**Machine learning using UNet to extract faults and fractures satellite images (Keras Code)**

The programming language : Python (Keras)

Required packages:

tensorflow>=2.0.0

keras>=2.3.1

rasterio>=1.1.0

scikit-image

**In the utils folder:**

**Code Execution**:

The main files to execute the code are:

1. **multi\_value\_rasterization.py**

The algorithm will execute rasterizing a shapefile vector with the following command on Ubuntu:

python3 multi\_value\_rasterization.py –shapefile\_path ../path\_to\_the\_desired\_shapefile\_shp –rgb\_reference\_image ../path\_to\_the\_ortho\_rgb\_image –output\_path ../path\_to\_store\_the\_raster **–burn\_column Unc (for uncertain faults if you dont precise it in the command all faults will be selected as certain faults)**

optional arguments:

-h, --help show this help message and exit

--shapefile\_path SHAPEFILE\_PATH

The path related to the vector mapping .shp

--rgb\_reference\_image RGB\_REFERENCE\_IMAGE

The path related to the RGB image

--output\_path OUTPUT\_PATH

The path to store the outpout raster

--burn\_column BURN\_COLUMN

A column in the shapefile vector mapping for the

uncertain faults (Unc): optional argument, if you did

not precise it in the main all faults will be figured

as certain

2. **balanced\_tile\_partition.py**

a technique used for tile partition of a selected optical site into “train”, “valid” tiles of RGB and their corresponding GT with 0°, 45° roatation and 90° rotation.

Use the following Ubuntu command:

python3 balanced\_tile\_partition.py –site\_name name\_your\_site --valid\_shp\_path ../path\_to\_valid\_zone\_area\_shp –rgb\_path ../path\_to\_ortho\_optical\_image –gt\_path ../path\_to\_gt\_raster\_that\_corresponds\_to\_rgb\_optical\_site --tile\_size 256 –output\_folder ../path\_to\_store\_tiles (use data/processed/folder\_name) **–tile\_type\_column TTV (do not put it if you want, it will differentiate between valid and train tiles)**

optional arguments:

-h, --help show this help message and exit

--site\_name SITE\_NAME

set the name of the selected RGBT site

--valid\_shp\_path VALID\_SHP\_PATH

The path of the shapefile (polygone) related to the

validation zone

--rgb\_path RGB\_PATH The path related to the RGB image

--gt\_path GT\_PATH The pâth related to the ground truth mapping raster

--tile\_size TILE\_SIZE

Select the size (heightxwidth) for the tiles used in

the decompostion (default: 256)

--output\_folder OUTPUT\_FOLDER

The path related to the folder name in which the user

store the tiles: contains two sub-folders (train,

valid) on each one the user find (image, gt) folders

for the RGB tiles anbd their corresponding ground

truth respectively

--tile\_type\_column TILE\_TYPE\_COLUMN

A name used to differentiate the training tiles from valid ones