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Object Identification Using Image Fusion

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Abstract: Image processing and computer vision are the wide research areas which has much focus towards the representation of objects, like biomedical image analysis, Traffic surveillance systems and face recognition systems. In this paper, the two major techniques i.e., Image Registration and Image Fusion were considered for the analysis of images taken at traffic surveillance system. Image registration is a major task in image processing in matching is performed by considering two or more pictures taken from different sources at different times from different sensors, or from different viewpoints where the two images are referred as reference image and sensed images were geometrically aligned. Image fusion is the method of combining appropriate information from two or more images into a unique image.[1] The resulting image will be more helpful than any of the input images.

Keywords: Image Registration, Image Fusion.

I. INTRODUCTION

Image fusion is the latest Research area in Image Processing in which multiple images were combined into an individual image [1][2] for grabbing important features from each of the original images. The fusion [3][4] of images are required for images which are captured from various sources acquired from different instruments modalities or capture techniques of the same scene or objects. The applications of the fusion of images include medical imaging, microscopic imaging, remote sensing, computer vision, and robotics. The Fusion process is considered with many variations i.e., w.r.t Multiview and for Image Restoration process as shown in the following figures 1 & 2.

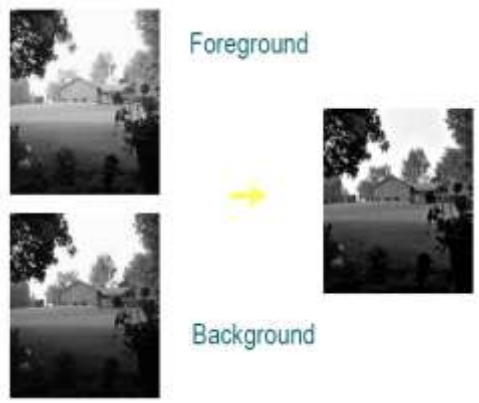


Fig-1: Multiview Fusion

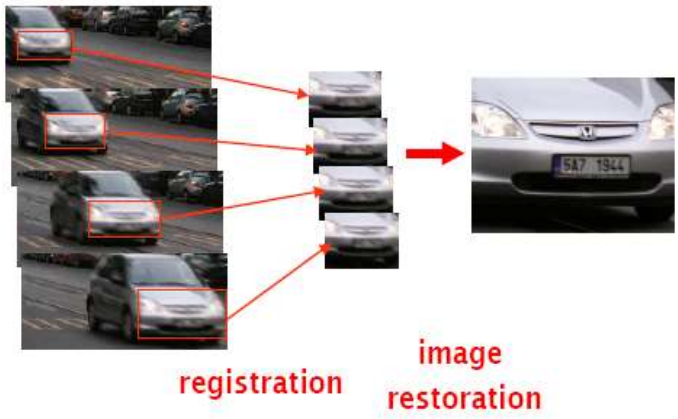


Fig-2: Image Restoration Process

The actual fusion process can take place from diverse levels of information representation; a general categorization is to consider the different levels, sorted in ascending order of abstraction: i.e., signal, pixel, feature and symbolic level. This is also referred on the pixel level [1] fusion process. This paper is discussed basing on the research work implemented on Image Fusion. The images can be taken from various sources and registered with a selective Region of Interest using Image Registration process which is the technique used for extracting features from the image before preprocessing.

2. PROPOSED SYSTEM ARCHITECTURE

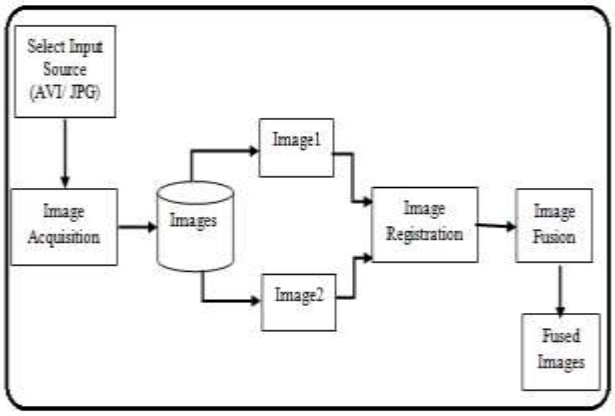


Fig-1: Overall System Architecture

The above figure shows the architecture of the proposed system in which we are going to consider the process in three phases presented as follows:

1) Image Acquisition

Image acquisition[5][7] is one of the technique used in image processing which can be defined as the process of retrieving the image from different sources i.e, either from cc cameras or digital cameras . Among various forms of acquisition process one of the form used is real-time image acquisition [5]. This usually involves retrieving images from a source that is automatically capturing images. Real-time image acquisition generates a set of images that is automatically processed, queued for processing, or stitched into a single media format. One general technology that is used with real-time image processing is known as background image acquisition, which describe both software and hardware so as to quickly preserve the images flooding into a system.

2) Image Registration

Image registration[8][9][10] is a major step in the analysis of image ,in which the final information is obtained by grouping multiple data sources images as an image fusion technique, change detection, and multichannel image restoration[12]. Normally, registration is essential in areas like remote sensing (multispectral classification, environmental monitoring, change detection, image mosaicing[13], weather forecasting[10], creating super-resolution images, integrating information into geographic information systems - GIS) , in medicine (combining CT and NMR data[10] to obtain more information about the patient, about the tumor growth status, treatment verification, comparison of the patient's data with anatomical atlases), in cartography (map updating), and in computer vision (target localization, automatic quality control) [10], to name a few. Image registration is the manipulating process of two or more images of the same scene which are taken at different sources at different viewpoints using different Sensors. Specific examples where image registration is required are matching a target image with a real-time image of a scene. Various applications of image registration are target recognition, monitoring land usage via satellite images, identifying similar stereo images to recover shape for navigation, and aligning images from different medical views for diagnosis.

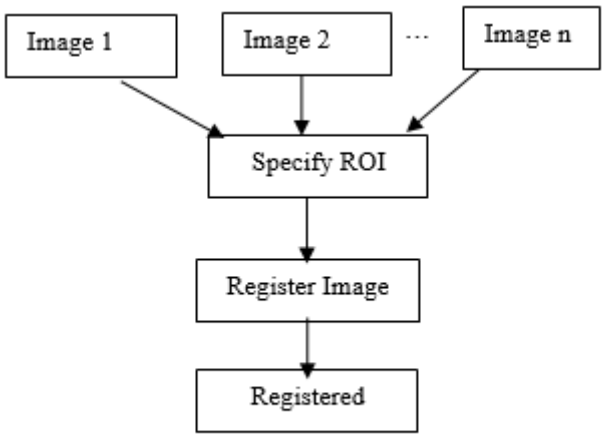


Fig-2: Image Registration Process

3) Image Fusion

Image fusion[16][14] is the method of obtaining information from multiple images[17] of a scene by combining into a single merged image which is more useful and is more suitable for visual perception or computer processing. The idea of an image fusion is to simply combine matching multisensor, multitemporal and/or Multiview information into one new fused image containing the quality of information . The objective is to reduce ambiguity [16] in the output while obtaining relevant information for the specific purpose of task. Image fusion provides an efficient way of identifying information from the source of registration containing set of blurred images very often which is just a preprocessing step for image fusion.

3. Proposed Algorithm

Step-1: Acquire Images from Camera Source or Existing Data Set. Take two images from the Data Set.

Step-2: Compare the two Images, check for the Width and Height Properties of the images.

Step-3: if **true**,

Go to Step-4,

Otherwise

Go to Step-5

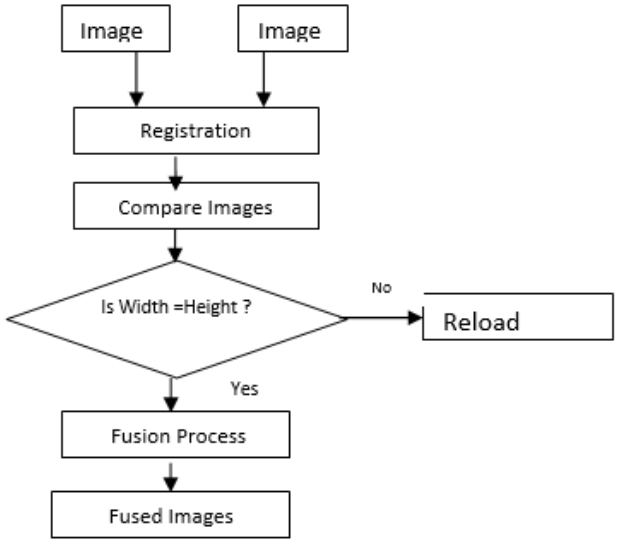
Step-4: Reload the images with similar Height and width, perform Image Registration.

Step-5: Fuse the two images using the following notation:

(1-fusion) * stack1 + fusion * stack2

Where fusion is a number between 0 and 1. The width and height of the two stacks must be the same. If stack is a color stack ("8-bit Color" or "RGB Color"), then the stacks are fused as it is. (Note that color formatted stacks may only have gray pixel values.)

4. Flow Chart



5. Implementation

The main process of this paper deals with two important phases i.e, *Image Registration and Image Fusion*.The following code presents the implementation of Registration and Fusion Process.

Image Fusion

```
private void makeFused() {
   pFused = new Point(pImpIn.x+w+xinc, pImpIn.y+yinc);
            double avail = screen.width-pFused.x-2*edgex;
            if(w>avail)
                        pFused.x = pImpIn.x+2*edgex;
            makeFusedPixels();
            if(ipFused==null)
ipFused = new ColorProcessor(w, h);
                        ((ColorProcessor)ipFused).
setRGB(pixelsFused[0], pixelsFused[1], pixelsFused[2]);
   ipFused.resetMinAndMax();
      impFused = new ImagePlus("Fused Image", ipFused);
   impFused.show();          }


 boolean updateFused() {
   makeFusedPixels();
   ((ColorProcessor)ipFused).
      setRGB(pixelsFused[0], pixelsFused[1], pixelsFused[2]);
   impFused.updateAndDraw();
   return true; }
```



```
 private void makeFusedPixels() {
  float m0 = (float) (1.0-mixer), m1 = (float) mixer;
  for(int i=0; i<3; i++) {
  if(pixelsFused[i]==null || pixelsFused[i].length!=w*h)
                    pixelsFused[i] = new byte[w*h];
          for(int j=0; j<w*h; j++)
                    pixelsFused[i][j] = (byte)
                    (m0*(0xff&pixelsIn[0][i][j])+m1*(0xff&pixelsIn[1][i][j]));
  }                 return;    }
```

Image Registration [19][20]:

```
public void register(ImagePlus imp) {
                    int nSlices = imp.getStackSize();
                    int width = imp.getWidth();
                    int height = imp.getHeight();
          int bWidth = (int)Math.round(1.414 * width);
          int bHeight = (int)Math.round(1.414 * height);
          ImageProcessor ip = imp.getProcessor();
 ImageProcessor buffer = ip.createProcessor(bWidth, bHeight);
          PointRoi[] points = getPointSelections(nSlices);
          if (points==null) return;
          int refImage = imp.getCurrentSlice();
          int slicesDone = 1;
          int i = 1;
          while (i<=nSlices) {
                    if (i==refImage) {
                              i++;
                              if (i>nSlices) break;
 JOptionPane.showMessageDialog(new RegisterFrame(),"Registering images"+ i +"/" + nSlices,"Registering:"
,JOptionPane.PLAIN_MESSAGE );
                    }
          IJ.showStatus("Registering: "+ i +"/" + nSlices);
        IJ.showMessage("Registering: "+ i +"/" + nSlices, "Registering");

    // rotate image then translate to complete registration
          findAngleAndDisplacement(points, i, refImage);
   IJ.log(xDisplacement+"  "+yDisplacement+"  "+angle);
                    i++;
          } // while
    }
       PointRoi[] getPointSelections(int nSlices) {
         RoiManager r=new RoiManager();
         r.setVisible(true);
         r.setLocation(950, 60);
 Frame frame = WindowManager.getFrame("ROI Manager");
          if (frame==null || !(frame instanceof RoiManager)) {
  IJ.error("Register", "The ROI Manager must be open");
                    return null;
          }
```



```
    Roi[] rois = new Roi[table.size()];
    int points = -1;
    boolean error = false;
boolean first = true;
    for (Enumeration en=table.keys(); en.hasMoreElements();)
    {
          String key = (String)en.nextElement();
          if (key.charAt(4)!='-') break;
  int slice = (int)Tools.parseDouble(key.substring(0,4), -1);
          if (slice<1 || slice>table.size()) break;
          Roi roi = (Roi)table.get(key);
          rois[slice-1] = roi;
          if (roi instanceof PointRoi) {
                PointRoi p = (PointRoi)roi;
                int n = p.getNCoordinates();
                if (first) {points=n; first=false;}
                if (n!=points) error = true;
           } else
                error = true;
         }
```

6. RESULTS

Fig 4: Loading Images

Fig: 5: Specify ROI for Registration

Fig 6: Rough Registration

Fig 7: Fusion Process

Fig 8: Fused Image

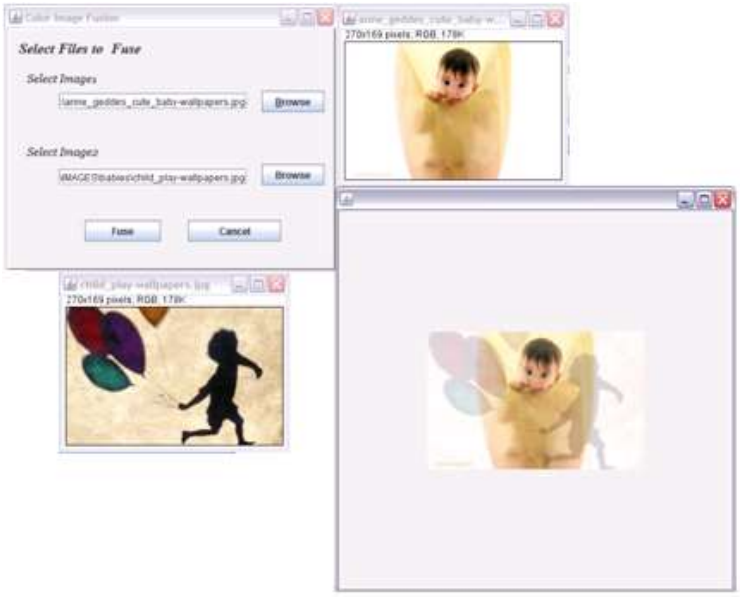


Fig 9: Color Image Fused

7. CONCLUSION

We present a brief idea on fusion and its types for the purpose of object identification in traffic surveillance systems and for investigation purpose in cyber forensics. The identification process is carried in three phases –i) image acquisition ii) image registration and iii) image fusion. Image Acquisition acts as a source for obtaining various images from multiple sources like cameras and CC footages. Image registration obtains the final information by grouping multiple data sources of images collected during phase I, where a region of interest is collected from the collected images. Image Fusion focuses on obtaining information from multiple images of a scene by combining into a single merged image which is more useful and is more suitable for visual perception or computer processing. The results depicts the identification of the fused images.

REFERENCES

1. Prof. Vishmay M. Vaidya, Prof. Darshan R. Chauhan, Prof. Dhaval A. Jadhav, COMPARISON ON VARIOUS PIXEL BASED IMAGE FUSION TECHNIQUES, International Journal of Advanced Research in Engineering, Science &Management, and ISSN: 2394-1766.
2. Anjali Malviya, S. G. Bhirud, Multi-Focus Image Fusion of Digital Images, Advances in Recent Technologies in Communication and Computing, International Conference on (2009), pp: 887-889
3. Akshata M, Aparna BV, Sathyasri Donthi, Nupur Jain and Saritha Chakrasali ,A Comparative study between Contourlet and Wavelet Transform for Medical Image Registration and Fusion , International Journal of Scientific & Engineering Research, Volume 6, Issue 6, June-2015 891 ISSN 2229-5518.
4. FUSION OF TWO IMAGES BASED ON WAVELET TRANSFORM Pavithra .C , Dr. S. Bhargavi, International Journal of Innovative Research in Science, Engineering and Technology Vol. 2, Issue 5, May 2013.
5. Anju Varghese, Aswin P. Chacko, Jyothilakshmi .K Unnikrishnan , Lakshmi Haridas , Sherin Thom , Contour Drawing Robot with Canny Edge Detection, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering An ISO 3297: 2007 Certified Organization Vol. 5, Special Issue 4, March 2016 National Conference on Signal Processing, Instrumentation and Communication Engineering (SPICE' 16)
6. Ms. Shrilekha P. Rathod*, Prof. A. H. Soni, Ms. Shrilekha P. Rathod ,An Approach on Determination on Coal Quality using Digital Image Processing Int. Journal of Engineering Research and Applications www.ijera.com ISSN: 2248-9622, Vol. 5, Issue 12, (Part - 4) December 2015, pp.38-41.
7. Ghulam Mustafa ,Choudhary Vikrant ,Gulati ,Advance in Image Processing for Detection of Plant Diseases, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 7, July 2015 ISSN: 2277 128X
8. Prachi Goyal, Chitvan Gupta ,Identification of running Vehicle using Vision Based Holistic Property of Registration Technique for Traffic Surveillance in India, , International Journal of Innovations in Engineering and Technology (IJIET), Volume 4 Issue 4 December 2014, ISSN: 2319 – 1058.
9. Supriya Kothalkar, Manjusha Deshmukh, Comparative Study of Image Registration Methods, International Journal of Image Processing (IJIP), Volume - 8 Issue – 3, June 2014, Pages - 125 - 147.
10. Neeraj Kumar Pandey, Ashish Gupta, Amit Kumar Mishra, Sanjeev Sharma, and Image Registration: An Application of Image Processing, International Journal of Modern Engineering Research (IJMER), Vol. 2, and Issue. 5, Sep.-Oct. 2012 pp-3271-3274 ISSN: 2249-6645.
11. Barbara Zitová, Jan Flusser, Image registration methods: a survey, Image and Vision Computing, Volume 21, Issue 11, October 2003, Pages 977–1000.
12. Md Shahid Ullah, Image registration Analysis, IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE), Volume 10, Issue 5 Ver. I (Sep – Oct. 2015), PP 30-37.
13. Priyanka Kumar, Shailesh Bhalerao, Detection of Tumor in Liver Using Image Segmentation and Registration Technique , IOSR Journal of Electronics and Communication Engineering (IOSR-JECE),Volume 9, Issue 2, Ver. VIII (Mar - Apr. 2014), PP 110-115.
14. Matangi Raju, Medical Image Registration Based On Gradient Field Mutual Information, International Journal of Research in Medical &Applied Sciences (IJRMAS) Vol. 1, Issue. 1, May. 2015, pp-33-38.
15. Darshana Mistry, Asim Banerjee, Review: Image Registration, International Journal of Graphics & Image Processing |Vol 2|issue 1|Feburary 2012, pp-18-22.
16. Anjali Malviya , S. G. Bhirud ,'' Image fusion of digital images , PER International Journal of Recent Trends in Engineering, Vol 2, No. 3, November 2009,pp-146-148.
17. Gonzalo Pajares, Jesús Manuel de la Cruz, A wavelet-based image fusion tutorial, Pattern Recognition, Volume 37, Issue 9, September 2004, Pages 1855–1872.
18. Yong Chen, Rong hua Zhang, and Lei Shang, A Novel Method of Object Detection from a Moving Camera Based on Image Matching and Frame Coupling, PLOS ONE , October 2014 ,volume 9, Issue 10. Pseudo code Support
19. Image Slices-http://imagej.nih.gov/ij/plugins/download/misc/SliceAligner.java
20. Image Registration -https://imagej.nih.gov/ij///plugins/download/misc/Registration4.java

