# o2xbqipbt

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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.

[15]:
```
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(
```

```
                [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))

        # Check if barrier is less than offset and adjust if necessary
        if barrier <= offset:
            barrier = offset + 1  # Ensure barrier is greater than offset

        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
```

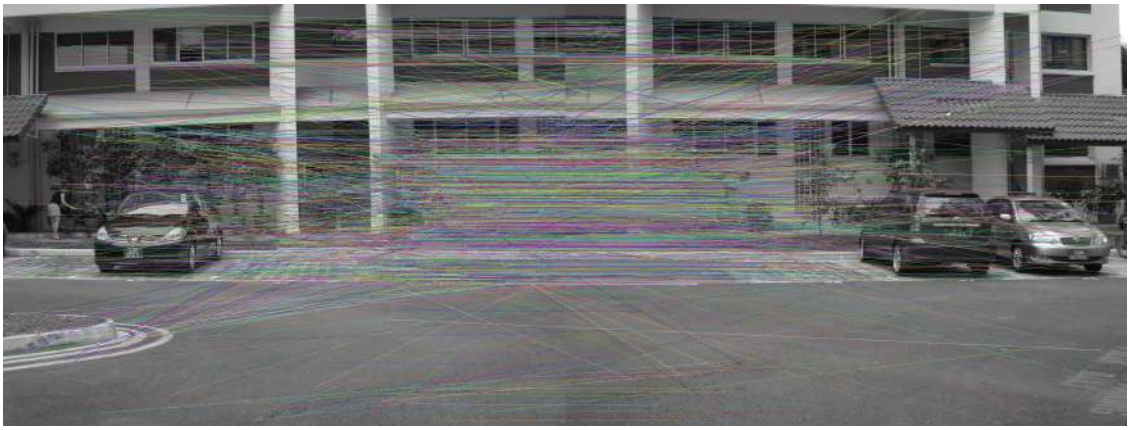
```
        final_result = result[min_row:max_row, min_col:max_col, :]
        return final_result

def main(argv1,argv2):
    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
-47548001-1849-44e5-937e-518c3a93f86f.json
Current working directory: /content
```

[16]:
```
# image 1
img1 = cv2.imread('img1.JPG')
cv2_imshow(img1)
```

[17]:
```
# image 2
img2 = cv2.imread('img2.JPG')
cv2_imshow(img2)
```

[18]:
```
#matching
matching = cv2.imread('matching.jpg')
cv2_imshow(matching)
```



[19]:
```
# panorama
panorama = cv2.imread('panorama.jpg')
```

```
cv2_imshow(panorama)
```

[19]: