CSC

ICT Solutions for Brilliant Minds

PyQGIS: expanding QGIS's functionality with Python – Day 1

November 2021

Introductions

- Tatu Leppämäki
- What I do
  - Finalizing my master's thesis in geoinformatics at Uni Helsinki
  - Part-time research assistant in Digital Geography Lab
- PyQGIS history
  - Developed a plugin in 2019
  - Used PyQGIS for various purposes ever since

What about you? ☺

- Brief introduction
  - Who are you?
  - What do you do?
  - How experienced are you with QGIS and Python?
  - What are your expectations for this course?

Course structure

- **Day 1: Basics of PyQGIS**

9–10:20 - PyQGIS intro practical

10:20–10:40 – BREAK

10:40 – 12 – PyQGIS intro practical

- **Day 2: Processing and plugins**

9–10:20 – Processing via PyQGIS

10:20–10:40 - BREAK

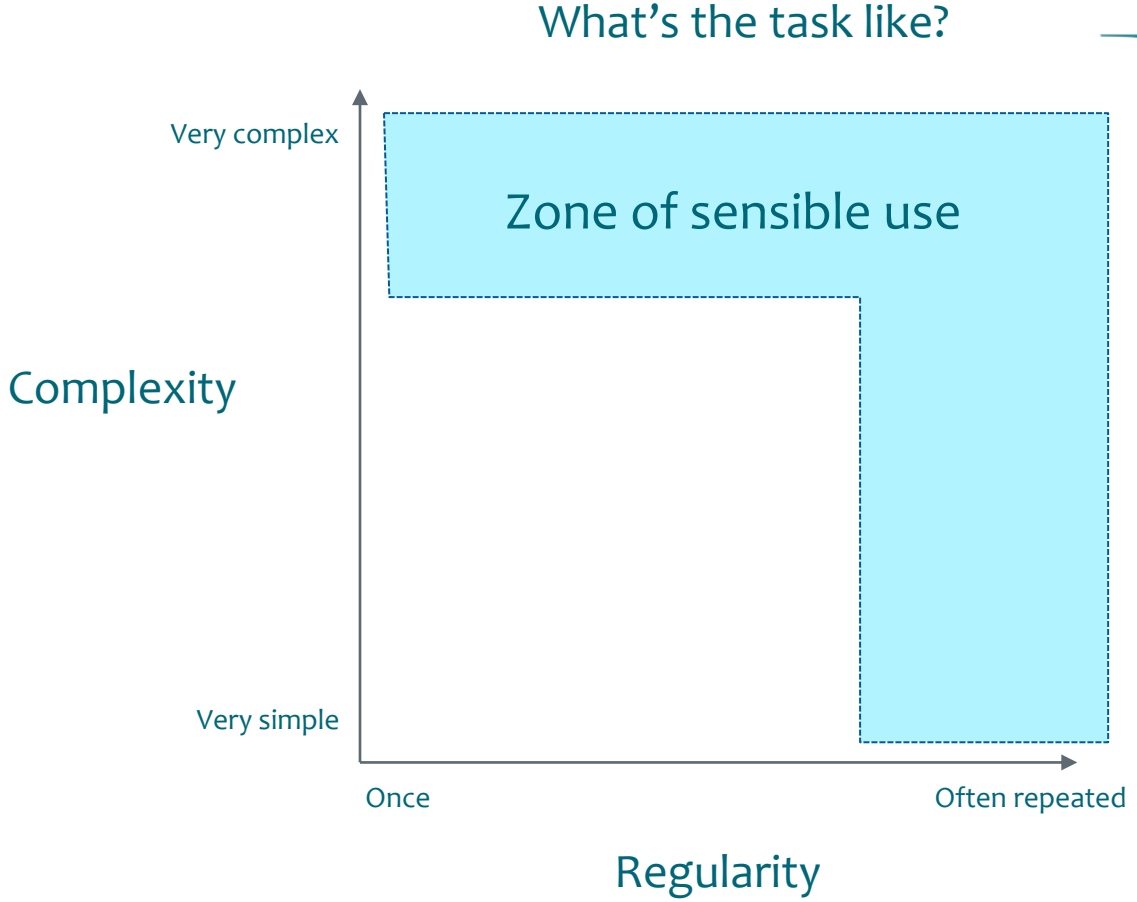
10:40–12 - A look at plugin development

What is PyQGIS?

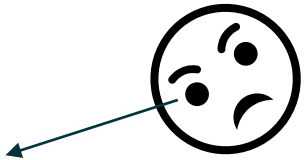
- PyQGIS is a general term for running Python code in QGIS
- QGIS is written is C++, but almost everything is possible through the Python bindings
- Some of the things possible with PyQGIS:
  - Run custom code within QGIS that interacts with the core program
  - Create processing algorithms
  - Create plugins with custom user interface and functionality
  - Run Python macros on startup
  - Create custom programs *based* on QGIS (like QField)

When to use PyQGIS

- QGIS is very powerful in itself – no need to whip out Python for a single buffer operation
- PyQGIS shines when used on:
  - Often repeated tasks (like tools)
  - Rare and complex tasks



Usage example: looping through thousands of shapefiles



Problem

- A polygon database covering whole Finland was shared as shapefiles broken into hundreds of folders
  - Only some polygons were relevant
  - In each layer, there could be *N* relevant polygons

Solution

- Python script to loop the folder structure -> load each layer ->save relevant features -> remove layer
- A unique, but time consuming problem

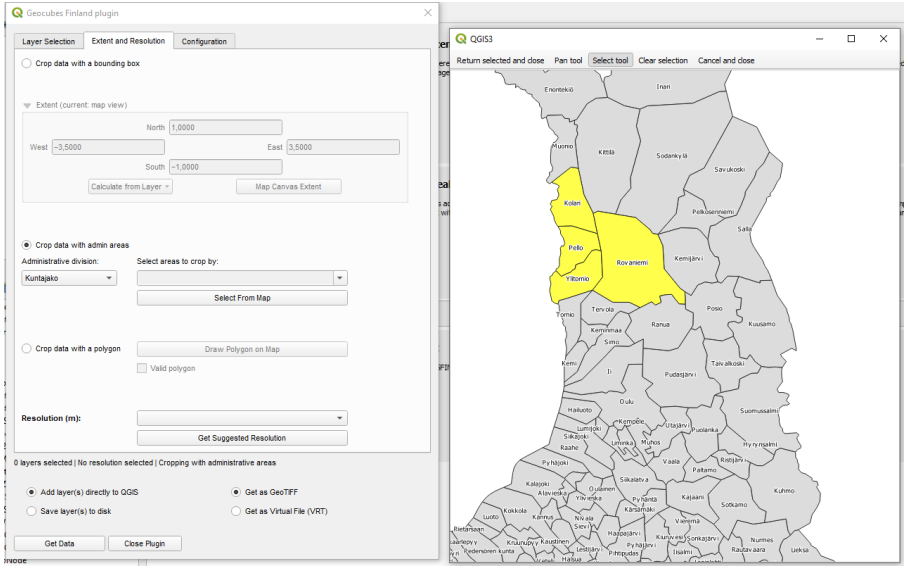
Usage example: GeoCubes Finland plugin

Problem

- GeoCubes Finland is a service for accessing lots of raster data on the cloud
  - It can be queried on multiple variables: dataset, year, resolution, extent
  - QGIS couldn't interact with it natively

Solution

- A plugin with custom interface for selecting the variables was created
- Here, the task was both complex and repeated



Practicals

- Everything is run *within* QGIS
- Practical instructions
  - Independent work
  - Narrative structure mixed with code blocks --->
  - Run the code blocks as you go
  - The narrative is broken by **tasks**
  - If you have time, the’re **challenges** at the end

Course practicalities

- HackMD page for a summary of course practicalities: https://hackmd.io/@GeospatialCSC/PyQGIS
  - You may also use it to ask questions
- Ask for help in Zoom via chat or voice
- All the course materials can be found in GitHub https://github.com/csc-training/pyqgis
  - Practical instructions are as .ipynb files, you may open them directly in GitHub

Day 1: Basics of PyQGIS

- Objectives
  - Learn to run PyQGIS code from the integrated Python console and scripts
    - Interacting with QGIS through code
  - Get familiarized with core concepts and classes
    - QgsVectorLayer
    - QgsProject

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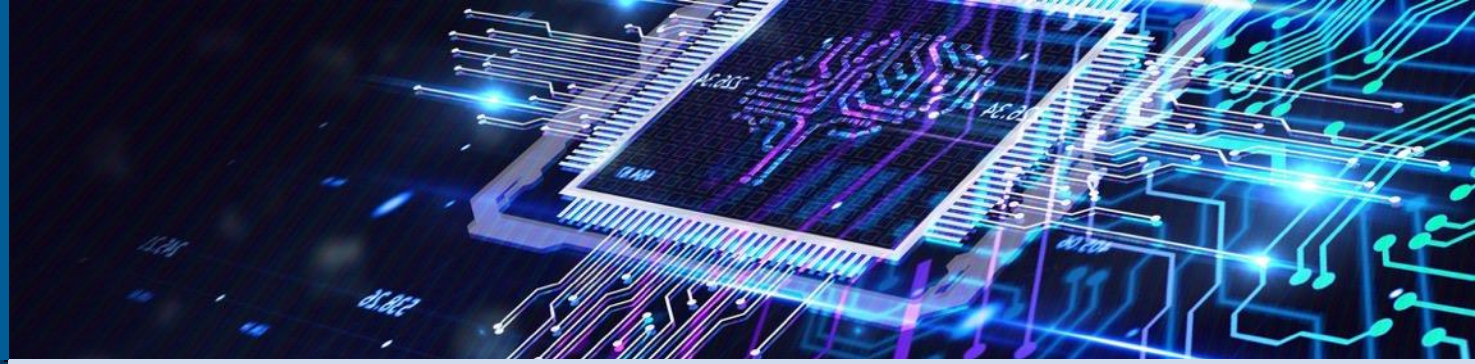

Good luck, have fun!