IMAGE MOSAICING USING CLASSIC CORRELATION BASED PATTERN MATCHING TECHNIQUE

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ABSTRACT

This paper intends to create a full view panoramic mosaic from image sequences. There are situations where it is impossible to capture a large photo image with the given imaging media such as scanners or digital cameras in a single stretch because of their inherent limitations. The solution is to capture a large photo image in terms of split components of the image. Hence, the need is to mosaic the split components of the photo image into a single large uniform photo image. To mosaic two split photo images, this paper is implemented by using pattern matching technique. The method compares the values of pixels window by window via the column of split images. Window by window comparing identifies out the common or overlapping region between two split components of photo image. From this identification of overlapping region, mosaicing of split images get complete final image of large photo image. To implement this system, C # programming language is used.

1. INTRODUCTION

Image mosaicing is an active research area, because its ability to construct a large, high resolution panoramic image from a collection of standard images. Photo image mosaicing is the process of merging split images that are obtained by scanning different parts of single large photo image with some sort of overlapping region to produce a single and complete of the photo image. In image mosaicing method, can be classified into direct method and feature based method. Feature based method can usually handle small overlapping region but computationally intensive. Direct method is used in mosaicing large overlapping region, small rotations and translations. To implement this system, direct image mosaicing method is used.

2. RELATED WORK

A number of methods have been proposed to build the image mosaicing system. Heung-Yeung Shum and Richard Szeliski developes the panoramic Image Mosaics system by using Patch-based alignment algorithm [1]. In that paper, each image is warped to cylindrical coordinates and stitched together to get cylindrial mosaic.

Marko Heikkila and Matti Pietikaninen describe an automatic images mosaicing method, wide-area video surveillance [2].Satya Prakash Mallick presented a feature based Image Mosaicing system [3]. In this system, homography relating the two images was estimated using Random sample consensus (RANSAC).

3. PROCESS OF IMAGE MOSAICING

Image mosaicing is process of stitching together two or more images of the same scene taken from different viewpoints or viewing direction.

3.1 Image acquisition

The hand-held digital camera is used for taking the images from arbitrary view positions. It gives a 640 × 480 resolution. Two images of a scene have been taken at different time, from different viewpoints. In image acquisition, online or off-line image can be got for image mosaicing. On-line image acquisition includes images that are acquired from digital camera. In off-line image acquisition, these images from scanner or pictures are stored in computer's memory. This system can be used both on-line and off-line image acquisition. The test image were obtained in the outside and inside scenes by using hand held camera for minimum time interval. Each image has 320 × 240 pixels and image format is JPEG format. Reference image and operated image of original images are shown in figure 2.

3.2 Image Mosaicing

Image mosaicing is a technique that uses image processing and computer vision to develop a presentation based on panorama from many related images. It can be used for many different applications such as video compression and indexing, the creation of virtual environments, visual scene representation, and even photo editing

[4]. Image mosaicing involves three basic steps: image registration, projection and blending.

3.2.1 Image Registration: Image registration is one of the fundamental tasks in image processing. It is used to match two or more images of the same scene taken at different time, from arbitrary view. It is the process of matching two images which are reference image and operated image. The corresponding coordinate points in the two images correspond to the same physical region of the scene being imaged, shown in figure 3. Image registration is widely used in remote sensing, computer vision, video processing and many others. In this system, the reference image could be the first frame of image sequences.

Image registration is the process of transforming one image into the coordinate transformations between all pair of an image sequences. After that we cut off the image which is not overlapping region from operated image and then merged it to the reference image.

3.2.2 Image Projection: The aim of image projection is to find the correspondence between two images. After image registration, every point in each image can be transformed to a point in the global coordinate frame.The aim of the projection is to find the correspondences between the coordinates of the global frame and those of each image.

3.2.3 Blending: The final step of image mosaicing is to blend the registered images together in their overlapping regions. Several schemes can be chosen to blend images into a mosaic [5].

