```python
import cv2
from mpl_toolkits.basemap import Basemap


import os
import glob
img_dir = "../input/uni-campus-dataset/RGB-img" # Enter Directory of all images
Category = ['img']
for category in Category:
    folder = os.path.join(img_dir,category)


for files in os.listdir(folder):
    img_path = os.path.join(folder,files)
```

```python
import exifread
from PIL import Image
from PIL.ExifTags import TAGS, GPSTAGS
import pandas as pd

def get_exif_data(image):
    """Returns a dictionary from the exif data of an PIL Image item. Also converts the GPS Tags"""
    exif_data = {}
    info = image._getexif()
    if info:
        for tag, value in info.items():
            decoded = TAGS.get(tag, tag)
            if decoded == "GPSInfo":
                gps_data = {}
                for t in value:
                    sub_decoded = GPSTAGS.get(t, t)
                    gps_data[sub_decoded] = value[t]

                exif_data[decoded] = gps_data
            else:
                exif_data[decoded] = value

    return exif_data

def _get_if_exist(data, key):
    if key in data:
        return data[key]

    return None

def _convert_to_degress(value):
    """Helper function to convert the GPS coordinates stored in the EXIF to degress in float format"""
    d0 = value[0]

    d = float(d0)


    m1 = value[1]
    m = float(m1)

    s0 = value[2]
    s = float(s0)

    return d + (m / 60.0) + (s / 3600.0)

def get_lat_lon(exif_data):
    """Returns the latitude and longitude, if available, from the provided exif_data (obtained through g
    lat = None
    lon = None

    if "GPSInfo" in exif_data:
        gps_info = exif_data["GPSInfo"]

        gps_latitude = _get_if_exist(gps_info, "GPSLatitude")
        gps_latitude_ref = _get_if_exist(gps_info, 'GPSLatitudeRef')
        gps_longitude = _get_if_exist(gps_info, 'GPSLongitude')
        gps_longitude_ref = _get_if_exist(gps_info, 'GPSLongitudeRef')
```

```python
        if gps_latitude and gps_latitude_ref and gps_longitude and gps_longitude_ref:
            lat = _convert_to_degress(gps_latitude)
            if gps_latitude_ref != "N":
                lat = 0 - lat

            lon = _convert_to_degress(gps_longitude)
            if gps_longitude_ref != "E":
                lon = 0 - lon

    return lon,lat


###############
# Example ######
###############
if __name__ == "__main__":
    img_dir = "../input/uni-campus-dataset/RGB-img" # Enter Directory of all images
    Category = ['img']
    for category in Category:
        folder = os.path.join(img_dir,category)

    for files in os.listdir(folder):
        data = []
        img_path = os.path.join(folder,files)
        image = Image.open(img_path)
        exif_data = get_exif_data(image)
        (lon,lat) = get_lat_lon(exif_data)
        print(lon,lat)
```

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100.60905495972222  14.074190449166666
100.60905950722221  14.070690391666666
100.60605235277777  14.076129800277778
100.60406325805555  14.066515741666667
100.61008481166667  14.067475043611111
100.60905894472222  14.065422692222223
100.61603730861111  14.065593513611113
```

```
100.61005730001111 14.00393331301111
100.60601255472221 14.071765259722222
100.61405297305555 14.069500344166666
100.60407171166666 14.06738730388889
100.6090717975 14.071130331944444
100.61006583416666 14.070971196944445
100.61708456 14.074814933333332
100.60402802833333 14.072212920555556
100.61307715166666 14.069458940277778
100.61303069527777 14.072523029722221
100.6110498886111 14.072937372777778
100.61601262388888 14.068620645833333
100.61207907083333 14.069979235833333
100.60409543861111 14.064780804722224
100.60709649527777 14.07665553388889
100.61506991916666 14.070384186111111
100.60309513722221 14.066942925555555
100.60808105749999 14.064749588611113
100.61506976583333 14.065130389444445
100.60904040194444 14.075506999166667
100.61406259055555 14.076504796944445
100.6070573036111 14.075771819444444
100.61105299722222 14.071627879166666
100.61305340833333 14.065095706666668
100.60505162166666 14.06828337111111
100.61603310944444 14.076518168611111
100.60407028416667 14.066076245555557
100.61708390166666 14.066060646111112
100.61807135555554 14.0650635375
100.60504305305555 14.073107039722222
100.61008483527777 14.071408838333333
100.60708702388888 14.077083106388889
100.60404885638889 14.073515816666667
100.60403816972222 14.07569827388889
100.61407598277778 14.068185143333332
100.61102914944443 14.069005046666666
100.60806433527777 14.069132299722222
100.60304829277777 14.071297774444444
```
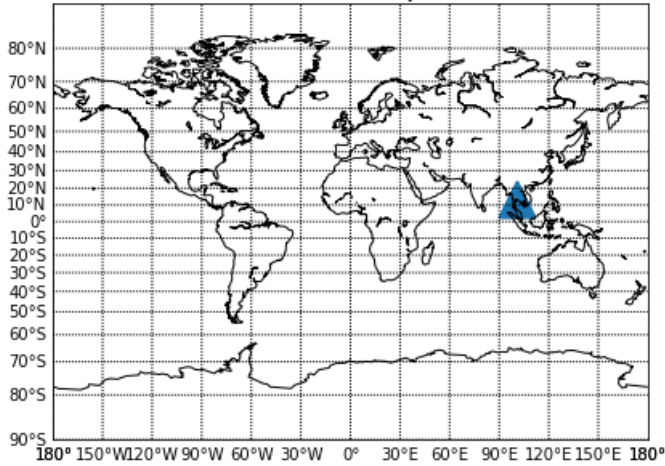
```python
from mpl_toolkits.basemap import Basemap
import matplotlib.pyplot as plt
import numpy as np
fig = plt.figure(figsize=(12,5))
m = Basemap(projection='mill',
            llcrnrlat=-90,
            urcrnrlat=90,
            llcrnrlon=-180,
            urcrnrlon=180,
            resolution='c')
m.drawcoastlines()
m.drawparallels(np.arange(-90,90,10),labels=[True,False,False,False])
m.drawmeridians(np.arange(-180,180,30), labels=[0,0,0,1])
lon = [100.61806575638889,100.60708245472222,100.61606427166666,100.60805817666666,100.61008061944443]#10
#,100.61507294472221
#,100.61608368833333
#,100.60506821388888
#,100.61605421083333
#100.61704432944444
#,100.60905121666666
#,100.61403877388888
#,100.60708906638888
#,100.6171229736111
###,100.61708152555555
#,100.61106006222222
#,100.60802811277777
#,100.60303152611111
#,100.61105569777777
,#100.60608742916666
,#100.60807720916667]

