Image Stitching Basics Using OpenCV

December 7, 2019

[42]:

```
from google.colab import drive
drive.mount('/content/drive', force_remount=True)
```

```
Mounted at /content/drive
```

[0]:

```
!unzip -uq "/content/drive/My Drive/image-stitching-opencv/images.zip" -d "/
 ↪content/drive/My Drive/image-stitching-opencv"
```

[0]:

```
# import the necessary packages
from imutils import paths
import numpy as np
import imutils
import cv2
from google.colab.patches import cv2_imshow
from matplotlib import pyplot as plt
```

[45]:

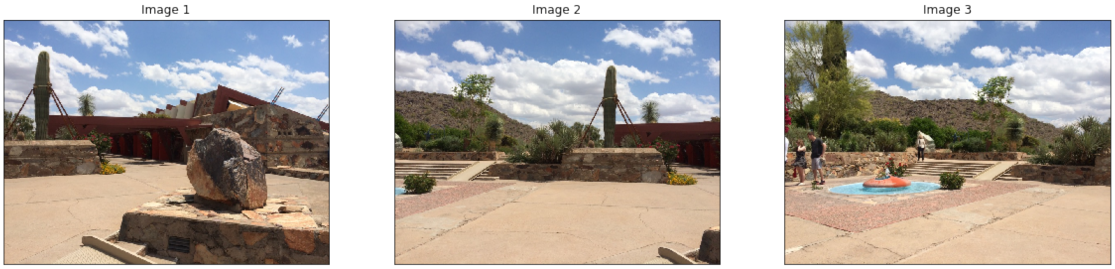
```
# grab the paths to the input images and initialize our images list
pathToImages = "/content/drive/My Drive/image-stitching-opencv/images"
print("Loading Images...")
imagePaths = sorted(list(paths.list_images(pathToImages)))
images = []
```

```
Loading Images...
```

[46]:

```
# loop over the image paths, load each one, and add them to our
# images to stich list
for imagePath in imagePaths:
        image = cv2.imread(imagePath)
        images.append(image)

titles = ['Image 1', 'Image 2', 'Image 3']
plt.figure(figsize=(20,20))
plt.subplot(1,3,1),plt.imshow(cv2.cvtColor(images[0], cv2.COLOR_BGR2RGB))
plt.title(titles[0]), plt.xticks([]), plt.yticks([])
plt.subplot(1,3,2),plt.imshow(cv2.cvtColor(images[1], cv2.COLOR_BGR2RGB))
plt.title(titles[1]), plt.xticks([]), plt.yticks([])
plt.subplot(1,3,3),plt.imshow(cv2.cvtColor(images[2], cv2.COLOR_BGR2RGB))
plt.title(titles[2]), plt.xticks([]), plt.yticks([])
plt.show()
```



[47]:

```
# initialize OpenCV's image sticher object and then perform the image stitching
print("Stitching Images...")
stitcher = cv2.createStitcher() if imutils.is_cv3() else cv2.Stitcher_create()
(status, stitchedImage) = stitcher.stitch(images)
```

```
Stitching Images...
```

[50]:

```
outputPath = "/content/drive/My Drive/image-stitching-opencv/output.png"
# if the status is '0', then OpenCV successfully performed image stitching
if status == 0:
        print("Cropping...")

        stitchedImage = cv2.copyMakeBorder(stitchedImage, 10, 10, 10, 10, cv2.
 ↪BORDER_CONSTANT, (0, 0, 0))
        # Convert the stitched image to grayscale and threshold it
        # such that all pixels greater than zero are set to 255
        # (foreground) while all others remain 0 (background)
        gray = cv2.cvtColor(stitchedImage, cv2.COLOR_BGR2GRAY)
        thresh = cv2.threshold(gray, 0, 255, cv2.THRESH_BINARY)[1]

        # find all external contours in the threshold image then find
        # the *largest* contour which will be the contour/outline of
        # the stitched image
        cnts = cv2.findContours(thresh.copy(), cv2.RETR_EXTERNAL, cv2.
 ↪CHAIN_APPROX_SIMPLE)
        cnts = imutils.grab_contours(cnts)
        c = max(cnts, key=cv2.contourArea)

        # allocate memory for the mask which will contain the rectangular␣
 ↪bounding box of the stitched image region
        mask = np.zeros(thresh.shape, dtype="uint8")
        (x, y, w, h) = cv2.boundingRect(c)
        cv2.rectangle(mask, (x, y), (x + w, y + h), 255, -1)
        # create two copies of the mask: one to serve as our actual
        # minimum rectangular region and another to serve as a counter
        # for how many pixels need to be removed to form the minimum
        # rectangular region
        minRect = mask.copy()
        sub = mask.copy()

        # keep looping until there are no non-zero pixels left in the
        # subtracted image
        while cv2.countNonZero(sub) > 0:
                # erode the minimum rectangular mask and then subtract
                # the thresholded image from the minimum rectangular mask
                # so we can count if there are any non-zero pixels left
                minRect = cv2.erode(minRect, None)
                sub = cv2.subtract(minRect, thresh)

        # find contours in the minimum rectangular mask and then
        # extract the bounding box (x, y)-coordinates
        cnts = cv2.findContours(minRect.copy(), cv2.RETR_EXTERNAL,
                cv2.CHAIN_APPROX_SIMPLE)
        cnts = imutils.grab_contours(cnts)
        c = max(cnts, key=cv2.contourArea)
        (x, y, w, h) = cv2.boundingRect(c)

        # use the bounding box coordinates to extract the our final
        # stitched image
        stitchedImage = stitchedImage[y:y + h, x:x + w]

        # write the output stitched image to disk
        cv2.imwrite(outputPath, stitchedImage)

        # display the output stitched image to our screen
        cv2_imshow(stitchedImage)

# otherwise the stitching failed, likely due to not enough keypoints)
# being detected
else:
        print("Image stitching failed ({})".format(status))
```

```
Cropping...
```