4. CLASSIC CORRELATION BASED PATTERN MATCHING

We find overlap region by using classic correlation based Pattern Matching. The following is the concept of correlation based pattern matching.

Let the 1st split image may be f (x,y) of size M×N.

Let the column split of 2nd split image may be w (x,y) of size J × K.

Where we assume that J < = M and K < = N.

The normalized correlation between w (x,y) and f (x,y) at a point (i,j) is

$$C(i,j)=\frac{\sum_{x=0}\sum_{y=0}[w(x,y)-\bar{w})(f(x+i,y+j)-\bar{f}(i,j))]}{\left[\sum_{x=0}^{J-1}\sum_{y=o}^{K-1}(w(x,y)-\bar{w})^2\right]^{1/2}\left[\sum_{x=0}^{J-1}\sum_{y=0}^{K-1}(f(x+i,y+j)-f(i,j))^2\right]^{1/2}}$$

Where i = 0, 1, ----, M – 1

j = 0, 1, ----, N – 1

$\bar{w}$ = the average intensity value of the pixels in the template w.

$\bar{f}(i,j)$ = the average value of f in the region of coincident with the current location of w.

$$\bar{w}(x,y)=\frac{1}{JK}\sum_{x=0}^{J-1}\sum_{y=0}^{K-1}w(x,y)$$

$$\bar{f}(i,j)=\frac{1}{MN}\sum_{i=0}^{M-1}\sum_{j=0}^{N-1}f(i,j)$$

The value of C lies in the range -1 to 1 and is independent of scale changes in the intensity value of f and w. After finding the overlap region, the final step is to carried out image blending. Then, we obtain the mosaic image.

4.1 Design of the System

Figure 1 illustrates the design of the system. In this system, firstly input the split parts of the whole image. The input images are read the images files with jpg file type. Then, Remove the noise from the initial input images. After this preprocessing step, image mosaicing steps are carried out. The first step of image mosaicing is image registration. Image registration is the process of aligning two or more images of same scene. It is the process of matching two images which are reference image and operated image. The important step in image mosaicing is to find overlap region. To find overlap region, use the classic correlation based pattern matching technique. After finding overlap region image blending step is carried out. In this step, blend the registered images together in their overlapping region. Finally, obtain a full view panoramic image.

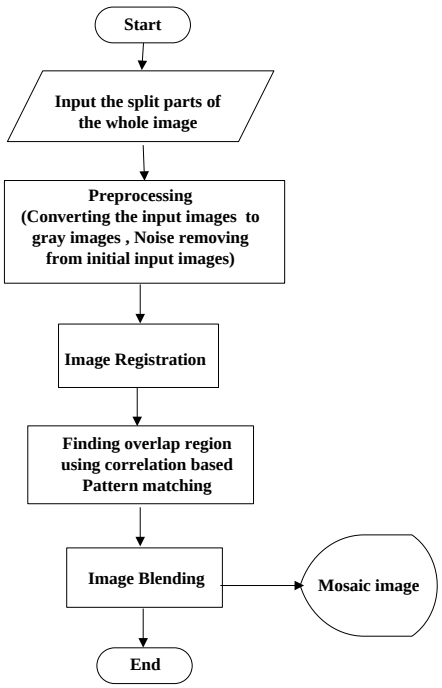


Figure 1: System Flow Diagram

5. IMPLEMENTATION

In this system, we describes two image mosaicing and three image mosaicing although several images can be merged in image mosaicing.

5.1 Two Images Mosaicing

In two images mosaicing, the initial input image is accepted as a reference image. Later, the next input image is also accepted an operated image.

5.2 Three Images Mosaicing

In three images mosaicing, firstly, the first two images are mosaiced. Then, the result mosaiced image is accepted as a reference image and the next input image is also accepted as an operated image. Finally, these two images are mosaiced to form a panoramic view.

Reference image

Operated image

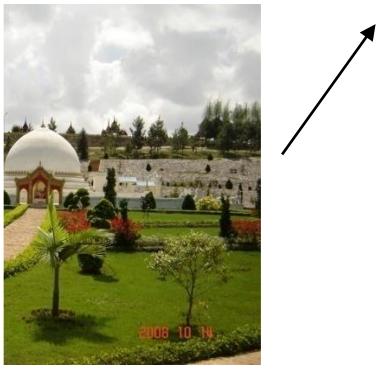
Figure2: Reference Image and Operated Image

5.3 Experiment Result

This section introduces the result of applying mosaicing techniques to synthesizing the multiple images. Figure3 shows the overlapping region of two images. The registered image is obtained from operated image by using image registration. The corresponding coordinate points in the two images correspond to the same physical region of the scene being imaged. In system, the reference image could be the first frame of the image sequences. The large scale image is created with operated image and the coordinate system of the reference image is known. The overlapping region between two images is calculated by using classic correlation based pattern matching. Then, the non overlapping region of operated image is cut off (see figure 4) and then merged it to the reference image. Figure5 shows the integrating both the reference image and non overlapping region of operated image. By

synthesizing these images, the whole view of a scene is obtained.

Reference image Registered image



Operated image

Figure 3: Illustration of Image Registration

Figure 4: Cut Off Non-Overlapping Region from Operated Image

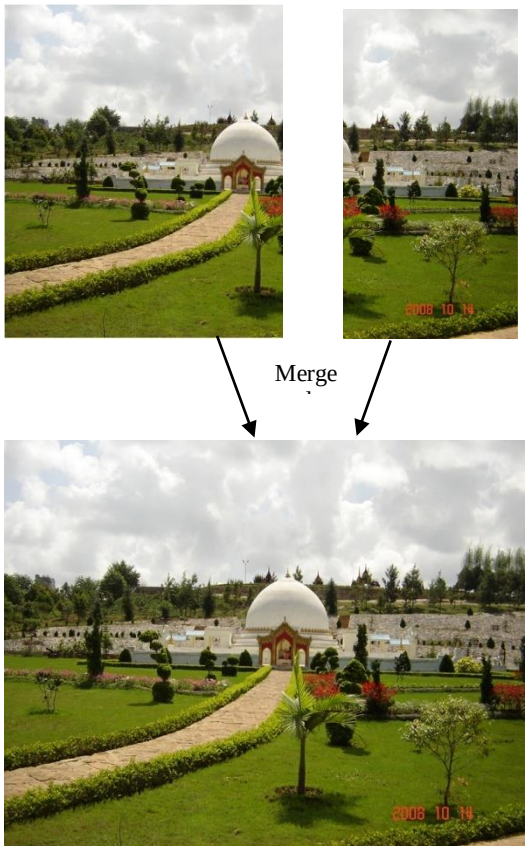


Figure.5 Synthesized Images using Reference image and non overlapping region from operated image

6. CONCLUSIONS

In this paper, we presented image mosaicing using pattern matching technique. Mosaicing creates surrounding scenes not only as large view but also as real image. It does exactly get the corresponding pair points from the overlapping region of two images. Synthesizing is performed the large-scale which has not sufficient distance between camera and object with the following major steps. (i) Image acquisition (ii) perporcessing (iii) matching the overlapping region (iv) Integrating common parts. After performing these steps, we obtain panoramic image mosaic.In this system we intend to obtain a full view image of large scaled object,to know the image processing steps,to get image processing application,to apply

pattern matching technique in image mosaicing, to get automatic mosaicing system and adaptive machine learning.

7. LIMITATIONS

In this system, the types of input images are used JPEG (Joint Photographic Expert Group) image file and BMP (bit map) image file. This system can only implemented in spatial Domain When finding the overlap region, this system was limited via the column splits. This system can also handle JPEG and BMP file types only. The input splits images are must equal the size of resolution and the height of split images.

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