Recap

TU Delft

Code Management

Bug fix

Removed old text
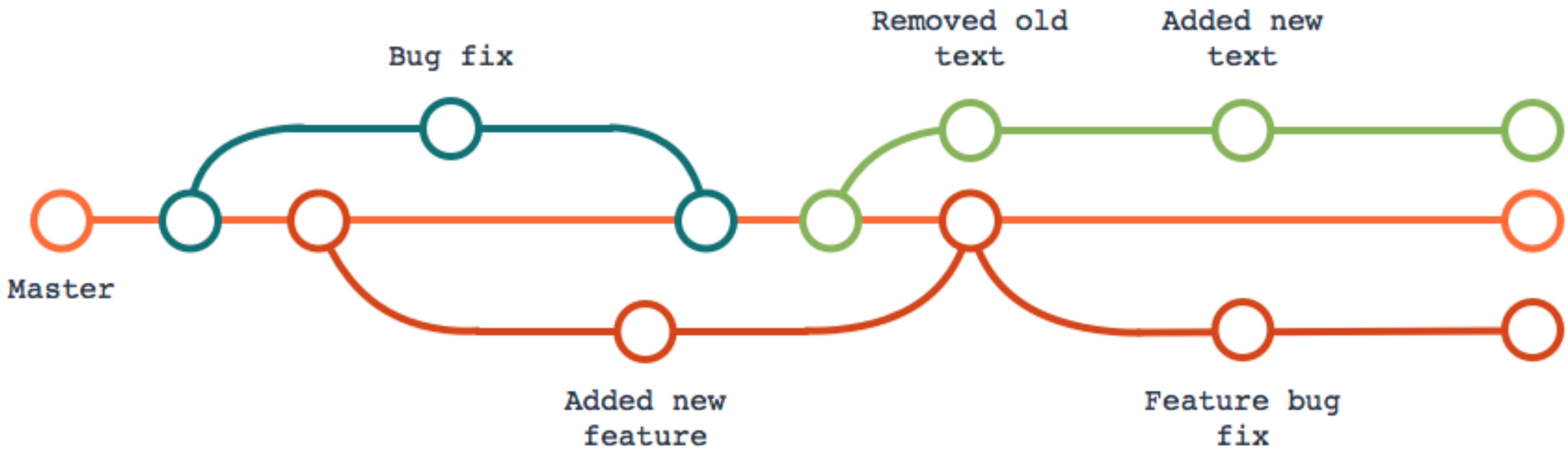
Added new text

Master

Added new feature

Feature bug fix

Master

Branch

Merge

Visualisation

- Different types of plots

- Matplotlib

- Seaborn

- Plotly express

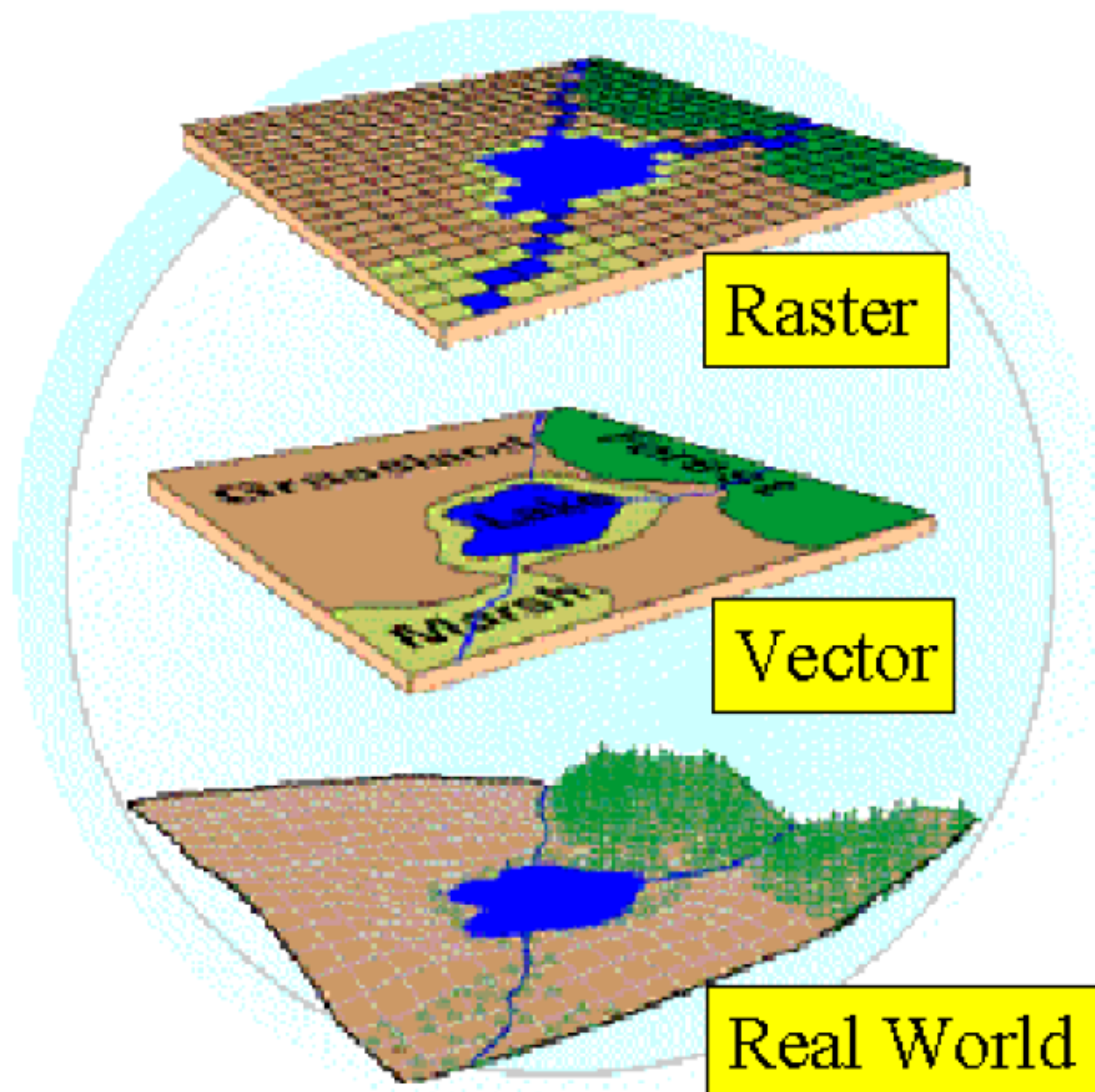# Advanced visualisation

Overview

- 3D plots

- Geospatial visualisation

- Interactive visualisation

- Dashboarding

3D plots

- x

- y

- z

- Eg: line plots, scatter plots, surface plots

- plotly_express - only line_3d and scatter_3d
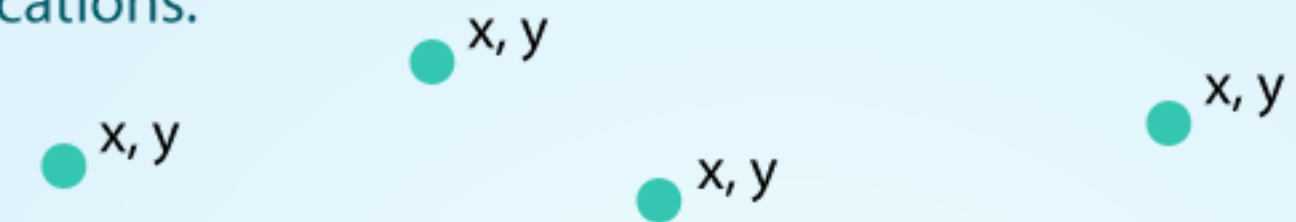
Geospatial visualisation

Raster

Vector

Real World

Vector data basics

- Point

- Linestring

- Polygon

POINTS: Individual **x, y** locations.
ex: Center point of plot locations, tower locations, sampling locations.

x, y

x, y

x, y

x, y

LINES: Composed of many (at least 2) vertices, or points, that are connected.
ex: Roads and streams.

x, y

x, y

x, y

x, y
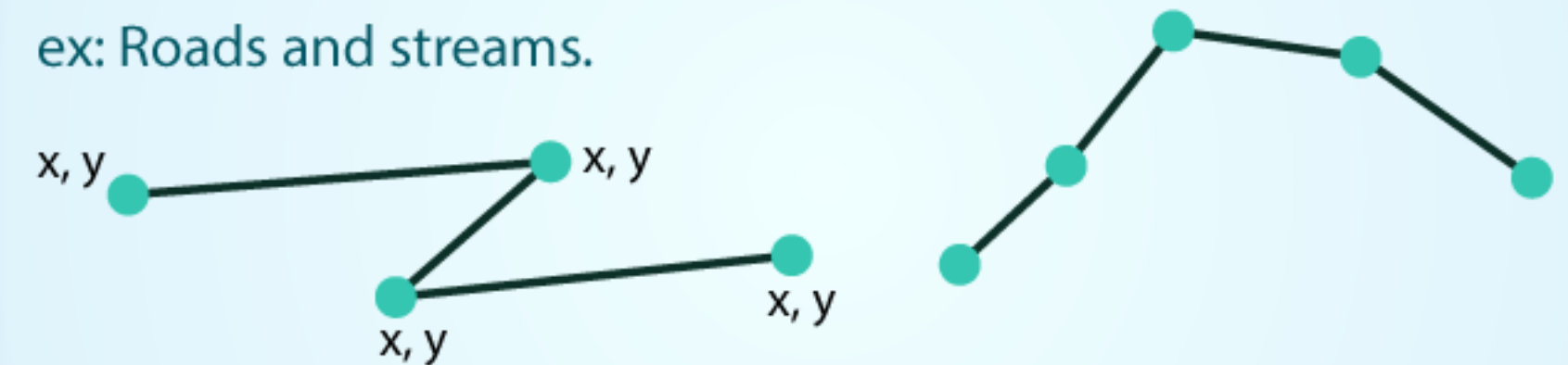
POLYGONS: 3 or more vertices that are connected and **closed**.
ex: Building boundaries and lakes.

x, y

x, y

x, y

neon

Raster data basics

Pixel (DN = 110)

