lab6_given

April 15, 2021

[ ]:
```
import numpy as np
import cv2
import matplotlib.pyplot as plt
from google.colab.patches import cv2_imshow
```

[ ]:
```
from google.colab import drive
drive.mount("/content/drive")

!wget -nc https://raw.githubusercontent.com/brpy/colab-pdf/master/colab_pdf.py
from colab_pdf import colab_pdf
colab_pdf('0415/lab6_given.ipynb')
```

```
Mounted at /content/drive
--2021-04-15 09:39:29--  https://raw.githubusercontent.com/brpy/colab-
pdf/master/colab_pdf.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)...
185.199.108.133, 185.199.110.133, 185.199.111.133, ...
Connecting to raw.githubusercontent.com
(raw.githubusercontent.com)|185.199.108.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1864 (1.8K) [text/plain]
Saving to: colab_pdf.py

colab_pdf.py        100%[===================>]   1.82K  --.-KB/s    in 0s

2021-04-15 09:39:29 (45.9 MB/s) - colab_pdf.py saved [1864/1864]


WARNING: apt does not have a stable CLI interface. Use with caution in scripts.


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Extracting templates from packages: 100%
```

1 1. Perspective Projection Correction

Correct the source image in reference with the destination image

[ ]:
```
#Download the images
!gdown --id '1O3_PJ9bTKJbf89b2_SUEuFkbTXrmCsrK' --output book1.jpg
!gdown --id '1Qh1Ydq9bJezPfGvdFCnF-9iN5Yp_Kv1r' --output book2.jpg
```

```
Downloading...
From: https://drive.google.com/uc?id=1O3_PJ9bTKJbf89b2_SUEuFkbTXrmCsrK
To: /content/book1.jpg
2.86MB [00:00, 90.2MB/s]
Downloading...
From: https://drive.google.com/uc?id=1Qh1Ydq9bJezPfGvdFCnF-9iN5Yp_Kv1r
To: /content/book2.jpg
2.76MB [00:00, 88.1MB/s]
```

[ ]:
```
#Read the source Image
im_src = cv2.imread("book1.jpg")
#Read the destination Image
im_dst = cv2.imread("book2.jpg")
#display the images
cv2_imshow(im_src)
cv2_imshow(im_dst)
```

```
Output hidden; open in https://colab.research.google.com to view.
```

[ ]:
```
#Identify the coordinates of the points marked in red color in the source image
pts_src = np.array([[1053,1633], [1821,469],␣
 ↪[2033,1064],[1969,1838],[2933,1050]])

#Identify the coordinates of the points marked in red color in the destination␣
 ↪image
pts_dst = np.array([[1247,527],[2941,549],[2393,1148],[1541,1556],[2957,2105]])

#Calculate the homography use function cv2.findHomography
h, status = cv2.findHomography(pts_src, pts_dst)
#Wrap the images using cv2.warpPerspective
im_out = cv2.warpPerspective(im_src, h, (im_dst.shape[1],im_dst.shape[0]))
#display the corrected image
cv2_imshow(im_out)
```

```
Output hidden; open in https://colab.research.google.com to view.
```

2 2. Image Stitching

Stitch first two images into one from the image dataset

[ ]:
```
# download the images (6 Images)
!gdown --id '1CDPf0zhlVYR7Fd1vSL22A10KSLb3JeCl' --output site1.jpg
!gdown --id '1b7EZ_nLLUx_sjjHlPGxW4kaXRsZFVDzu' --output site2.jpg
!gdown --id '1KQ2xVihVNdUNtHnurStDbtD4L6AbhPZL' --output site3.jpg
!gdown --id '1gu3C0ZUMGcfRjyZHZbte_gesbUuBpW0S' --output site4.jpg
!gdown --id '1zHAtikO9dVHpLPJ-KQPdvKEC-wLB1hHM' --output site5.jpg
!gdown --id '1RNCdBF9a4fIdcyPvjelyx7dsheLgRoaQ' --output site6.jpg

# use openCV to read the original image
img_1 = cv2.imread('site1.jpg')
img_2 = cv2.imread('site2.jpg')
img_3 = cv2.imread('site3.jpg')
img_4 = cv2.imread('site4.jpg')
img_5 = cv2.imread('site5.jpg')
img_6 = cv2.imread('site6.jpg')

#Resize images for convenience
def resizeimg (img):
  img_1 = cv2.resize(img, (int(img.shape[1]*0.1),int(img.shape[0]*0.1)),␣
 ↪interpolation = cv2.INTER_AREA)
  return img_1
img_1 = resizeimg(img_1)
img_2 = resizeimg(img_2)
img_3 = resizeimg(img_3)
img_4 = resizeimg(img_4)
img_5 = resizeimg(img_5)
img_6 = resizeimg(img_6)

#Display the images
cv2_imshow(img_1)
cv2_imshow(img_2)
cv2_imshow(img_3)
cv2_imshow(img_4)
cv2_imshow(img_5)
cv2_imshow(img_6)
```

Output hidden; open in https://colab.research.google.com to view.

