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Panoramic Image Stitching using Sift and Homograph

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Abstract: *The construction of a high-resolution panoramic image from a sequence of input overlapping images of the same scene is called image stitching/mosaic. It is considered as an important, challenging topic in computer vision, multimedia, and computer graphics. Therefore, the main objective of this project is to get a panoramic image with minimum overlapping- together to create high quality, high resolution panorama. To process that we implement feature matching based using some algorithm such SIFT which is much less sensitive to rotation and Scale and homograph. Most image stitching techniques require exact overlap between image and its exposures to give better result*

1. INTRODUCTION

Image stitching is a process that wrapping two or more images together which can view from distance as a large size image with a wide field view (panoramic image). In generally, it is easy to make panorama panting but its relatively difficult to produce one in photography due to limitation. Main major factor to making image stitching determine the overlapping between images .Finding the overlapping position in an accurate way between two images is the most important thing in a stitching images to determining the relation of transformation between two images. we now general camera can produce a picture with viewing angle of 60-90 degree. Panoramic photography soon came to create wide views for casual user, that is stitching multiple pictures together from different perspectives. And using camera, produce images maybe liable in bad view and that will lead the stitched image have some mistakes, such as distortion, translation and rotation. So to solve this problem we should take effective measures .Many classic methods will be used to implement the image alignment like using the transform parameter to solve non liner optimization. This method is good for sequence images with the same gray scale, but if the images are different in gray scale that will not be work. We will use some algorithms and methods to stitching images based on color metric. One of algorithm we used to stitching images is Scale Invariant Feature Transforms (SIFT), which provide a set of features of an object that are not affected by many of the complications experienced in other methods, such as object scaling and rotation. This algorithm used in computer vision to detect and describe local features in images. Which it takes an image and transforms it into a collection of local feature vectors . Each of these feature vectors is supposed to be distinctive and invariant to any scaling, rotation or translation of the image.

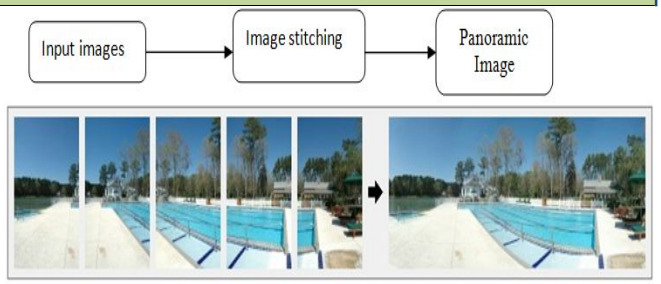

FIG 1 PANORAMIC IMAGE STITCHING

2. EXISTING SYSTEM

Now a days there is many studied and applications about producing image integration such as a panoramic cameras which became common place after the development of flexible film, and a number of dedicated panorama camera models were manufactured, from fixed lens cameras that had flat film planes and stationary lenses, to rotating lens systems with curved film planes, to rotating or "scanning" cameras that captured 360º of a scene .adobe Photoshop which most popular software application dealing with image . panoramic image also become part of types of images you want captured through smart phones.

3. PROBLEM OF EXISTING SYSTEM

Due to the cost and difficulty of producing wide-format digital sensors, very few dedicated digital panoramic systems have been developed. Those that are available are very expensive and technically complex compared to similar film-based systems. Some digital point-and-shoot cameras include a "panorama" shooting mode, but this is simply an in-camera crop. Digital photographers are therefore left with the option of stitched panoramas, where the camera captures multiple views of a scene, that is then reconstructed with software. Still image capture angle pose a problem for the application existing.

4. PROPOSED SYSTEM

In this project, we wont to develop an efficient way that is able to create high-quality panoramas image from multiple images taken from different viewpoints, and have simple overlap, also can handle large scene motions and images of large varieties. And we will making comparison between the quality of panoramic image stitching using SIFT & Homography algorithm and panoramic image stitching using apple iphone 5s

5. OBJECT OF PROJECT

Image stitching has wide uses in photo applications and has become a required toolset for many photographers. These stitched images, become panoramic views which increase the visual aesthetics of a scene, and are widely sought out for posters, postcards, and other printed materials. And the object of our project to enhance panoramic image stitching and allowing combining image haves simple overlap. And to make comparison between the quality of panoramic image stitching using SIFT & Homography algorithm and panoramic image stitching using apple iphone 5s

6. GOAL OF PROJECT

This project's aim is to stitch two images – with minimum overlapping- together to create high quality, high resolution panorama.

7. SYSTEM REQUIREMENT

(a) Hardware Requirements

- Digital Camera (Panasonic DMC-F2).
- Cable match between camera and PC
- Personal computer (4GB RAM, CORE i5, 120G Hard Disk)
- Apple iphone 5s.

(b) Software requirements

- Windows 7 operating system
- Windows photo viewer.
- MATLAB 2013 Software.

8. SYSTEM DESIGN

In this project we will Stitching two images using SIFT, Homography algorithms in RANSAC method then apply it on MATLAB. Stitching a photo can require a complex sequence of steps. In this project we used the fowling sequence of steps to do panoramic image from two images:

- choose image that have overlapping .
- Detect SIFT features on all input images.
- Match SIFT features between all pairs of images.
- Estimate Homographies for image pairs with matching points.
- Bundle adjustment to refine global alignment.
- Warp and pyramid blending to create panorama.
- Filter the final image.

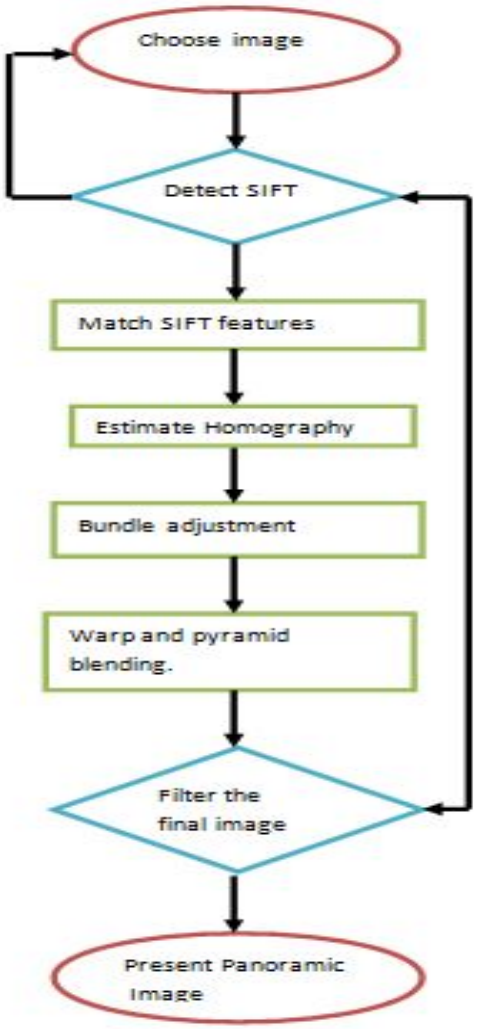

FIG 2 SYSTEM FLOW CHART

Use case of project

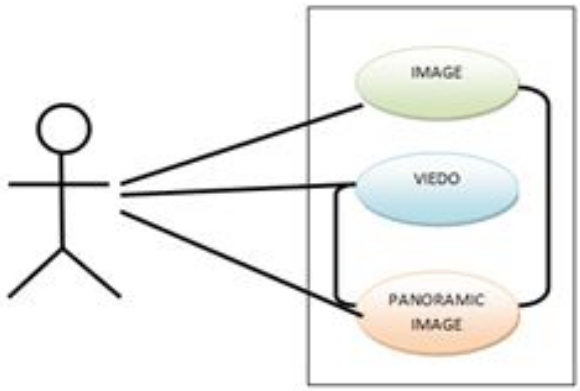

FIG 3 USE CASE DIAGRAM

9. SYSTEM IMPLEMENTATION

System Implementation uses the structure created during system design and the results of system analysis to construct system elements that meet the stakeholder requirements and system requirements developed in the early life cycle phases. These system elements are then integrated to form intermediate aggregates and finally the complete system. The

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design steps are implemented with MATLAB code and system is build.

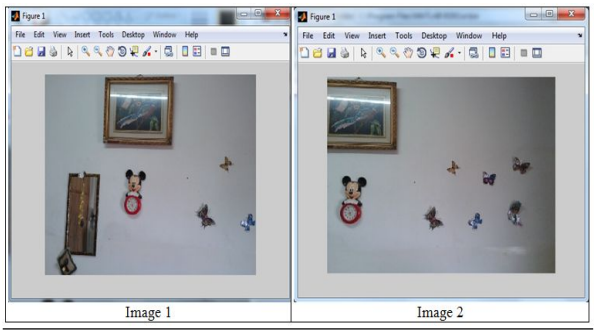
We take pictures with overlap using digital camera (Panasonic DMC-F2) and import images into Matlab. We write code to returns IMAGE's SIFT keypoints by loading image. The code reads two images, finds their SIFT features, and displays lines connecting the matched keypoints. The next stage of the project code computes a homography mapping the coordinates of one image to the coordinates of the other image. To do this we select four matched SIFT features at random and use the coordinates of each feature to solve for a homography. Use RANdom SAmple Consensus to find a fit between coordinate for features points and do the mosaic.

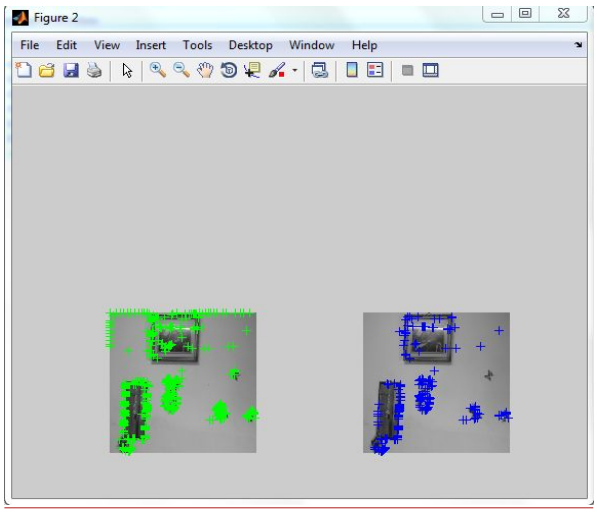
We make this steps in MATLAB code :

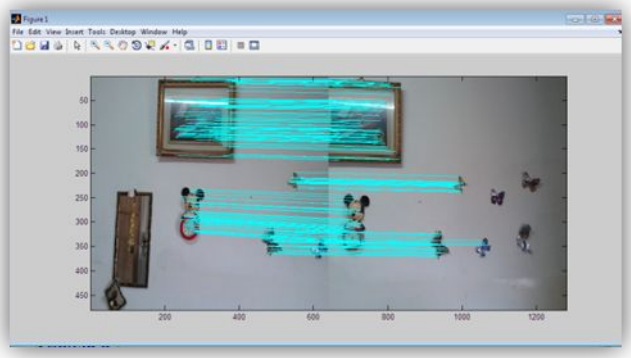
- use SIFT to find corresponding points
- use RANSAC to find homography matrix
- adjust color or grayscale linearly, using corresponding information
- do the mosaic

10. SYSTEM TESTING AND RESULTS

Software testing techniques include the process of executing a program or application with the intent of finding software bugs (errors or other defects). Once the source code has been generated the software must be tested to uncover an many error as possible before delivery to customer. The system build is run after all errors are corrected. The results are shown in the figures below.







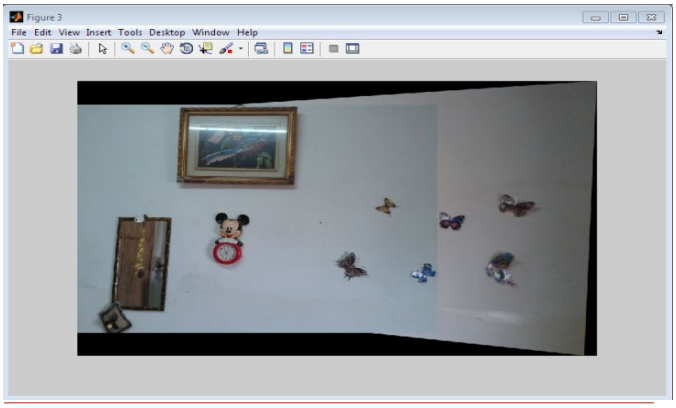


FIG 4: PANORAMIC IMAGE STITCHING RESULTS

11. BENEFITS OF THE PROJECT

- Image stitching is widely used technique for recovering of original data from ripped data.
- used in forensic and investigation science for the reconstruction of torned paper which is a big problem.
- In image mapping, stitching of image is done to do the complete mapping of particular place.
- used in digital maps and satellite photos. It's a wide research area in computer vision and in photogrammetry.
- Preserve your memories.
- our project provides a great precision in the integration of images and facilitate it because it offers the possibility of combining several images taken from different viewpoints with a simple overlap, it is able to handle large scene motions and images of large varieties

12. FEATURE OF THE SYSTEM

- Despite the availability of many applications in the integration of images but all of its need to be a clear overlap between the images, captured at specific angles and the same time. The most important feature of our project does not need all that we seek to integrate images regardless of time and angle of images.
- Using MATLAB which is very easy to use specially in image stitching.
- Very easy way to making image integration .
- Very cheap to implement.

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13. CONCLUSION

Image stitching is importantly required for many different applications, such as the construction of large satellite image from collections of input photographs. There are several problems while implementing the automatically image stitching system. For example, a change of camera rotation may lead to high parallax in the output image, which may decrease the stitching quality. In addition, a large number of overlapping images need a large processing time. The noisy input image may decrease the quality of stitching. The goal of this part of project is to introduce a system for image stitching with high quality and in the same time with less processing time because time is a major factor in many applications. We apply SIFT algorithm and homograph into two image to get a panoramic image stitching. we have good result because this algorithms can resolve the rotation ,the different of scale of images, the locality, and it allow to using individual features which can be matched to a large database of objects, also it is efficiency.

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