lat = [14.073395685277777,14.067295146944444,14.066033934722222,14.067816876111111,14.073615746666666]

m.scatter(lon,lat,latlon=True,s=500,marker='^')
plt.title('Basemap', fontsize=20)
plt.show()
```

Basemap

```python
mainFolder  = '../input/newset'
myFolders = os.listdir(mainFolder)
for folder in myFolders:
    path = mainFolder +'/'+folder
    images= []
    mylist = os.listdir(path)
    print(f'total number of images detected {len(mylist)}')


    for  imgN in mylist:
        curImg = cv2.imread(f'{path}/{imgN}')
        curImg = cv2.resize(curImg,(0,0),cv2.INTER_NEAREST,1.2,1.2)
        images.append(curImg)



    stitcher = cv2.Stitcher.create()
    (status,result) = stitcher.stitch(images)
    if (status == cv2.STITCHER_OK):

        print('Panorama Generated')
        plt.figure(figsize=(12,6))
        plt.imshow(result)
        plt.imsave('../stitched.jpg',result)
        plt.show()


    else:
        print('Panorama Generation Unsuccessful')
```
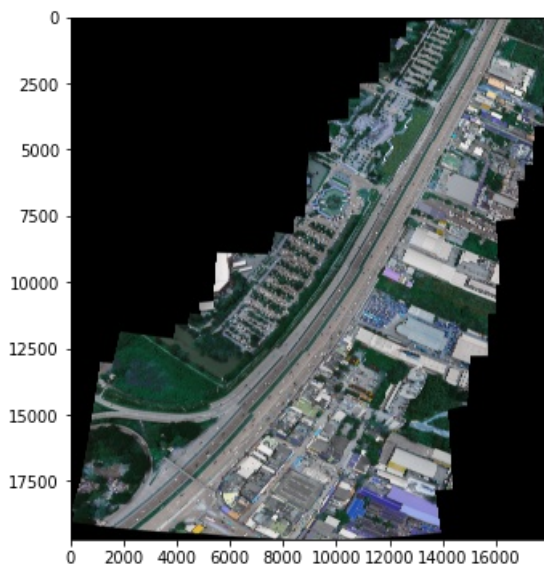
```
total number of images detected 20
Panorama Generated
```

```python
%matplotlib inline
```

```
%matplotlib inline
def plot_image(image, title=""):
    """
    Plots images from image tensors.
    Args:
      image: 3D image tensor. [height, width, channels].
      title: Title to display in the plot.
    """
    image = np.asarray(image)
    image = tf.clip_by_value(image, 0, 255)
    image = Image.fromarray(tf.cast(image, tf.uint8).numpy())
    plt.figure(figsize=(12,9))
    plt.imshow(image)
    plt.axis("off")
    plt.title(title)
```

```
import tensorflow as tf
```

```
plot_image(tf.squeeze(result), title='Super resolution')
```


Super resolution

In [13]:

```
img_path = '../stitched.jpg'
img = cv2.imread(img_path)
exif_data = get_exif_data(image)
(lon,lat) = get_lat_lon(exif_data)
print(lon,lat)
```

```
100.60304829277777 14.071297774444444
```

In [ ]: