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0.1 Lab Exercise 8: Image Stitching (Mosaicing)

- **Objective:** Stitch multiple images together to form a panorama.

- **Task:** Using feature detection and homography estimation, stitch two or more images into a single panoramic view.

```python
[26]: import cv2
      import numpy as np
      import sys
      from google.colab.patches import cv2_imshow

      class Image_Stitching():
          def __init__(self) :
              self.ratio=0.85
              self.min_match=10
              self.sift=cv2.SIFT_create()
              self.smoothing_window_size=800

          def registration(self,img1,img2):
              img1 = cv2.cvtColor(img1, cv2.COLOR_BGR2GRAY)
              img2 = cv2.cvtColor(img2, cv2.COLOR_BGR2GRAY)
              kp1, des1 = self.sift.detectAndCompute(img1, None)
              kp2, des2 = self.sift.detectAndCompute(img2, None)
              matcher = cv2.BFMatcher()
              raw_matches = matcher.knnMatch(des1, des2, k=2)
              good_points = []
              good_matches=[]
              for m1, m2 in raw_matches:
                  if m1.distance < self.ratio * m2.distance:
                      good_points.append((m1.trainIdx, m1.queryIdx))
                      good_matches.append([m1])
              img3 = cv2.drawMatchesKnn(img1, kp1, img2, kp2, good_matches, None,␣
          ↪flags=2)
              cv2.imwrite('matching.jpg', img3)
              if len(good_points) > self.min_match:
                  image1_kp = np.float32(
                      [kp1[i].pt for (_, i) in good_points])
                  image2_kp = np.float32(
```

```python
                [kp2[i].pt for (i, _) in good_points])
            H, status = cv2.findHomography(image2_kp, image1_kp, cv2.RANSAC,5.0)
        return H

    def create_mask(self,img1,img2,version):
        height_img1 = img1.shape[0]
        width_img1 = img1.shape[1]
        width_img2 = img2.shape[1]
        height_panorama = height_img1
        width_panorama = width_img1 +width_img2
        offset = int(self.smoothing_window_size / 2)
        barrier = img1.shape[1] - int(self.smoothing_window_size / 2)
        mask = np.zeros((height_panorama, width_panorama))
        if version== 'left_image':
            mask[:, barrier - offset:barrier + offset ] = np.tile(np.
↪linspace(1, 0, 2 * offset ).T, (height_panorama, 1))
            mask[:, :barrier - offset] = 1
        else:
            mask[:, barrier - offset :barrier + offset ] = np.tile(np.
↪linspace(0, 1, 2 * offset ).T, (height_panorama, 1))
            mask[:, barrier + offset:] = 1
        return cv2.merge([mask, mask, mask])

    def blending(self,img1,img2):
        H = self.registration(img1,img2)
        height_img1 = img1.shape[0]
        width_img1 = img1.shape[1]
        width_img2 = img2.shape[1]
        height_panorama = height_img1
        width_panorama = width_img1 +width_img2

        panorama1 = np.zeros((height_panorama, width_panorama, 3))
        mask1 = self.create_mask(img1,img2,version='left_image')
        panorama1[0:img1.shape[0], 0:img1.shape[1], :] = img1
        panorama1 *= mask1
        mask2 = self.create_mask(img1,img2,version='right_image')
        panorama2 = cv2.warpPerspective(img2, H, (width_panorama,␣
↪height_panorama))*mask2
        result=panorama1+panorama2

        rows, cols = np.where(result[:, :, 0] != 0)
        min_row, max_row = min(rows), max(rows) + 1
        min_col, max_col = min(cols), max(cols) + 1
        final_result = result[min_row:max_row, min_col:max_col, :]
        return final_result

def main(argv1,argv2):
```

```python
    img1 = cv2.imread(argv1)
    img2 = cv2.imread(argv2)
    # Check if images were loaded successfully
    if img1 is None or img2 is None:
        print(f"Error: Could not load image files: {argv1}, {argv2}")
        # Print current working directory for debugging
        import os
        print(f"Current working directory: {os.getcwd()}")
        return  # Exit the function if images are not loaded

    final=Image_Stitching().blending(img1,img2)
    cv2.imwrite('panorama.jpg', final)
if __name__ == '__main__':
    try:
        main(sys.argv[1],sys.argv[2])
    except IndexError:
        print ("Please input two source images: ")
        print ("For example: python Image_Stitching.py '/Users/linrl3/Desktop/
 ↪picture/p1.jpg' '/Users/linrl3/Desktop/picture/p2.jpg'")


main("img1.jpg","img2.jpg")
```
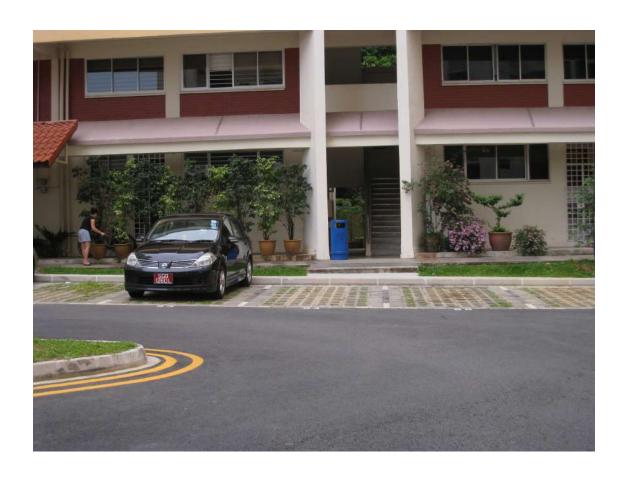
Error: Could not load image files: -f, /root/.local/share/jupyter/runtime/kernel
-060eff5b-2078-48e3-9ca6-88f8075490c1.json
Current working directory: /content

```python
[29]: # image 1
      img2 = cv2.imread('img1.jpg')
      cv2_imshow(img2)
```

```
[28]:  # image 2
       img2 = cv2.imread('img2.jpg')
       cv2_imshow(img2)
```

[31]:
```
#matching
matching = cv2.imread('matching.jpg')
cv2_imshow(matching)
```


[32]:
```
# panorama
panorama = cv2.imread('panorama.jpg')
```

```
cv2_imshow(panorama)
```


[ ]: