

In []:

```
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)
```

In [112]:

```
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 get_exif_data)"""
    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')
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    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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100.61603730861111 14.065593513611113

```
100.61000700001111 14.00000000001111
100.60601255472221 14.07176525972222
100.61405297305555 14.06950034416666
100.60407171166666 14.06738730388889
100.6090717975 14.07113033194444
100.61006583416666 14.07097119694444
100.61708456 14.07481493333333
100.60402802833333 14.07221292055555
100.61307715166666 14.06945894027778
100.61303069527777 14.07252302972221
100.6110498886111 14.07293737277778
100.61601262388888 14.06862064583333
100.61207907083333 14.06997923583333
100.60409543861111 14.06478080472224
100.60709649527777 14.07665553388889
100.61506991916666 14.07038418611111
100.60309513722221 14.06694292555555
100.60808105749999 14.06474958861113
100.61506976583333 14.06513038944445
100.60904040194444 14.07550699916667
100.61406259055555 14.07650479694445
100.6070573036111 14.07577181944444
100.61105299722222 14.07162787916666
100.61305340833333 14.06509570666666
100.60505162166666 14.06828337111111
100.61603310944444 14.07651816861111
100.60407028416667 14.06607624555557
100.61708390166666 14.06606064611112
100.61807135555554 14.0650635375
100.60504305305555 14.07310703972222
100.61008483527777 14.07140883833333
100.60708702388888 14.07708310638889
100.60404885638889 14.07351581666667
100.60403816972222 14.07569827388889
100.61407598277778 14.06818514333332
100.61102914944443 14.06900504666666
100.60806433527777 14.06913229972222
100.60304829277777 14.07129777444444
```

In []:

data

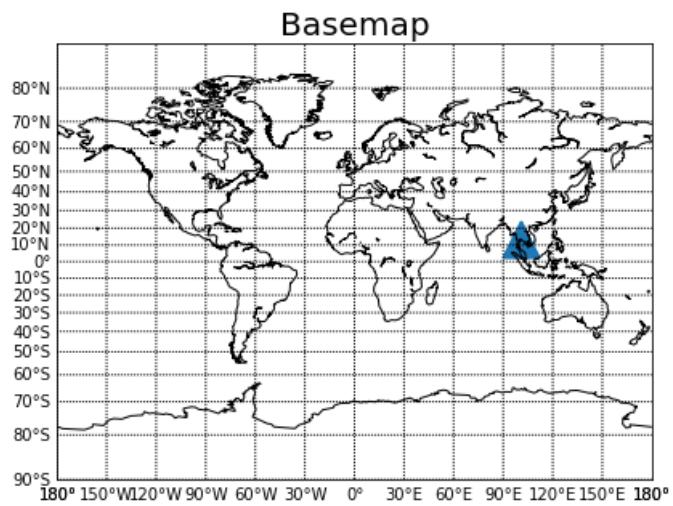
In [116]:

```
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()
```



In []: