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Google Earth Engine

An introduction to processing remote sensing data in GEE

Ben Collings
Noel Zeng
Nelis Drost

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Session housekeeping

- Introductions
- Mute, Raise your hand, ‘Chat’ in Zoom
- If you feel comfortable - cameras on

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Session plan

3 practical (***show and do***) modular sessions:

- **Session 1** – Introduction to GEE code editor, image collection, images and visualisation
- **Session 2** – Image functions, indices, colour palettes and exporting data
- **Session 3** – Import data and image classification

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Google Earth Engine (GEE)

- Cloud computing platform with access to most* publicly available EO data with pre-processing steps already applied.
- One-stop-shop for raster-based analyses.
- Ability to perform large scale processing (Global/National) quickly and efficiently with Google Cloud infrastructure.
- Access through a web-browser with the Javascript code editor or via a Python API.
- Free for research, non-profits.

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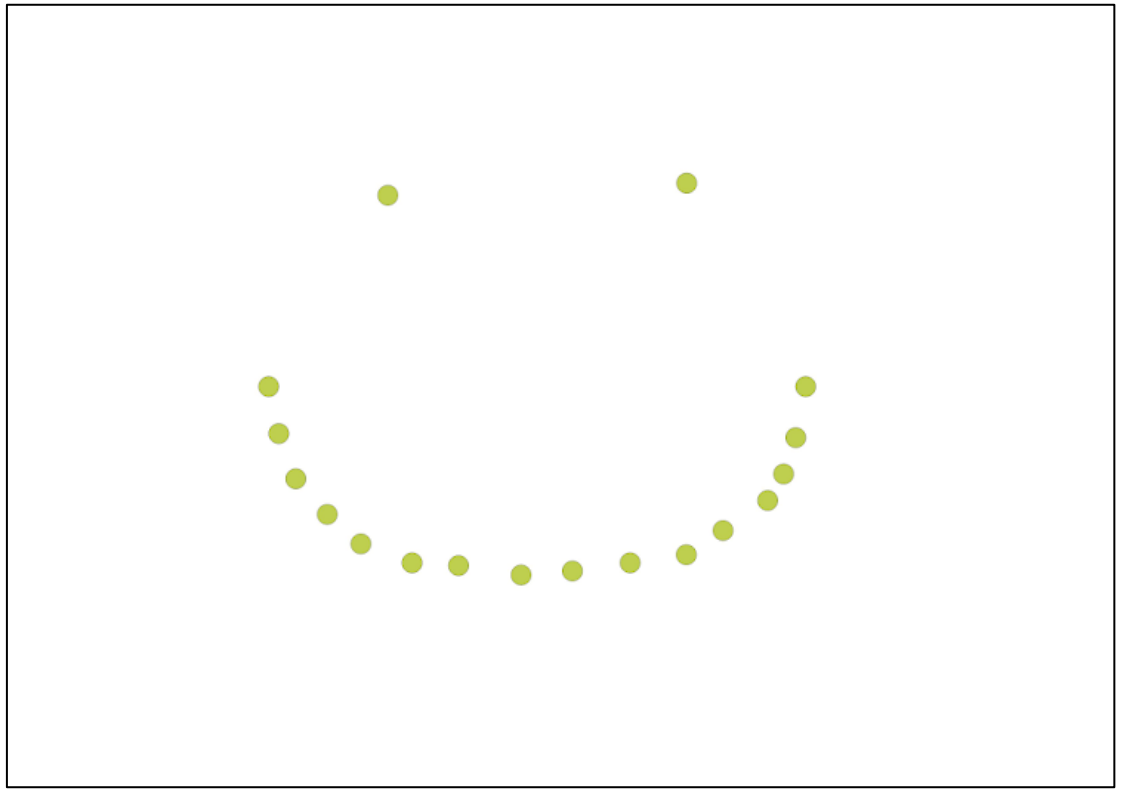
Geospatial data

- **The power of where:**
  - Data + location
- Useful for mapping and using data in multiple contexts



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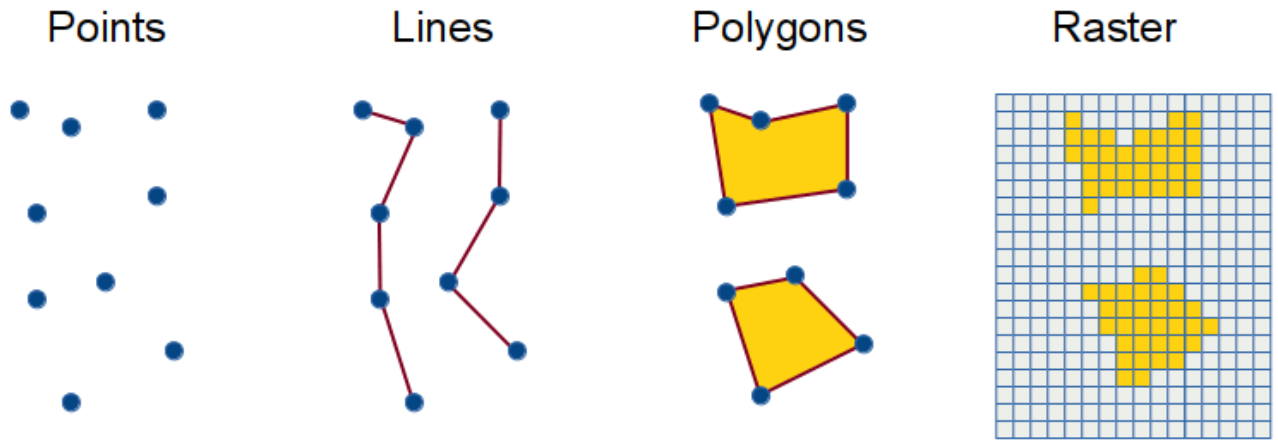
Types of geospatial data

- **Vector**
  - Points
  - Lines
  - Polygons
- **Raster**
  - Gridded array of values spatially referenced that can be used to represent spatially continuous information/phenomenon (e.g. satellite image, elevation)



Source: https://ui.josiahparry.com/spatial-analysis.html

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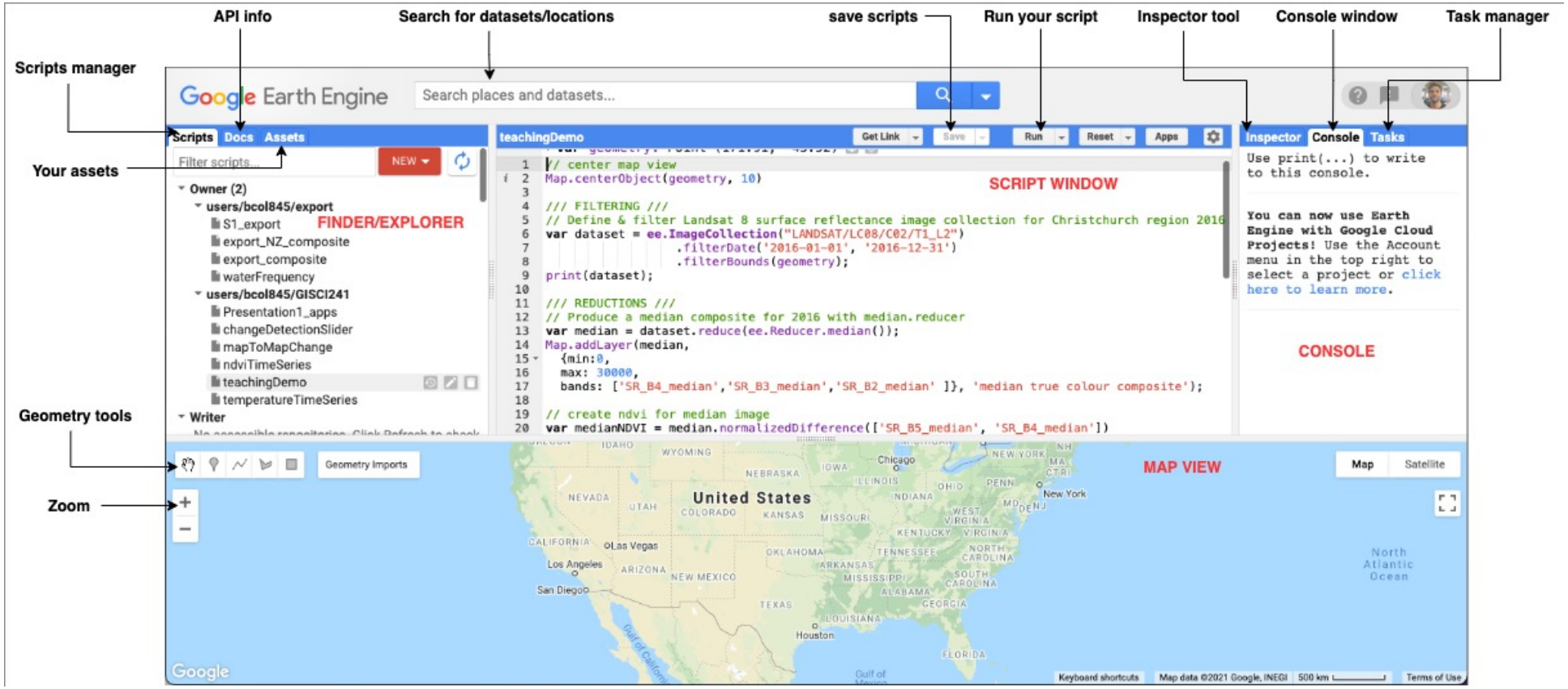
Session 1 – The code editor, image collections, images and visualisations

Objectives:

- Understand how to search for datasets using the code editor and import them into scripts
- Learn how to create a geometry and use it in a script
- Learn about image collections and how to filter them
- Understand how the doc tab works to search for functions
- Understand images, visualization parameters and visualizing an image in the map view

The code editor



https://code.earthengine.google.com/1ee47f9049304d3352dc4ddbc6a76832

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Let’s take a break

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Session 2 – Image functions, indices, colour palettes and exporting data

Objectives:

- Understand the concept of image functions and where to search for them
- Learn how to derive normalized indices in GEE using normalized burn ratio as an example
- Learn how to perform a difference between two images
- Learn how to apply a colour palette to an image
- Learn how to export data from GEE to use in other GIS/remote sensing software

Let’s take a break

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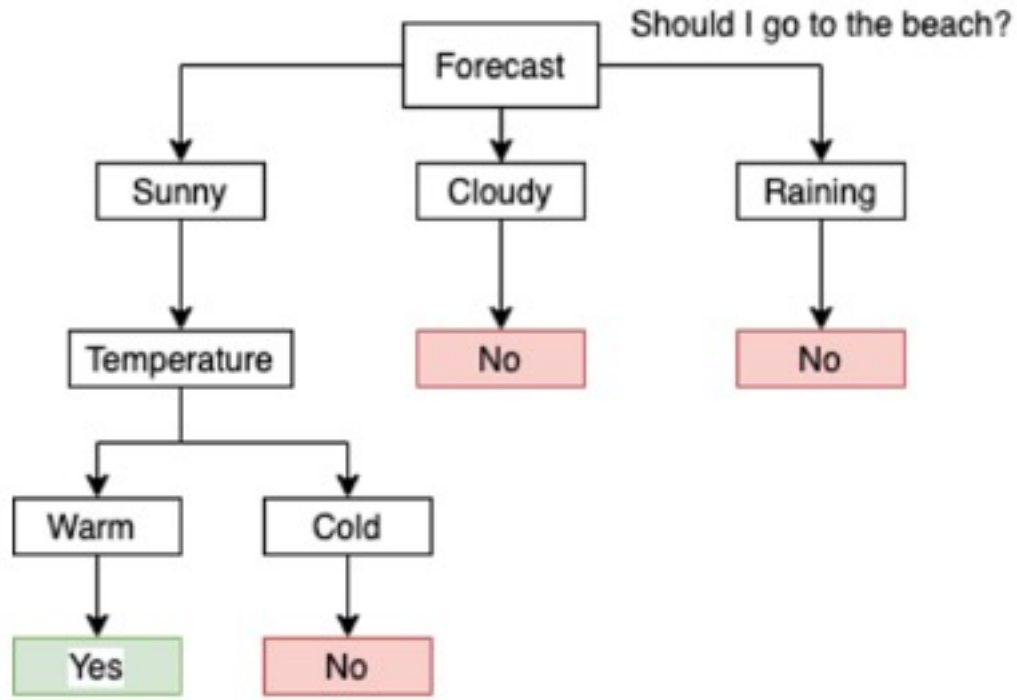
Image classification with decision trees

- Selection of decision tree machine learning algorithms available in GEE
- Random Forests is particularly useful for remote sensing image classification as final output is an aggregation of results from many decision trees minimizing overfitting, without increasing bias.



Session 3 – Ingesting data and image classification

Objectives:

- Learn about FeatureCollections and how they are useful for training classification algorithms
- Understand the concept of Assests, how they are useful for storing you own data and for saving data/outputs you might use regularly
- Learn how to ingest a dataset into GEE as an asset
- Understand what classification algorithms are available in GEE and where to find them
- Learn how to apply a supervised classification algorithm in GEE
- Learn how to assess the accuracy of a classification output in GEE
- Understand the limitations of classification in GEE

Summary

- Hopefully, you have tools/knowledge/resources to consider using GEE for your own research
- Check out the resources cheat sheet for further tutorials and information