CHAPTER 8

SUMMARY AND CONCLUSIONS

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8. SUMMARY AND CONCLUSIONS

8.1 SUMMARY

The research objective of this thesis is to investigate the invariant corner detectors, which is used to overcome the common difficulties of feature based image registration and mosaicing applications.

This thesis has brought out a comprehensive literature survey on image registration and mosaic system particularly using corner features. The main two important tasks in image mosaic systems are feature point detection and it’s matching. In this thesis several gradient based corner detectors and their performances are presented in terms of CCN, accuracy, matching score and repeatability. A detailed study of the invariant corner detection and its performance is presented. The proposed Steerable Harris Detector (SHD) method is compared with four methods SUSAN, Harris, KLT and FAST9. It is found that the SHD is better in terms of CCN, accuracy, matching score and repeatability. The detailed analysis is presented in the chapter 6 to substantiate our claim.

8.2 CONCLUSIONS

The objective of this thesis is to find out stable and invariant corner detector method. In this thesis, our proposed Steerable Harris Detector (SHD) method, derived from steerable filters and Harris
corner detector. The steerable filters provide better orientation selectivity and use of directional and band-limited filters enables us to detect true and stable corners. This new corner detection is based on multi-direction levels. The proposed SHD method detects stable and localized true corners with minimum number of false and missed corners, even after rotation and scaling. Steerable filters are useful in image registration for its rotation and scale invariant properties.

It can be seen that, the success rate of stitching is strongly related to number of feature points. However, it is not wise to blindly increase the number of feature points that can be extracted by a detector, since it will lead to increase in processing time due to massive amount of matching operation. In addition, it is observed that from chapter 6, the proposed SHD method performs better average CCN is 39.08% for the house image using uniform scale variations. The CCN using KLT is 10.5%, FAST9 is 32.47%, Harris is 8.6% and SUSAN is 22.75%. Similarly average CCN using block image with uniform rotation between \(-90^\circ\) to \(+90^\circ\) it is observed that SHD makes 42.15%, where as KLT is 20.11%, FAST9 is 20.14%, Harris is 27.96% and SUSAN is 18.42%.

It is noticed that the SHD performs better accuracy than other detectors using building image and that is 78.97%, whereas Harris is 64.5%, FAST9 is 69.05%, SUSAN is 33.33% and KLT is 30.7%. We concluded that, the proposed SHD method performs better matching score. For example, using horse image the matching score of proposed
SHD is **94.63**%, whereas Harris is 70.4%, FAST9 is 88.07%, KLT is 67.03% and SUSAN is 88.15%.

It is also observed that, SHD performs better repeatability for blur images when compared with other detectors. The SHD performs improved repeatability for rotation and scaling. The limitation of the SHD method is computational cost.

### 8.3 Future Scope

From the investigation reported in this thesis, the proposed method was found to be performs good accuracy but it requires more computational time. Hence, it is suggested that future investigation should be carried out with minimum computational cost and also looking forward to make suitable for real-time applications such as extend it to the video mosaicing.

It is observed that, in the resulted mosaic images suffer with artifacts which are formed at the joining position of the images, are collected with variations in intensities. Further such artifacts can be eliminated or/ minimized by applying the blending filters. Using the blending filters the mosaic image quality can be enhanced without losing the image information especially the resolution of the images.