

UP42 Data Engineering Challenge



Background

Thank you for taking the time to take the *UP42 Data Engineering Challenge*.

This challenge is intended to give us a better understanding of how you work and what your skills are. We also want to be able to compare your application to other applications for the same or similar roles.

Clip and Sharpen Challenge

In this challenge you will write a program that applies a high-pass filter to a satellite image. High-pass filters are used to "sharpen images" and there are many different algorithms available. You are free to use available image filters or you can implement one of your own.

As satellite images can be very large, the program should also be able to subset ("clip") a part out of the image before the memory-hungry filter operation is applied.

Data

You can download example data here: <https://www.intelligence-airbusds.com/en/8262-sample-imagery>, our suggestion would be SPOT or Pleiades.

Tasks

- Download some example data
- Your task is to write a program executing two steps:
 - Clipping a subset of the input image by using image or projected coordinates
 - Applying a high-pass filter on the clipped image
- Visualising the output either in a GIS (e.g. QGIS; a screenshot is sufficient) or a Jupyter notebook.
- Please be pragmatic with your solution! There is no need to implement a fancy convolution filter from scratch if there are fabulous open source solutions available.

Requirements and submission guidelines

- The solution needs to be implemented in Python, preferably 3.x
- Code and commit messages should be treated as you would on a real-world task
- Please take some time to think about code quality and testing, and demonstrate your approach to these aspects
- Provide a README with instructions on how to set up, run and test the application
- You should *not* include the downloaded data in the challenge -- but your README should tell us where to put it so that we can run your submission
- When submitting, please provide a link to an online Git repository or a ZIP file which includes the local `.git` folder for the project.

Extra

- Showing and explaining what the filter does in a Jupyter (IPython) notebook.
- Use rasterio (link below) for reading, clipping and writing images.
- Running the program in a virtualenv or – even better – a docker container.

Pointers to get you started

- <https://stackoverflow.com/questions/6094957/high-pass-filter-for-image-processing-in-python-by-using-scipy-numpy>
- <https://rasterio.readthedocs.io/en/latest/>

Please note

- This is supposed to check for your python software engineering skills and algorithmic thinking. Keep this in mind when developing your solution.

We are looking forward to your solution!

– The Engineering Team at *UP42*