**Instruction of optimal\_accuracy\_metrics (Python Code）**

Yan Wang ([daiki.wang@connect.polyu.hk](mailto:daiki.wang@connect.polyu.hk)), Xiaolin Zhu (xiaolin.zhu@polyu.edu.hk)

Department of Land Surveying and Geo-Informatics  
The Hong Kong Polytechnic University

Version: 24 March 2022

**Reference**



**Download link:**

<https://doi.org/10.1016/j.rse.2022.113002>

**Input data preparation**

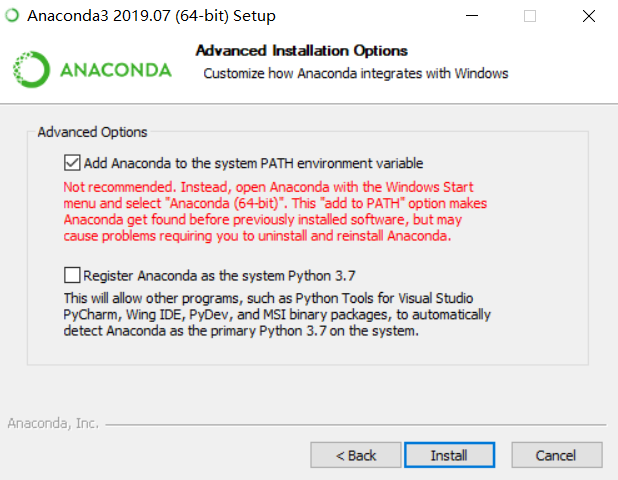
1) Two satellite images are required. One is the reference image and another is the fused image. These images can be multi-spectral reflectance images, single band image, or index image (such as NDVI). The test data is 3 bands (green, red, NIR) images.

**Operation Steps**

**Step1: Configure Anaconda**

**Anaconda is selected as a virtual environment**

1. Download Anaconda from <https://www.anaconda.com/distribution/> for your operating system and install (Please check the box of “Add Anaconda to the system PATH environment variable”)

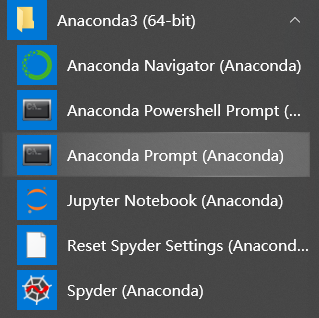


**Spyder**

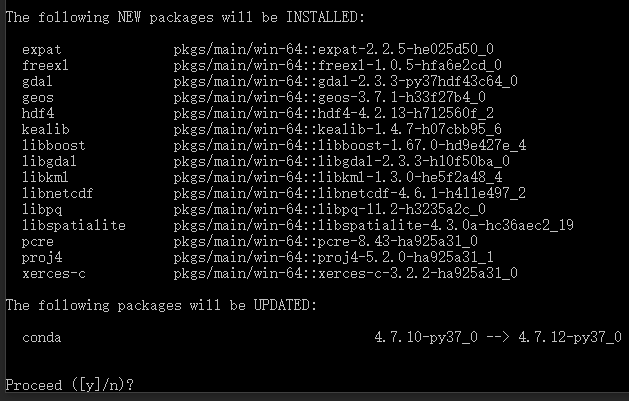
1. After the anaconda is installed, you can find the spyder icon () under anaconda folder. Spyder is a powerful scientific environment written in Python, for Python, and designed by and for scientists, engineers and data analysts. It features a unique combination of the advanced editing, analysis, debugging and profiling functionality of a comprehensive development tool with the data exploration, interactive execution, deep inspection and beautiful visualization capabilities of a scientific package.
2. Spyder offers built-in integration with many popular scientific packages, including NumPy, SciPy, Pandas, IPython, QtConsole, Matplotlib, SymPy, and more

**Install the required packages**

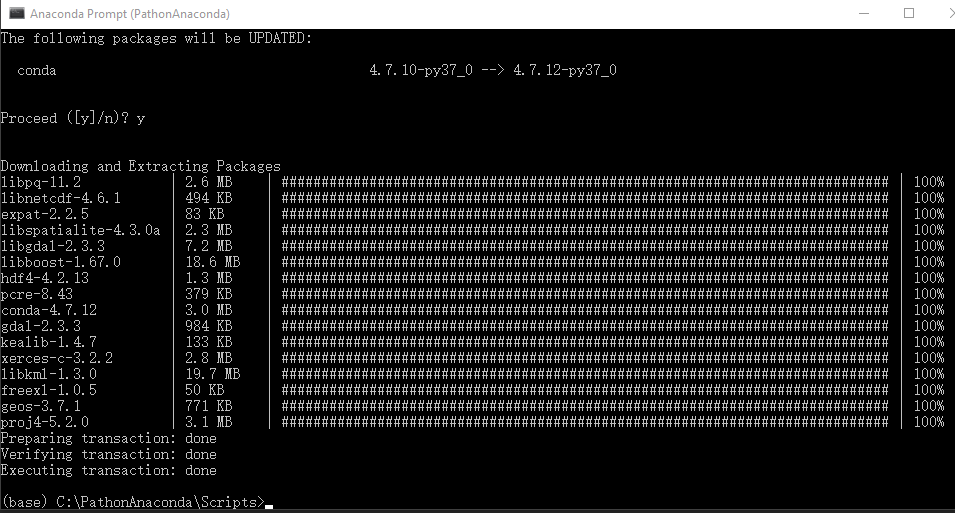
1. Open **Anaconda Prompt** in the window starter



1. Type “**conda install gdal” and press “enter”** toinstall the required Python package **gdal** (other required packages include os, numpy, pandas, scipy, tkinter, datetime, many of which have been included in Anaconda, if not, please use **conda install packagename** to install required packages). Type “y” and press “enter” when the window shows the following message:



1. It is done **when you see the following text** (if no errors appear, then the package was successfully installed)



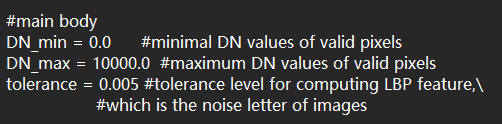
**Step 2 Data Preprocessing**

1. There is no preprocessing procedure before running this code. You need to ensure the two input images have the same dimensions (i.e. same raster width, raster height, and raster bands) and same DN range.

**Note: the provided test data can be directly fed to the program.**

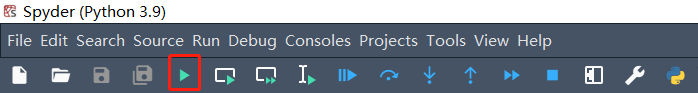
**Step 3 set the parameters**

1. Please follow the explanation to set the parameters. The default parameters are used for test data, you can change these parameters according to your own data before running this program.



**Step 4 Run**

Click Run icon



Open files according to the name of pop-up windows

* open the reference fine-resolution image
* open the fused fine-resolution image

**NOTE:** the result will be saved to the same folder as the reference image you opened. All accuracy metrics ranges -1 to 1 (RMSE 0-1) regardless of what DN ranges are for the input images, because they are normalized to 0-1 before computing metrics in the code.

The output would be slightly different from that of IDL code. It is because IDL uses the specific way for dealing with floating-point numbers. A detail description can refer to [Accuracy and Floating Point Operations (l3harrisgeospatial.com)](https://www.l3harrisgeospatial.com/docs/accuracy_and_floating_po.html). These slight difference between IDL and Python codes will not affect comparison among fused images.

Thanks for using optimal\_accuracy\_metrics algorithm. If you meet any problems, please feel free to contact Mr. Yan Wang or Dr. Xiaolin Zhu.