Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 9, September 2014, pg.450 – 455

RESEARCH ARTICLE

An Improved Decomposition Based Fusion Model for Medical Image Restoration

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Abstract: Image fusion is about to combine the features of two or more partial occluded or damaged images to generate a new effective image. Some image sequence is generated; sometimes some images are not taken well because of lighting problem, instrument problem etc. In such case, by combining the two or more image visible features, a faire image can be constructed. In this present work, ROI analysis based hybrid approach is presented to perform effective generation of reconstructed medical image. After the extraction of image ROI, the next work is to apply the curvelet over the image to extract the curvic features so that the main boundary areas over the image will get highlighted. This stage will repair the curves for new constructed image. At the final stage, the statistical measure based statistical measure will be applied to identify the effective image areas and to reconstruct the image features.
Keywords: Image Fusion, Medical Images, Restoration

I. INTRODUCTION

Image fusion represents a specific case of multisensor information fusion in which all the information sources used represent imaging sensors. Information fusion can be achieved at any level of the image information representation. Analogous to other forms of information fusion, image fusion is usually performed at one of the three different processing levels: signal, feature and decision. Signal level image fusion, also known as pixel-level image fusion, represents fusion at the lowest level, where a number of raw input image signals are combined to produce a single fused image signal. Object level image fusion, also called feature level image fusion, fuses feature and object labels and property descriptor information that have already been extracted from individual input images. Finally, the highest level, decision or symbol level image fusion represents fusion of probabilistic decision information obtained by local decision makers operating on the results of feature level processing on image data produced from individual sensors.

Pixel-level image fusion represents fusion of visual information of the same scene, from any number of registered image signals, obtained using different sensors. The goal of pixel-level image fusion can broadly be defined as: to represent the visual information present in any number of input images, in a single fused image without the introduction of distortion or loss of information.

In simpler terms, the main condition for successful fusion is that "all" visible information in the input images should also appear visible in the fused image. However, although theoretically possible, due to the redundant nature of multisensor information (for example, slightly different signatures of the same object in different sensor modalities), the complete representation of all of the visual information from a number of input images into a single one is seldomly achieved in practice. Thus, the practical goal of pixel-level image fusion is modified to: the fusion, or preservation in the output fused image, of the "most important" visual information that exists in the input image set. The main requirement of the fusion process then, is to identify the most significant features in the input images and to transfer them without loss into the fused image. What defines important visual information is generally application dependant. In most applications and in image fusion for display purposes in particular, it means perceptually important information.

The output fused image can also be distorted as the result of "true" information loss caused by the incomplete transfer of data from the inputs into the fused image. The loss of image information can be realised in a number of ways although the most common and certainly most noticeable is the loss of contrast. Contrast in this context refers to the relative difference in the illumination level of each pixel and mean illumination level of the surrounding area.

The above broad pixel-level image fusion definitions and objectives serve as a basis for developing pixel-level image fusion performance evaluation thereafter, a topic which is also considered in this thesis. The extent to which the visual information contained in the input images is preserved in the fused image, represents the success of the fusion process, i.e. the larger the loss of information, the worse the performance of the fusion algorithm. The amount of noise distortion present in the fused image also reduces fusion performance.

Another important consideration in pixel-level fusion is the number of input images and the colour characteristics of the input and output images. This research work addresses the topic of pixel-level fusion with two monochrome input images and a monochrome fused output image. However, all the work can be easily extended to accommodate a higher number of inputs and explanations of this are provided where appropriate.

In this paper, an effective approach is defined for medial image fusion so that the new effective image will be constructed from it. In this section, the description of the fusion process is defined. In section II, the work defined by the earlier researchers is discussed. In section III, new research methodology is proposed. In section IV, the results obtained from work are presented. In section V, the conclusion obtained from the work is discussed.

II. EXISTING WORK

Richa Singh[1] presented a work on multi level image fusion and match score based fusion to improve the visibility and image quality. Author defined the work for facial recognition. Author defined the fusion process for improving the match score for spectral face images. The fusion of visible and long wave infrared face images is performed using 2V-Granular SVM which uses multiple SVMs to learn both the local and global properties of the multispectral face images at different granularity levels and resolution. The efficacy of the proposed algorithm is validated using the Notre Dame and Equinox databases and is compared with existing statistical, learning, and evidence theory based fusion algorithms. R. Riyahi[2] presented a comparative analysis work on fusion approach and identification of tree crown images. Author presented a work on three different pixel based fusion methods under PCA approach so that the image transformation for satellite images. Author defined a work on visual and statistical analysis on images. Author defined the quality assessment of fusion images and shows the PCA based work to improve the image. Mohammad Hanif[3] presented a work on visual and termal images to improve the fusion process and to improve the accuracy of face recognition. Author defined the face recognition system so that the visual and termal images. Author defined facial feature extraction based work to perform image fusion under gabor filtration. The filtration process is defined to extract the image features and expression under light intensity. Firooz Sadjadi[4] defined a comparative analysis for different fusion approaches. In this paper we provide a method for evaluating the performance of image fusion algorithms. Author define a set of measures of effectiveness for comparative performance analysis and then use them on the output of a number of fusion algorithms that have been applied to a set of real passive infrared (IR) and visible band imagery. Shutao Li[5] has defined a work on image fusion under region segmentation and frequency analysis. In this paper, a new region based multi focus image fusion method is proposed. The motivation of our proposed method lies in the fact that region-based image fusion

methods could be more meaningful than pixel-based fusion methods which just consider individual pixels or associated local neighborhoods of pixels in the fusion process. The proposed method is more robust to misregistration or slight motion of the object than the pixel-based method.

Myungjin Choi[6] has defined a work on image fusion and curvelet based transformation. Author defined a work on curvelet transformation and edge detection and wavelet transformation. Since edges play a fundamental role in image understanding, one good way to enhance spatial resolution is to enhance the edges. Curvelet-based image fusion method provides richer information in the spatial and spectral domains simultaneously. Author performed IKONOS image fusion. This new method has reached an optimum fusion result. Yao Wan-qiang[7] defined a work on wavelet based work on image fusion. Author focuses on image fusion between multi-spectral images and panchromatic images using a wavelet analysis method with good signal processing and image processing traits. A new weighting technique is developed based on wavelet transformation for the fusion of a high spatial resolution image and a low-resolution, multi-spectral image. The experimental results show that the new method presented is clearly better in not only preserving spectral and improving spatial presentation, but also avoiding mosaic occurring. Paul Hill[8] defined a work on image fusion and complex wavelet. The fusion of images is the process of combining two or more images into a single image retaining important features from each. Fusion is an important technique within many disparate fields such as remote sensing, robotics and medical applications. Wavelet based fusion techniques have been reasonably effective in combining perceptually important image features. This novel technique provides improved qualitative and quantitative results compared to previous wavelet fusion methods.

M.Prem Kumar[9] has defined a work on image fusion under quality assessment so that the impulse noise over the image will be reduced. In this paper, Image Fusion based on local area variance is used to combine the de-noised images from two different filtering algorithms, Vector Median Filter (VMF) and Spatial Median Filter (SMF). Experimental results show that GIQI is better in non-reference image fusion performance assessment than universal image quality index (UIQI). Mrinal Kanti Bhowmik[10] has defined a work on image fusion and thermal images and visual images under wavelet transformation for face recognition. This paper investigates Quotient based Fusion of thermal and visual images, This approach is based on a definition of an illumination invariant signature image which enables an analytic generation of the image space with varying illumination. Harishwaran Hariharan[11] has defined a work on image fusion and enhancement so that the image decomposition will be performed. Author demonstrates how the proposed method improves the interpretive information of the input images, by comparing it with widely used fusion schemes.

III. RESEARCH METHODOLGY

Image fusion is about to combine the features of two or more partial occluded or damaged images to generate a new effective image. Some image sequence is generated; sometimes some images are not taken well because of lighting problem, instrument problem etc. In such case, by combining the two or more image visible features, a faire image can be constructed. In this present work, ROI analysis based hybrid approach is presented to perform effective generation of reconstructed medical image. At the earlier stage of the work, the color model based approach will be used to perform medical image segmentation. This segmentation process will separate the background and foreground area of image. This foreground will be considered as the main ROI on which image fusion will be applied. After the extraction of image ROI, the next work is to apply the curvelet over the image to extract the curvic features so that the main boundary areas over the image will get highlighted. This stage will repair the curves for new constructed image. At the final stage, the statistical measure based statistical measure will be applied to identify the effective image areas and to reconstruct the image features. This statistical measure will perform the similarity analysis at the earlier stage and on later stage, perform the visibility.

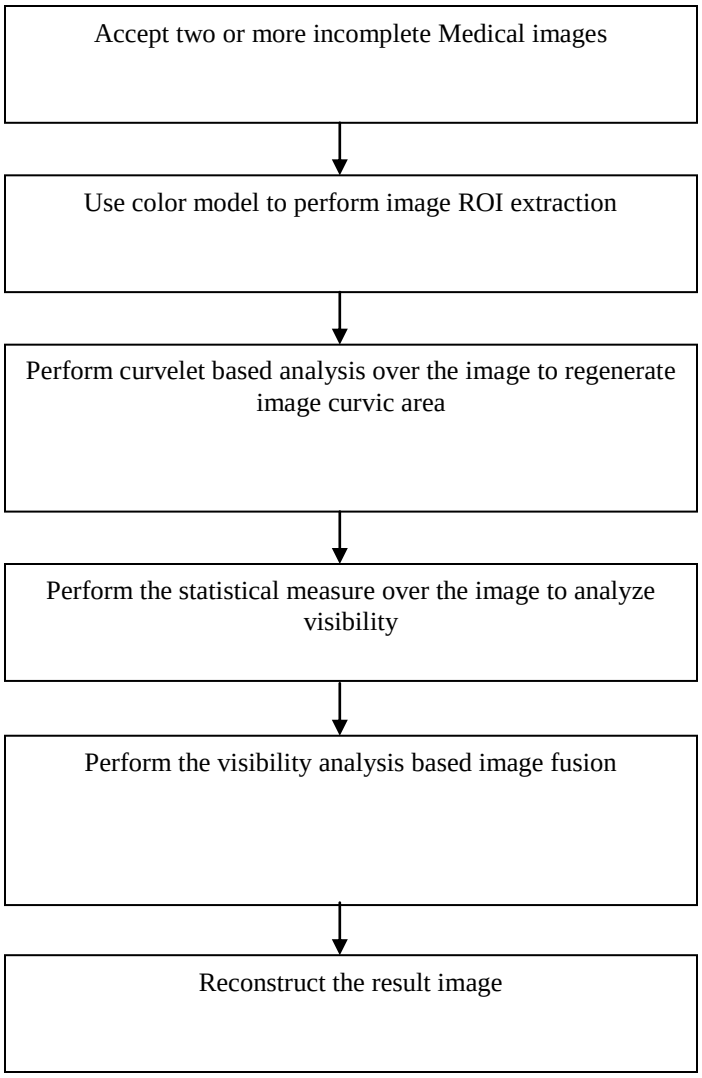

Figure 1: Flow of Work

In this present work, a hybrid model is presented to perform fusion on medical image ROI so that effective reconstruction of image will be done. The work will be implemented on medical DICOM images. The presented work will at first identify the image ROI so that effective recognition will be performed. The ROI extraction approach is based on color model. After the extraction of image ROI, the curvelet will be applied over the images to extract the image boundaries. At the final stage, the statistical measure will be applied over the image to reconstruct the image. The statistical measure will identify the better visibility pixels or areas over the image and reconstruct the result image.

IV. RESULTS

The presented work is implemented in Matlab environment and analyzed under different vectors. The work is here been analyzed under Standard Deviation and Entrophy values. The results obtained from the work are shown here under.

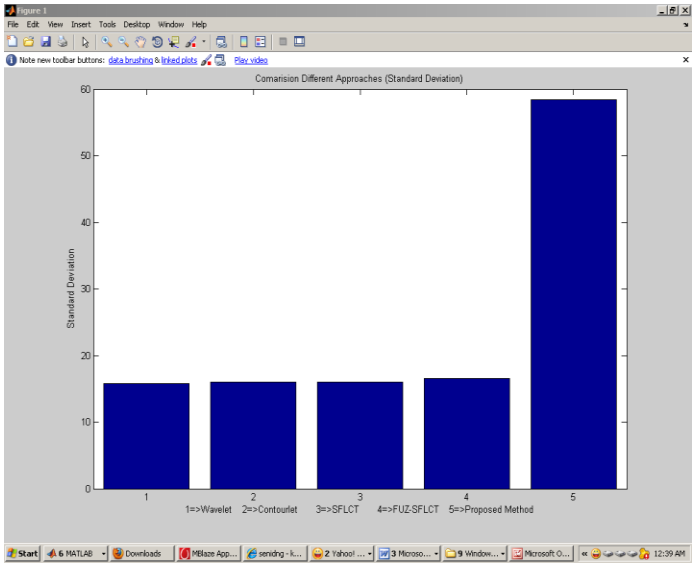

Figure 2 : Standard Deviation Analysis

As we can see figure 2 is showing the comparison between different approaches of image fusion. The comparison is done respective to proposed approach. Here we can see the standard deviation of proposed approach is much higher then existing approaches.

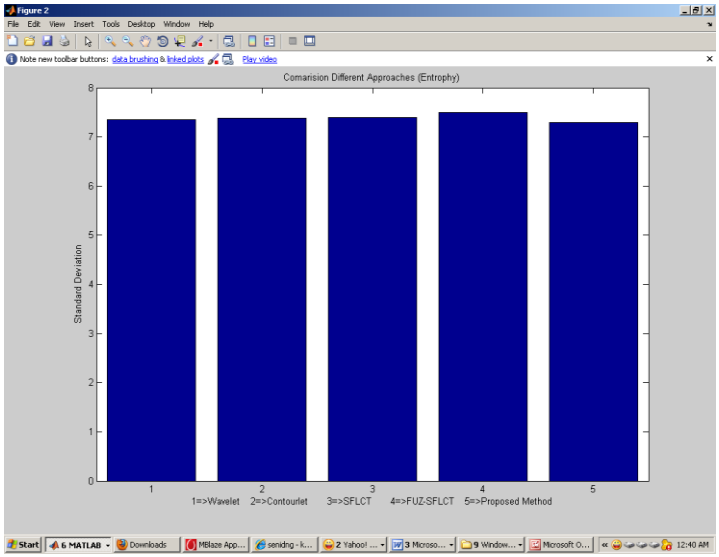

Figure 3 : Entrophy Value Analysis

As we can see figure 3 is showing the comparison between different approaches of image fusion. The comparison is done respective to proposed approach. Here we can see the Entropy of proposed approach is much Lower than existing approaches.

V. CONCLUSION

In this paper, we have used Image fusion approach to construct a new improved image from two images. These images are of scene with some problem at different places of image. The problems can be in terms of contrast unbalancing,

blurring, distortion etc. In this present work we have used curvelet based approach is decomposition to construct a new image from two improper images. The results shows that the proposed approach has significantly improve the image.

REFERENCES

[1] Q. Ye, W. Shi and Y. Li, "Sentiment Classification for Movie Reviews in Chinese by Improved Semantic Oriented Approach", Proceedings of the 39th Hawaii International Conference on System Sciences, pp 1-5, 2006

[2] R. Colbaugh and K. Glass, "Estimating Sentiment Orientation in Social Media for Intelligence Monitoring and Analysis", International Conference on Intelligence and Security Informatics, pp 135 - 137, 2010

[3] X. Yuy,Y. Liu and A. Anz, An Adaptive Model for Probabilistic Sentiment Analysis, IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology, pp 661-665, 2010

[4] X. Yu, Y. Liu, J. X. Huang and A. An, "Mining Online Reviews for Predicting Sales Performance: A Case Study in the Movie Domain", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 24, NO. 4, APRIL 2012

[5] C Liu, W. Hsaio, C. Lee, G. Lu, and E. Jou, Movie Rating and Review Summarization in Mobile Environment, IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART C: APPLICATIONS AND REVIEWS, VOL. 42, NO. 3, MAY 2012

[6] K. Glass and R. Colbaugh, Estimating the Sentiment of Social Media Content for Security Informatics Applications, IEEE International Conference on Intelligence and Security Informatics, pp 65 - 70 , 2011

[7] S.M. S. Hasan and D. A. Adjeroh, Proximity-Based Sentiment Analysis, 4th International Conference on Applications of Digital Information and Web Technologies, pp 106 - 111, 2011

[8] A. Hogenboom, P. v. Iterson, B. Heerschop, F. Frasincar, and Uzay Kaymak, "Determining Negation Scope and Strength in Sentiment Analysis", pp 2589 - 2594 , 2011

[9] M. Hao, C. Rohrdantz, H. Janetzko and U. Dayal, Visual Sentiment Analysis on Twitter Data Streams, IEEE Conference on Visual Analytics Science and Technology, pp 277 – 278, 2011

[10] C. B. Ward, Y. Choi, S. Skiena and E. C. Xavier, "Empath: A Framework for Evaluating Entity-Level Sentiment Analysis", International Conference & Expo on Emerging Technologies for a Smarter World, pp 1 - 6, 2011

[11] M. Wöllmer, F. Weninger, T. Knaup, and B. Schuller, YouTube Movie Reviews: Sentiment Analysis in an Audio-Visual Context, IEEE Intelligent Systems, pp 46 – 53, 2013

[12] K. Mouthami, .K. Nirmala Devi and V. M. Bhaskaran, Sentiment Analysis and Classification Based On Textual Reviews, International Conference on , pp 271 – 276, 2013.

[13] V.K. Singh, R. Piryani, A. Uddin and P. Waila, Sentiment Analysis of Movie Reviews and Blog Posts, IEEE International Advance Computing Conference, pp 893 – 898, 2013

[14] S. Kamath, S A. Bagalkotkar, A. Khandelwal, S. Pandey and K. Poornima, Sentiment Analysis Based Approaches for Understanding User Context in Web Content, International Conference on Communication Systems and Network Technologies, pp 607-611, 2013

[15] V.K. Singh, R. Piryani, A. Uddin and P. Waila, Sentiment Analysis of Movie Reviews, International Multi-Conference on Automation, Computing, Communication, Control and Compressed Sensing, pp 712 - 717, 2013

