Research Article Impact Factor: 4.226 ISSN: 2319-507X
Snehal Gomase, IJPRET, 2016; Volume 4 (9): 440-446 IJPRET

INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

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MODIFIED APPROACH ON IMAGE FUSION USING WAVELET TRANSFORM

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Accepted Date: 15/03/2016; Published Date: 01/05/2016

Abstract: In the recent past digital image processing has broad areas of application. One of the most important applications of image processing is in image fusion. In this paper we are proposing an algorithm for protecting the secret image whose confidentiality needs to be maintained, and also to authenticate the distributor who distributes that secret image to multiple users is proposed. The secret image will be fused with the fingerprint of the dealer for authentication purpose. Fusion of the finger print will be done by using image fusion technique to generate a single image consisting of the secret image as well as the finger print image of the dealer. This provides both confidentiality of the secret image and as well as the authentication of the dealer who has sent the image. The verification will be done during reconstruction of the secret image.

Keywords: Dealer, Image Fusion, Secret Sharing

PAPER-QR CODE

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Access Online On:

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How to Cite This Article:

Snehal Gomase, IJPRET, 2016; Volume 4 (9): 440-446

INTRODUCTION

In today's information age, security of data has become an developing area of research that arrangement with all aspects of secure data communication. The Internet has become a popular communication network in the field of medicine, military, geographical fields etc, lots of images need to be handled to achieve the clearinformation about the problem a patient has in the case of medical field, to obtain the information about the attackers or terrorists in the field of military, to obtain the information about the fields which arrange good crop or mining facility etc in the field of geography. But, over Internet the information is viewed to many users. Hence, now the security of visual information has become more and more important in many actual applications to fulfill such an increasing requirement of security.

In which multiple images of same scene from visual sensor networks are fuse together to form single fuse image by Image fusion technique. The important features in the fused image without introducing inconsistencies in this image and it extracts the relevant information from input images and highlights the useful data. which are processes and fuses multiple images of scene from different viewpoints into a single image by Visual sensor networks is a network formed of spatially distribute cameras. which are capable of processing and fusing the image data obtain from multiple cameras by the network also contains central computers. which fuses several images of scene capture with focus on various object using different sensors and then these images are fuse to from a resulting image which focus all the objects in the scene by a single image cannot focus on all the objects in a scene in many situations thus multi-focus image fusion technique is used. In traditional data fusion, datafusion can be divided into three levels these levels are pixel level fusion, feature level fusion and decision level fusion. These different fusion levels have different algorithms and have different application.

PROPOSED BLOCK DIAGRAM

Image processing is a very useful tool which bringinformation more precisely. Image fusion is a technique where we add or merge two images, the resultant image is a combination of both images which contain more information and actual information. The following fig shows the block diagram of proposed work which will used to combine the secret image with the image of the finger print of the dealer.

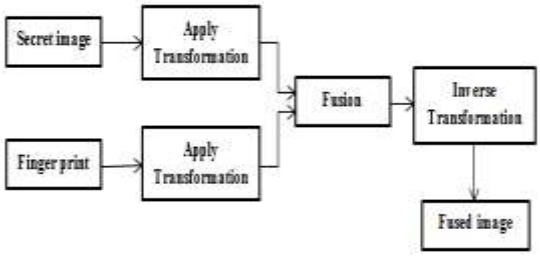


Fig.1 Transformation Based Image Fusion

Above fig.1 shows the block diagram of wavelet transform. This block diagram can be explained using few steps:

A. Image Acquisition

First, we have to take two images i.e. secret image first and Finger print second.

B. Wavelet Transform

In wavelet transform, we use wavelets as transform basis. Wavelet functions are functions generated from one single function ψ by scaling and translation:

$$\psi_{a,b}(t) = \frac{1}{\sqrt{a}}\psi\left(\frac{t-b}{a}\right)$$

The mother wavelet ψ (t) has to be Zero integral, High frequency wavelets correlate to a<1 or narrow width, while low frequency wavelets correlate to a>1 or wider width.

Wavelets are functions defined over a finite interval and having an average value of zero. The basic idea of the wavelet transform is to represent any arbitrary function f(x) as a superposition of a set of such wavelets or basis functions. These basis functions are obtained from a single prototype wavelet called the mother wavelet ψ (x), by dilations or scaling and translations.Wavelet bases are very good at conveniently representing functions that are smooth except for a small set of discontinuities.

After taking two images, we have to apply wavelet transform to that images. The different types of wavelet transform are as follows:

1.Continuous Wavelet **Transform:**

The continuous wavelet transform was developed as andifferent approach to the short time Fourier transform to overcome the resolution problem. The wavelet analysis is done in a similar way to the STFT analysis, in the impression that the signal is multiplied with a function,identical to the window function in the STFT, and the transform is computed separately for particular segments of the time-domain signal.

Continuous wavelet transform (CWT) is an implementation of the wavelet transform using arbitrary scales and almost arbitrary wavelets. The wavelets used are not orthogonal and the data complete by this transform are highly correlated. For the discrete time series we can use this transform as well, with the limitation that the smallest wavelet translations must be equal to the data sampling. This is sometimes called Discrete Time Continuous

Wavelet Transform (DTCWT) and it is the most used way of computing CWT in real applications. In principle the continuous wavelet transform works by using directly the definition of the wavelet transform, i.e. we are computing aconvolution of the signal with the scaled wavelet. For each scale we obtain by this way an array of the same length N as the signal has. By using Marbitrarily chosen scales we obtain a field N×Mthat represents the time frequency plane precisely[5].

The continuous wavelet transform is defined as follows

$$CWT_x^{\psi}(\tau, s) = \Psi_x^{\psi}(\tau, s) = \frac{1}{\sqrt{|s|}} \int x(t)\psi^* \left(\frac{t-\tau}{s}\right) dt$$

As seen in the above equation, the transformed signal is a function of two variables, tau and s, the translation and scale parameters, respectively,psi(t) is the transforming function, and it is called the mother wavelet.

2. Lifting Wavelet Transform**:**

In the lifting scheme version of the Haar transform, the prediction step predicts that the odd element will be equal to the even element. The difference between the predicted value (the even element) and the actual value of the odd element replaces the odd element. For the forward transform iteration *j* and element *i*, the new odd element, *j+1,i*would be[6]

ddj+1,i = oddj,i - evenj,i

In the lifting scheme version of the Haar transform the update step replaces an even element In the lifting scheme interpretation of the Haar transform the update step replaces an even element with the average of the even/odd pair (e.g., the even elements and its odd successor, s):

$$even_{j+1,i} = \frac{even_{j,i} + odd_{j,i}}{2}$$

with the average of the even/odd pair (e.g., the even element s and its odd successor, The original value of the odd element has been replaced by the difference between this element and its even predecessor. Simple algebra lets us recover the original value:

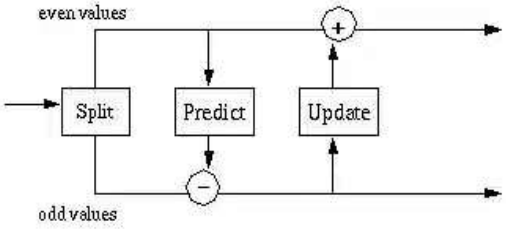
oddj,i = evenj,i + oddj+1,i

Substituting this into the average, we get

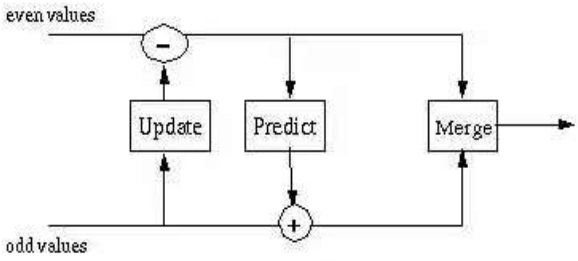
$$even_{j+1,i} = \frac{even_{j,i} + even_{j,i} + odd_{j+1,i}}{2}$$

$$even_{j+1,i} = even_{j,i} + \frac{odd_{j+1,i}}{2}$$

The averages (even elements) become the input for the next recursive step of the forward transform. This is shown in Fig, below.



Lifting Scheme forward wavelet transform



Lifting Scheme inverse transform

Above fig. shows the scheme of Inverse lifting wavelet transform In the inverse transform, the inverse predict stage has returned the odd elements to their original values. The inverse scaling function is calculating by via the inverse of the average[6].

C. Fusion Rule

The arrival of multiresolution wavelet transforms gave rise to wide advancement in image fusion research. Several methods were recommended for various applications utilizing the directionality, orthogonality and compactness of wavelets [7],[8],[9]. Fusion process should maintain all important analysis information in the image and should not suggest any artefacts or inconsistencies while suppressing the undesirable characteristics like noise and other inappropriate details [8], [10].

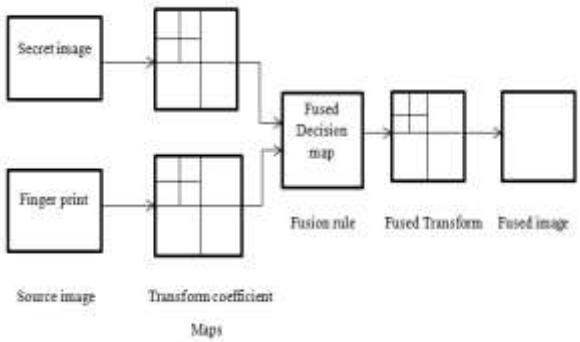


Fig.2 Transform based image fusion

The source images such as Secret image and Finger print are disintegrate in rows and columns by low-pass (L) and high-pass (H) filtering and subsequent down sampling at each level to get approximation and detail coefficients. Scaling function is correlated with smooth filters or low pass filters and wavelet function with high-pass filtering. As the wavelet coefficients are achieved, we have to implement fusion rules to those coefficients.Various types of fusion rules are used which helps us to compute fusion decision map:

High activity level approved over low activity level.

Edge points preferred over non-edge.

Small regions approved over large regions.

Make decision on non edge point first and consider their neighbors when making the decision on edge points A void isolated points in decision map[11].

D.Inverse Wavelet Transform

The input for the next recursive step of the transformation. In inverse transform the fused image is reconstructed.

E. Fused Image

Ultimately we get the fused image. This image is a combination of two input images. This consist of the information of both input images.

III. CONCLUSION AND FUTURESCOPE

This paper puts forward an image fusion algorithm based on Wavelet Transform. It accommodatemultiresolution analysis adequacyin Wavelet Transform. Image fusion be after to combine information from different images. It integrates correlative information to give a better visual picture of a scenario, suitable for processing. Image Fusion outcome a single image from a set of input images. It is widely recognized as an efficient tool for developing overall performance in image based application. Wavelet transforms provide a framework in which an image is decomposed, with each level corresponding to a base resolution band. The wavelet sharpened images have a very good spectral quality. The wavelet transform suffers from noise and artifacts and protect secret image efficiently with less computational Complexity. In image fusion the edge preservation is important in obtaining complementary details of input images. So future work include transform based image fusion which is best suited for secret images.

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