

Lab 5:Descriptors and Matching

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1 Introduction

In this lab session,i explored methods for the description and matching of points of interest (PoI) in the scene.

2 Image warping through PoI matching

2.1 Exercise 1:-POI based matching

For matching based on POI, i observed that , SIFT extracts around 6900 to 9900 points and that's the reason of it's slowness.SURF is fast as it extracts around 1400-2100 interest points and process images faster. I tried a combination of LoG_{SS} as detector and SURF as descriptor which extracted around 1413-2100 points.

2.2 Exercise 2:- Kaze Detector and Descriptor

I have implemented linear and non-linear detectors like LoG, DoG, K. Also, the descriptors like SURF,SIFT, DSP-SIFT,KAZE were also implemented. I used KAZE as detector and descriptor and could see that it was very fast and efficient, it detected more than 17000 points. In case of KAZE, there are a lot of mismatched points which can be observed below.



Figure 1: KAZE matched points

		Detector								
		Linear scale-space			Non linear scale-space			Handcrafted		
		LoG	DoH	k	LoG	DoH	k	SIFT	SURF	KAZE
Descriptor	On self extracted scale-space	✓	✓	✓	✓	✓	✓			
	SIFT	✓	✓	✓	✓	✓	✓			
	DSP-SIFT	✓	✓	✓	✓	✓	✓			
	KAZE	✓	✓	✓	✓	✓	✓			
On method's scale-space	SURF							✓	✓	✓
	SIFT							✓	✓	✓
	DSP-SIFT							✓	✓	✓
	KAZE							✓	✓	✓

Figure 2: Implemented Detectors.

2.3 Exercise 3:-

1.Strong perspective changes:- KAZE-KAZE, SIFT-SURF, SURF-SURF could not handle strong perspective changes.

2.Strong Illumination:- KAZE-KAZE has many mis-matched points. SIFT-SURF,SURF-SURF matched the points but has a few mis-matched points. SURF-*DSP_SIFT*,SIFT-*DSP_SIFT* was unable to match any detected points.

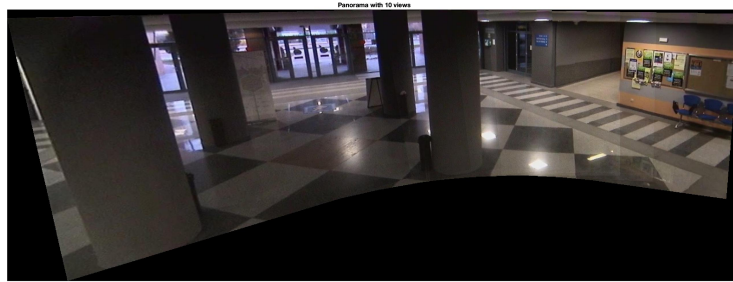
3.Repetitive textures:- I used images where texture was repetitive, and perspective distortion was less. Images are located in *my_image* folder. SURF-*DSP_SIFT*,SIFT-SIFT, SURF-SURF matches points but final result is not good, may be due to distortion in the input images [3](#).

2.4 Exercise 4:- Panorama Creation

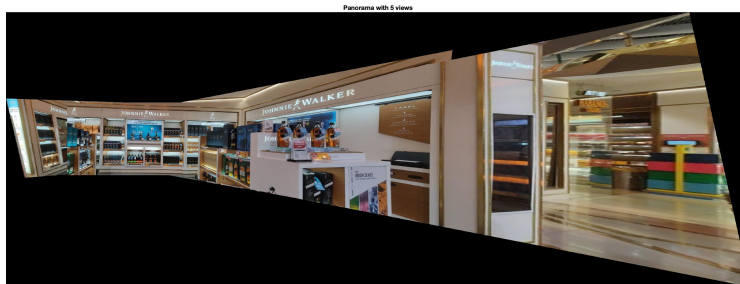
For panorama exercise, i tried three set of images. First one was provided and the images were captured without much perspective distortion, hence resulting panorama was stitched neatly. In the second output, i used 5 images that i took at the airport little variation in the perspective and could see that the resulting panorama image was decent. I could improve the results with more images. For the third output, i took those images outside EPS, building A. The resulting image is not good, may be due to a little high variation in perspective.



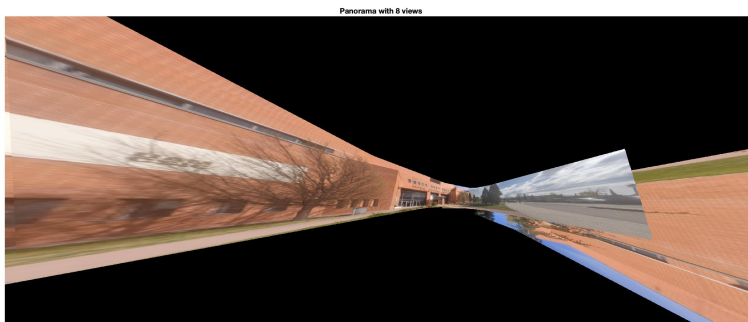
Figure 3: Matched points for a highly textured image.



(a) 1st run output



(b) 2nd run output



(c) 3rd run output

Figure 4: Output of Panorama.