[ ]:
```
#Write a function named 'imagestitcher' that can stitch two images
def imagestitcher (img1, img2):

    #Convert input images to grayscale
    img1 = cv2.cvtColor(img_1,cv2.COLOR_BGR2GRAY)
```

```
    img2 = cv2.cvtColor(img_2,cv2.COLOR_BGR2GRAY)

    #SIFT Feature detection: try cv2.xfeatures2d.SIFT_create, sift.
↪detectAndCompute
    sift = cv2.xfeatures2d.SIFT_create()
    kp1, des1 = sift.detectAndCompute(img1,None)
    kp2, des2 = sift.detectAndCompute(img2,None)

    #Feature matching use cv2.BFMatcher(), bf.knnMatch
    bf = cv2.BFMatcher()
    matches =  bf.knnMatch(des1,des2, k=2) # K nearest neighbour matching with␣
↪k =2
    good = [] # Store good matches into a list if the distance between␣
↪corresponding matches lies between 0.5
    for m in matches:
        if (m[0].distance < 0.5*m[1].distance):
            good.append(m)
    matches = np.asarray(good)

    #Homography calculation using RANSAC use cv2.findHomography, cv2.RANSAC and␣
↪reprojection theshold =5
    if (len(matches[:,0]) >= 4): # for ma
        src = np.float32([ kp1[m.queryIdx].pt for m in matches[:,0] ]).
↪reshape(-1,1,2)
        dst = np.float32([ kp2[m.trainIdx].pt for m in matches[:,0] ]).
↪reshape(-1,1,2)
        H, masked = cv2.findHomography(src, dst, cv2.RANSAC, 5.0) # Write␣
↪yourself
    else:
        raise AssertionError('Cant find enough keypoints.')

    #Image Stitching use cv2.warpPerspective(1st image, homography matrix, size␣
↪of the output image)
    dst = cv2.warpPerspective(img_1,H,((int(img_1.shape[1]*0.5) + img_2.
↪shape[1]) , img_2.shape[0])) #wraped image
    dst[0:img_2.shape[0], 0:img_2.shape[1]] = img_2 #stitched image
    return dst
```

[ ]:
```
#In case your Open CV version do not support SIFT
!pip install opencv-contrib-python==3.4.2.17
```

```
Requirement already satisfied: opencv-contrib-python==3.4.2.17 in
/usr/local/lib/python3.7/dist-packages (3.4.2.17)
Requirement already satisfied: numpy>=1.14.5 in /usr/local/lib/python3.7/dist-
packages (from opencv-contrib-python==3.4.2.17) (1.19.5)
```

[ ]:
```
#Stitch the first two site images into one and display
stitched_img = imagestitcher(img_1,img_2)
cv2_imshow(stitched_img)
```

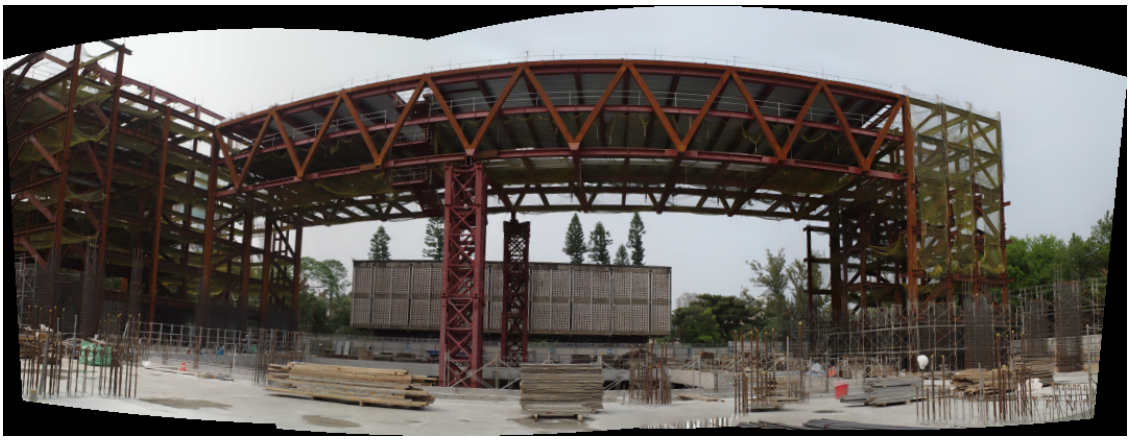
3 3. Panorama creation

Create a panorama combining all 6 images

[ ]:
```
#In case your Open CV version do not support SIFT
!pip install opencv-contrib-python==4.4.0.46
```

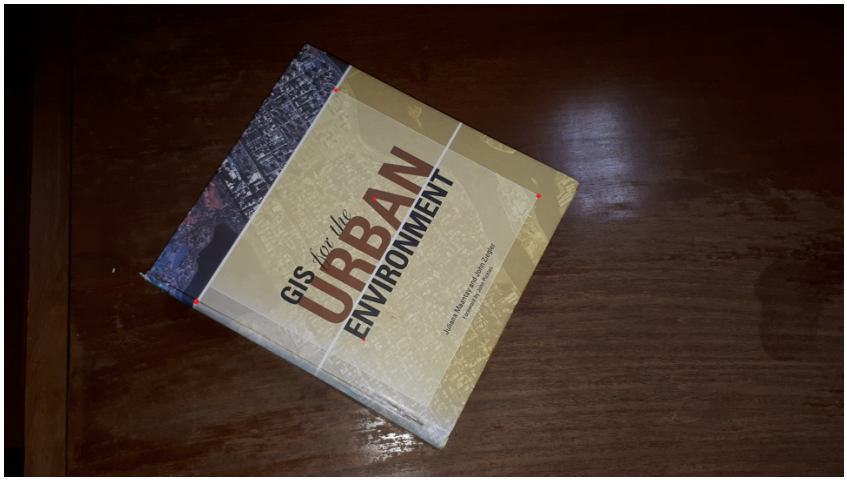
```
Requirement already satisfied: opencv-contrib-python==4.4.0.46 in
/usr/local/lib/python3.7/dist-packages (4.4.0.46)
Requirement already satisfied: numpy>=1.14.5 in /usr/local/lib/python3.7/dist-
packages (from opencv-contrib-python==4.4.0.46) (1.19.5)
```

[ ]:
```
#Stitch all 6 images to make a Panorama
images = [img_1,img_2,img_3,img_4,img_5,img_6]
stitcher = cv2.Stitcher_create()
(status, pano) = stitcher.stitch(images)
cv2_imshow(pano)
```

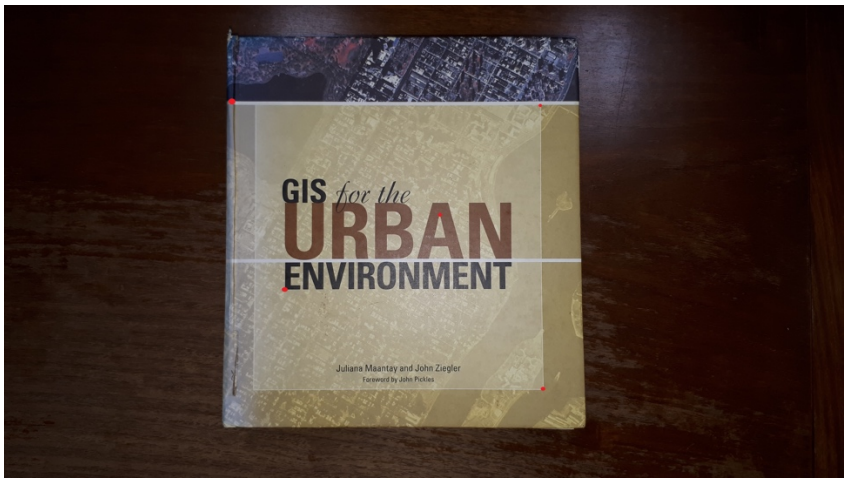


Three missing images in part one:

cv2_imshow(im_src)



cv2_imshow(im_dst)



cv2_imshow(im_out)