Layers

Lines
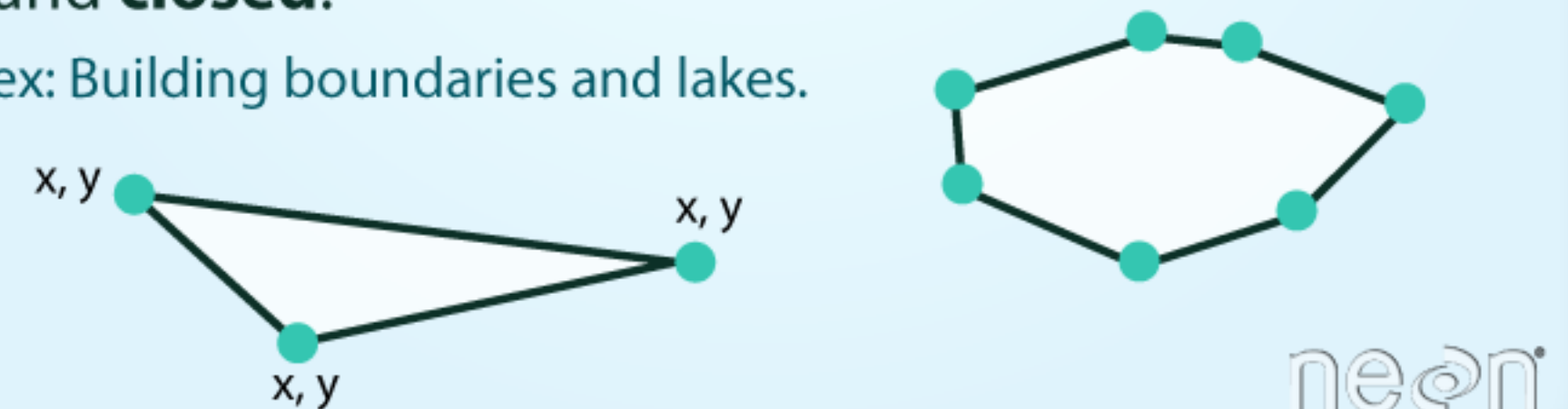
Columns
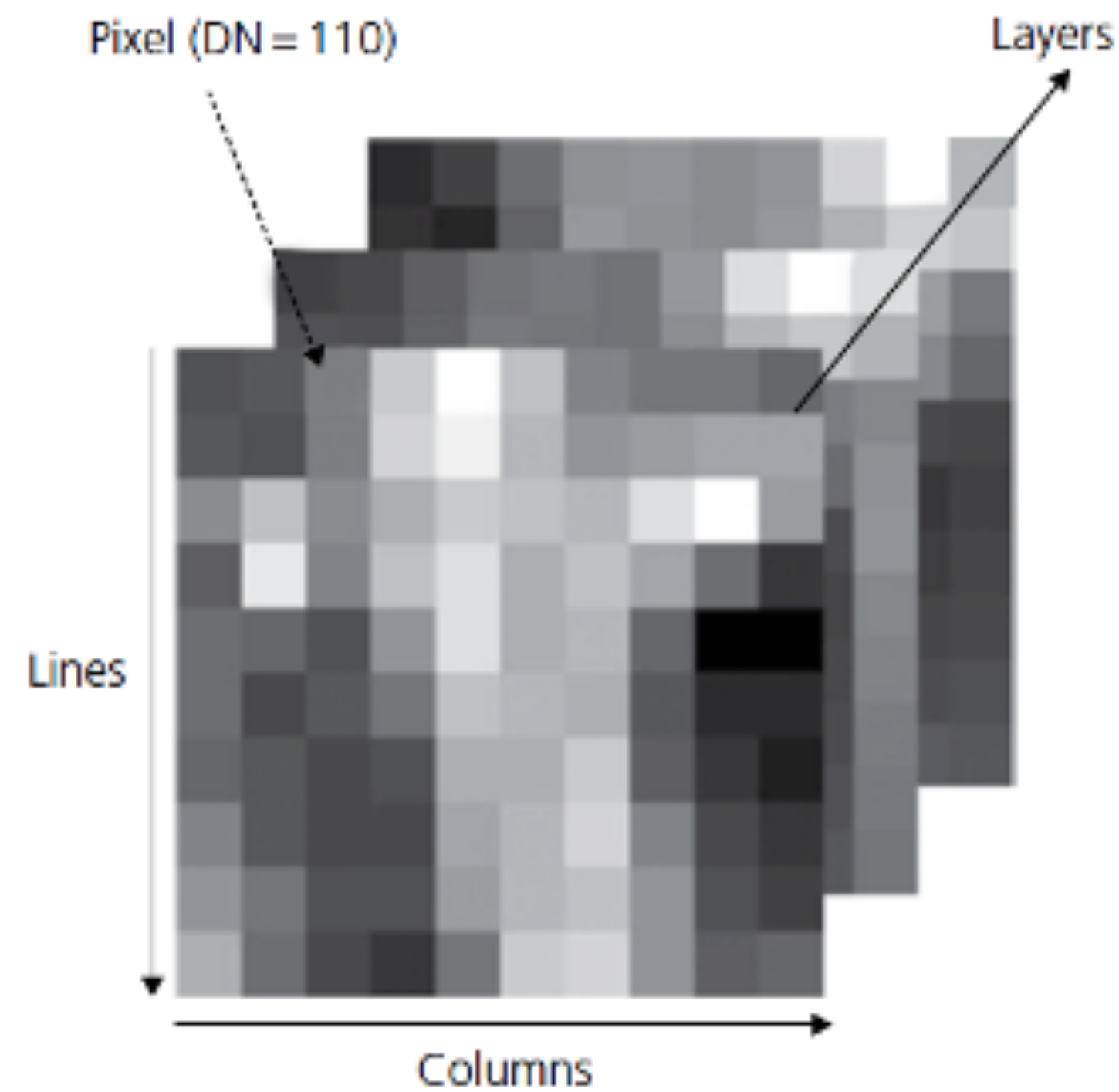
Raster over the same extent, at 4 different resolutions

| 0,8 | 8,8 | 0,8 | 8,8 | 0,8 | 8,8 | 0,8 | 8,8 |

8 meter   **4 meter**   **2 meter**   **1 meter**

0,0   8,0   0,0   8,0   0,0   8,0   0,0   8,0
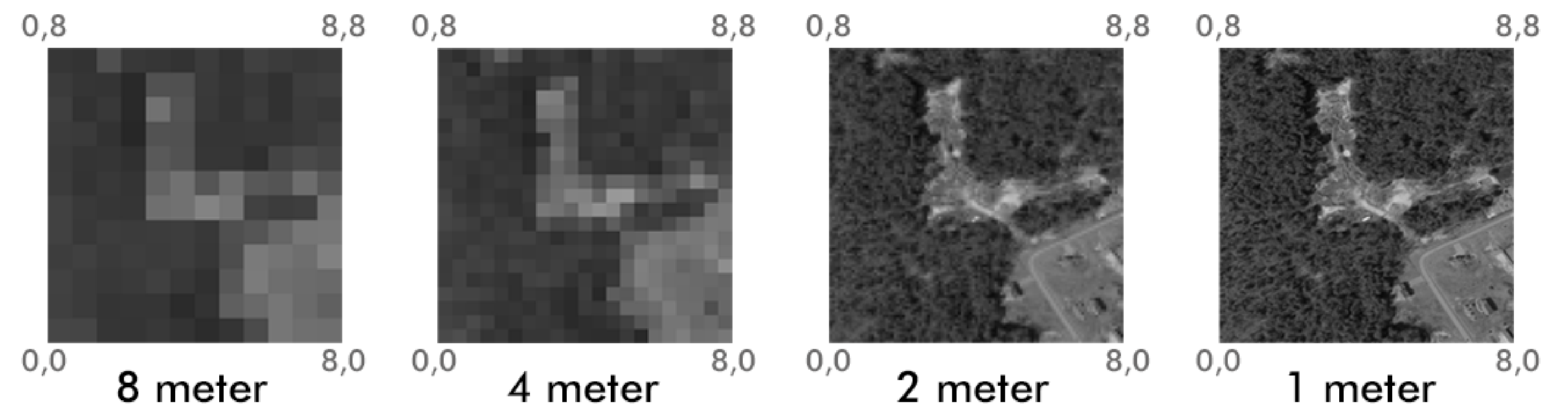
Data formats

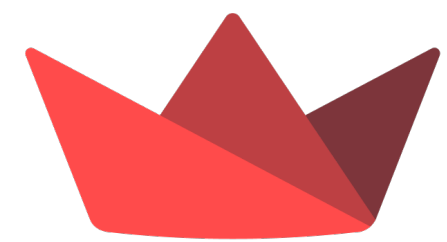| Extension	File Type	Description
Esri Shapefile	.SHP, .DBF, .SHX	The shapefile is BY FAR the most common geospatial file type you'll encounter. All commercial and open source accept shapefile as a GIS format. It's so ubiquitous that it's become the industry standard. But you'll need a complete set of three files that are mandatory to make up a shapefile. The three required files are: • SHP is the feature geometry. • SHX is the shape index position. • DBF is the attribute data. You can optionally include these files but are not completely necessary. • PRJ is the projection system **metadata**.XML is the associated metadata.SBN is the spatial index for optimizing queries.SBX optimizes loading times.
Geographic JavaScript Object Notation (GeoJSON)	.GEOJSON .JSON	The GeoJSON format is mostly for web-based mapping. GeoJSON stores coordinate as text in JavaScript Object Notation (JSON) form. This includes vector points, lines and polygons as well as tabular information. GeoJSON store objects within curly braces {} and in general have less markup overhead (compared to GML). GeoJSON has a straightforward syntax that you can modify in any text editor. Webmaps browsers understand JavaScript so by default GeoJSON is a common web format. But JavaScript only understands binary objects. Fortunately, JavaScript can convert JSON to binary.

Libraries

- Data manipulation - pandas, geopandas

- Visualisation - plotly graph objects, plotly_express, geopandas, folium

Interactive visualisation

- Hover, animation, slider, buttons

- animation_frame

- animation_group

Visualisation - Dashboarding

Streamlit

plotly

Flask

https://realpython.com/python-dash/
https://streamlit.io

TUDelft

Artificial Intelligence
for Mobility

Streamlit

- Prototyping

- No additional languages needed

- Only python

Project

Prepare you to apply data pipelines to real-world TIL tasks or to leave you well-qualified to start data modelling and quantitative research in TIL

Project

- Schedule

	♟ **Advanced Visualisation** ⊛ **Lab 8**	📑 **Hand in Lab 8**	⊛ **Project (no supervision)** ⊛ **Project**		📑 **Research Questions Data check**
6	⊛ **Project (no supervision)** ⊛ **Project**		⊛ **Project (no supervision)** ⊛ **Project**		📑 **Resit Exam**
7	⊛ **Project (no supervision)** ⊛ **Project**		⊛ **Project (no supervision)** ⊛ **Project**		📑 **Mid-term check**
8	⊛ **Project (no supervision)** ⊛ **Project**		⊛ **Project (no supervision)** ⊛ **Project**		
9					
10					📑 **Project submission**

Project

- Application project

  - Effect of covid on activity patterns and vice-versa

- Algorithmic project

  - Implement an optimization method and improve it efficiency and accuracy

- Theoretical project

  - Build a car-following model and analyse its sensitivity to different parameters

Project

- Research question (10%)

  - Must include data modelling and quantitative research in TIL domain

  - Data check and requirements

- Coding/Logic (30%)

- Narrative (20%)

- Code readability (20%)

  - Pep8 standard, modularity, creating libraries if necessary

- Individual contribution (10%)

- Technical quality and significance (10%)

Deliverables

- Jupyter notebook, PDF/HTML

- Milestones

    - Proposal + datasets - **formative feedback**

    - Midterm notebook - **formative feedback**

    - Final notebook - **summative feedback**

        - Should include research objective, dataset details, author contribution statement

        - Result analysis, visuals, insights, discussion

Possible datasets

- EUROPE data - https://ec.europa.eu/eurostat/web/transport/data/main-tables

- CBS data - https://opendata.cbs.nl/statline/portal.html?_la=en&_catalog=CBS

- Dutch open data - https://data.overheid.nl

- Google mobility report - https://www.google.com/covid19/mobility/

- COVID data - https://ourworldindata.org/coronavirus, https://data.rivm.nl/covid-19/

- Flight data - https://opensky-network.org

- Public transport data - https://travic.app/?z=12&x=260915.3&y=6251439.5&l=osm_standard&ol=

- Emission data - https://map.carbonspace.tech

Example project

- Research objective

  - How did covid affect the activity patterns of people in NL?

- Data

  - Google mobility report

  - Covid data

  - Population data

  - RIVM data