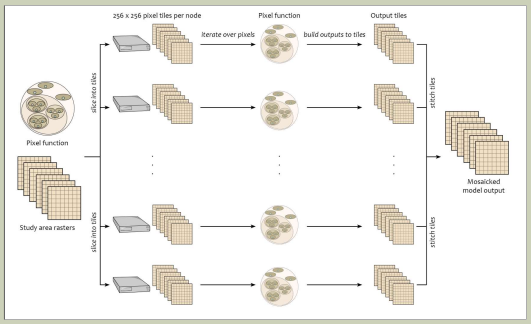
EARTH ENGINE IS LIKE AN ONION…

Image credit: http://www.healthyfoodspirit.com/the-almighty-onion/

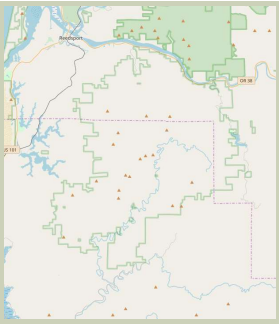
EARTH ENGINE IS LIKE AN ONION…



… REALLY, THOUSANDS OF ONIONS

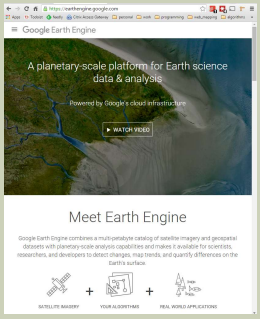


CASE STUDY: STAND DELINEATION AND ATTRIBUTION



- Study area
  - Elliott State Forest
- Goals
  - Delineate stand boundaries automatically using GEE and spectral data
  - Attribute stands with volume using GNN as training dataset
  - Use model to apply to larger extent area
- Live coding using GEE

FOR MORE INFORMATION



- Google Earth Engine sign-up:
  - https://signup.earthengine.google.com/
- LEMMA (GNN) homepage:
  - https://lemma.forestry.oregonstate.edu