2_Align_IRREDGE

June 20, 2018

This code uses the Python Open CV library to align red and rededge images in the format tif and combines them to produce an aligned RGB image in the format JPG. In addition, this code transfers the GPS information from the image in the reference band to the aligned RGB image.

Extensions asociated to each name file refers to a diferente band as is detailed below.

- '*_1.tif' = Blue Band
- '*_2.tif' = Green Band
- '*_3.tif' = Red Band
- '*_4.tif' = Near Infrarred Band
- '*_5.tif' = Rededge Band

The output can be used to compute the NDRE vegetation index.

```
In [1]: ##Preamble
        %matplotlib inline
        import cv2
        import numpy as np
        import matplotlib.pyplot as plt
        import os
        import glob
        import traceback
        import sys
        from PIL import Image, ImageFilter
        import PIL
        import matplotlib.pyplot as plt
```

```
In [2]: ##Setting directory
        dir_set='/tidchile/collaborative/udd/ids/agro/AGRIFRUT_10-02/MICASENSE/0000SET/001'
        num_set=dir_set[-2:]
        filenames=glob.glob(dir_set+'/*.tif')
        ##Creating lists and listing rededge band images
        filenamesIR=[]
        filenamesREDGE=[]
        for i in range(len(filenames)):
            if filenames[i][83]=='5':
                filenamesREDGE.append(filenames[i])

        filenamesREDGE.sort()
        filenamesREDGE
```

```
Out[2]: ['/tidchile/collaborative/udd/ids/agro/AGRIFRUT_10-02/MICASENSE/0000SET/001/IMG_0000_5.t
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In [3]: ##Listing near infrarred images
        filenamesIR=[]

        for i in range(len(filenames)):
            if filenames[i][83]=='4':
                filenamesIR.append(filenames[i])

        filenamesIR.sort()
        filenamesIR
```

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Out[3]: ['/tidchile/collaborative/udd/ids/agro/AGRIFRUT_10-02/MICASENSE/0000SET/001/IMG_0000_4.t
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```

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 '/tidchile/collaborative/udd/ids/agro/AGRIFRUT_10-02/MICASENSE/0000SET/001/IMG_0199_4.t
```

```
In [4]: ##Creating folder to save aligned images
        if not os.path.exists(dir_set+'_IR-REDGE_ALIGNED/'):
            os.makedirs(dir_set+'_IR-REDGE_ALIGNED/')
```

```
In [5]: ##Preparing to align images
        # Define motion model
        warp_mode = cv2.MOTION_TRANSLATION  #(Options: MOTION_EUCLIDEAN, MOTION_AFFINE and MOTIO
        # Set the warp matrix to identity.
        if warp_mode == cv2.MOTION_HOMOGRAPHY:
            warp_matrix = np.eye(3, 3, dtype=np.float32)
        else:
            warp_matrix = np.eye(2, 3, dtype=np.float32)
```

```
In [6]: # Set the stopping criteria for the algorithm.
        criteria = (cv2.TERM_CRITERIA_EPS | cv2.TERM_CRITERIA_COUNT, 100000,  1e-5)
```

```
In [7]: dir_ir_redge=dir_set+'_IR-REDGE_ALIGNED/'

        print(dir_ir_redge)
```

```
/tidchile/collaborative/udd/ids/agro/AGRIFRUT_10-02/MICASENSE/0000SET/001_IR-REDGE_ALIGNED/
```

```
In [ ]: ##Aligning images and saving as .JPG

        #Creating log file. List images which were not aligned

        log = open(dir_ir_redge + "error_align.log", "w")

        for i in range(len(filenamesREDGE)):
            try:
                print("Processing: " + filenamesREDGE[i][74:82])

                im_ir             =  cv2.imread(filenamesIR[i],0);
                im_redge          =  cv2.imread(filenamesREDGE[i],0);

                sz = im_redge.shape
                print (sz)
                height = int(sz[0])
                width = sz[1]

                im_aligned = np.zeros((height,width,3), dtype=np.uint8 )
                im_aligned[:,:,1] = im_redge[:,:]

                #Ir (Aligning Ir)

                (cc, warp_matrix) = cv2.findTransformECC(im_redge[:,:], im_ir[:,:], warp_matrix,

                im_aligned[:,:,0] = cv2.warpAffine(im_ir[:,:], warp_matrix, (width, height), fla
                cv2.imwrite(dir_ir_redge + filenamesREDGE[i][74:82] + '_IRREDGE.JPG', im_aligned
            except Exception:
                print("Error processing: " + filenamesREDGE[i][74:82])
                log.write("Error processing: " + filenamesREDGE[i][74:82] + '\n')
                continue
```

```
In [ ]: !ls
```

```
In [ ]: ##Copy information from red images (*_5.tif) with Exiftool. I aligning using as a refere
        #If you align using another band as a reference you have to use the images with
        #the correct extension.
```

```
In [ ]: %%bash -s "$dir_set" "$dir_ir_redge"

        dir=$(pwd)

        dir_set=$1/
        dir_irr=$2

        echo $dir_irr

        ls $dir_irr*.JPG | xargs -n 1 basename > ${dir_irr}irr_files.txt
```

```
for f in `cat ${dir_irr}irr_files.txt`;
do
aa=$dir_set${f:0:8}_5.tif
bb=$dir_irr$f

echo $aa
echo $bb
exiftool —overwrite_original_in_place -r -tagsFromFile $aa -gps:all -ExifIFD:all $bb;
done
```