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An Improved Image Fusion Technique Based on Texture Feature Optimization Using Wavelet Transform and particle of swarm optimization (POS)

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Abstract:- *Image fusion technique applied in varied field of natural science for diagnose of great medical daisies. The brain stroke detection in head is very robust task as results of the tissues of head square measure necessary issue. Presently the detection technique used high intensity transmission camera for gathering brain stroke image for analysis of stroke. Throughout this paper projected a feature improvement technique for brain stroke detection. The projected technique supported ripple transforms operate and particle of swarm improvement technique. The projected rule performs higher in compression of pervious methodology like WT and IWT transform methodology.*

Keywords:- *image fusion, feature optimsation, POS*

1. INTRODUCTION

The term image fusion typically implies the combination of pictures noninheritable by multiple sensors with the intention of providing a much better robust perspective of a scene that contains more content. For merging remotely detected pictures, significantly one multi-spectral image and one panchromatic image, fusion algorithms ought to aim to integrate data from pictures of various spectral and abstraction resolution[1,2], resulting in acquire one image that has} the simplest features of every one. Image fusion is rising as an important technology in several are like military, police investigation and medical applications. It's a sub space of the additional general topic of information fusion, dealing with image and video knowledge. To get a picture that at the same time contains the define of scene moreover as special objects for the convenience of human seeing or for additional image-processing tasks, image fusion is accustomed integrate the data provided by individual sensors. Throughout the past two decades, several image fusion strategies are developed. Consistent with the stage at that image data is integrated, image fusion algorithms is categorised into pixel, feature, and decision levels [4,5]. The pixel-level fusion integrates visual data contained in source pictures into one consolidated image supported the initial pixel data. Within the past decades, pixel-level image fusion has attracted a good deal of analysis attention. Generally, these algorithms is categorised into spatial domain fusion and transform domain fusion [6,7]. A dual-tree advanced wavelet transform (DT-CWT) is employed to phase the options of the each kind of input pictures, like collectively and individually, to produce a neighborhood map. Characteristics of every region are calculated and a region-based approach is employed for fusion the photographs, region primarily based within the wavelet domain. Alternative fusion strategies are supported prominence measuring, native gradient and edge fusion. Pixel based algorithms consider increasing image distinction whereas region based algorithms

give edge improvement and have extraction. Fusion is performed on pixel, feature or decision level [15]. PCA may be a classical de- correlation technique in statistical signal processing and it's pervasively employed in pattern recognition and spatiality reduction, etc. By remodeling the initial dataset into PCA domain and conserving solely the many most important principal elements, the noise and trivial data is removed. A PCA-based scheme was planned for image denoising by employing a moving window to calculate the native statistics, from that the native PCA transformation matrix was calculable. largely targeted on a selected aspect of the analysis task, like multimodal video indexing, automatic audio-visual speech recognition, biometric audiovisual speech synchroneity, multi-sensor management for data fusion, face recognition, multimodal human computer interaction, audio-visual biometric , multi-sensor fusion etc. Genetic Algorithms (here forrader known as as GA) are supported activity discovered by charles darwin. GA makes use of the best illustration, replica and variety mechanism. optimisation with GA is performed through natural exchange of genetic material between oldsters. GA's are being employed in several applications like operate optimisation, System Identification and management, Image process, Parameter optimisation of Controllers, Multi-Objective optimisation, etc[18]. During this paper we have a tendency to planned a feature primarily based image fusion technique. The planned technique supported feature optimisation technique or optimization algorithm. The higher than section discuss introduction of image fusion. In section II we have a tendency to describe gabor wavelet transform. In section III discuss particle of swarm (POS). In section IV discuss planned methodology for image fusion. In section V discuss Experimental result and at last conclude in section VI.

2. FEATURE EXTRACTION

Feature extraction technique is very important section of image fusion technique [5]. In fusion image primarily 3 forms of options are color, texture and dimensions. Feature extraction may be outlined because the act of mapping the image from image area to the feature area. Now days, finding smart options that effectively represent a picture are still a tough task [9]. During this section discuss a options are used for fusion image from the raw image.

Integer wavelet transform function is beneficial transform function for lossless knowledge coding in image process. the worth of transform H(Z) is often integer and therefore the a part of image is lossless. For lossless writing it's necessary to create associate invertible mapping from associate whole number image input to associate whole number wavelet illustration. The lifting theme is employed to construct parallel bi-orthogonal wavelet transforms ranging from interpolating Deslauriers–Dubuc scaling functions. A family of (N, N) parallel bi-orthogonal wavelets springs, wherever N is that the variety of vanishing moments of the analysis high-pass filter and N is that the variety of vanishing moments of the synthesis high-pass filters. Associate instance of this family of transforms is that the (4, 2) interpolating transform. The whole number version of it, given in [7], is enforced within the initial stage of our writing formula. During this case, the whole number wavelet representation of a 1 dimensional signal A0(n) having N nonzero samples is given by

$$\forall n: D^{(i+1)}(n) = A^{(i)}(2n+1) - \left[\sum_k \left\llbracket pk A^{i}(2(n-k)) + 1/2 \right\rrbracket\right]$$

$$0 \le i - 2 \le k \le 1$$

$$\forall n: A^{i}(2n) = A^{(i)}(2n) + \left[\sum_k \left\llbracket uk \left\llbracket AD \right\rrbracket^{(i+1)}(n-k) + 1/2 \right\rrbracket\right]$$

$$0 \le i\ 0 \le k \le 1$$

where[x] represents the whole number a part of x,j is that the variety of scales,Ai+1(n) and Di+1(n) denote, severally, the Approximation and therefore the detail of the initial signal calculated at the scales (i+1), 0≤ I transform

3. PARTICLE OF SWARM OPTIMIZATION

In Particle Swarm optimization [10] optimizes associate degree objective perform by enterprise a population based mostly search. The population comprise of doable solutions, named particles that are trope of birds in flocks. These particles are haphazardly initialized and freely fly across the multi dimensional get space. Throughout flight, every particle updates its own speed and position supported the most effective expertise of its own and also the entire population. The various steps concerned in Particle Swarm optimization algorithmic program are as follows:

Step 1: All particles' speed and position are every which way place to inside pre-defined ranges.

Step 2: speed update – At each iteration, the velocities of all particles are updated supported below expression

v_i= v_i+ c_1 R_1 (p_(i,best)-p_i)+c_2 rope (g_(i,best)-p_i) ....(1)

where pi is that the position and vi are the speed of particle i, pi, best and gi, best is that the position with the 'best' objective worth found thus far by particle i and also the entire population respectively; w could be a parameter dominant the dynamics of flying; R1 and R2 are random variables within the vary [0,1]; c1 and c2 are factors dominant the connected coefficient of equivalent terms. The random variables facilitate the PSO with the power of random looking out.

Step 3: Position change – The positions of all particles are updated in step with,

p_i=p_i+v_i ...(2)

Following change, pi ought to be verified and restricted to the allowed vary.

Step 4: Memory change – Update pi, best and gi, best once condition is met,

p_(i,best)=p_i if f(p_i)>f(p_(i,best))

g_(i,best)=g_i if f(g_i)>f(g_(i,best)) ...(3)

Where f(x) is to be optimized and it's an objective perform.

Step 5: Stopping Condition – The algorithmic program repeats steps a pair of to four till sure stopping circumstances are met, like a pre-defined range of iterations. Once closed, the algorithmic program reports the values of gbest and f(gbest) as its solution[8].

PSO utilizes many looking out purposes and also the looking out points step by step get near the world optimum point victimization its pbest and gbest. Primary positions of pbest and gbest ar dissimilar but, victimization thee completely different direction of pbest and gbest, all agents more and more get shut down to the world optimum

4. PLANNED METHODOLOGY

Fusion feature optimisation is difficult task within the field of image fusion. Currently optimisation processes of fusion image would like a feature set of fusion image knowledge. currently in current situation numerous methodology are on the market for fusion feature optimisation like artificial neural network, genetic algorithmic program, particle of swarm optimisation and lots of additional heuristic algorithmic program for optimisation. We tend to plan a replacement methodology for image fusion feature optimisation supported particle of swarm optimisation (POS). All of the options are dishing supported their distances [23], that is an alternate thanks to live the importance of a feature in discriminating 2 options. The options discriminating supported the equalize distance formula for locating a similarity of options based mostly texture. Once calculation of discriminate we tend to apply POS.

1. Allotted the extracted feature matrix of image dataset.

- Remodel knowledge to the format of a feature house that's X is original feature R is

remodel feature house like Xi∈Rd here d is dimension of knowledge.

- Conduct scaling on the information
  α = ∑_(i=1)^m▒∑_(j=1)^n▒ 〖 sim(Xi,xj)∴m*k〗 here α is scaling issue and m is total information and k is total range of instant and sim realize shut point of knowledge.
- Take into account POS input as range of particle
- Step 1: All particles' speed and position are every which way place to inside pre-defined ranges.
- Step 2: speed update – At each iteration, the velocities of all particles are updated supported below expression
- v_i= v_i+ c_1 R_1 (p_(i,best)-p_i)+c_2 rope (g_(i,best)-p_i) ....(1)
- wherever pi is that the position and vi are the speed of particle i, pi,best and gi,best is that the position with the 'best' objective worth found thus far by particle i and also the entire population respectively; w could be a parameter dominant the dynamics of flying; R1 and R2 are random variables within the vary [0,1]; c1 and c2 are factors dominant the connected coefficient of equivalent terms. The random variables facilitate the PSO with the power of random looking out.
- Step 3: Position change – The positions of all particles ar updated in step with,
  p_i=p_i+v_i ...(2)
- Following change, pi ought to be verified and restricted to the allowed vary.
- Step 4: Memory change – Update pi,best and gi,best once condition is met,
- p_(i,best)=p_i if f(p_i)>f(p_(i,best))

- g_(i,best)=g_i if f(g_i)>f(g_(i,best)) ...(3)

1. method the feature vector generated by feature matrix.

2. For all the optimum feature is allotted

allow us to take into account vector of options c1, c2, c3…….cn

BEGIN

Find vector with no options

C=¢

Find feature at goop length

C=RL(Xd)

Find the minimum feature length

REPEAT

3. Perform feature vector

4. Result optimum feature.

5. Perform feature Rank method of optimum feature image score

6. Image fusion is perform

7. Exit

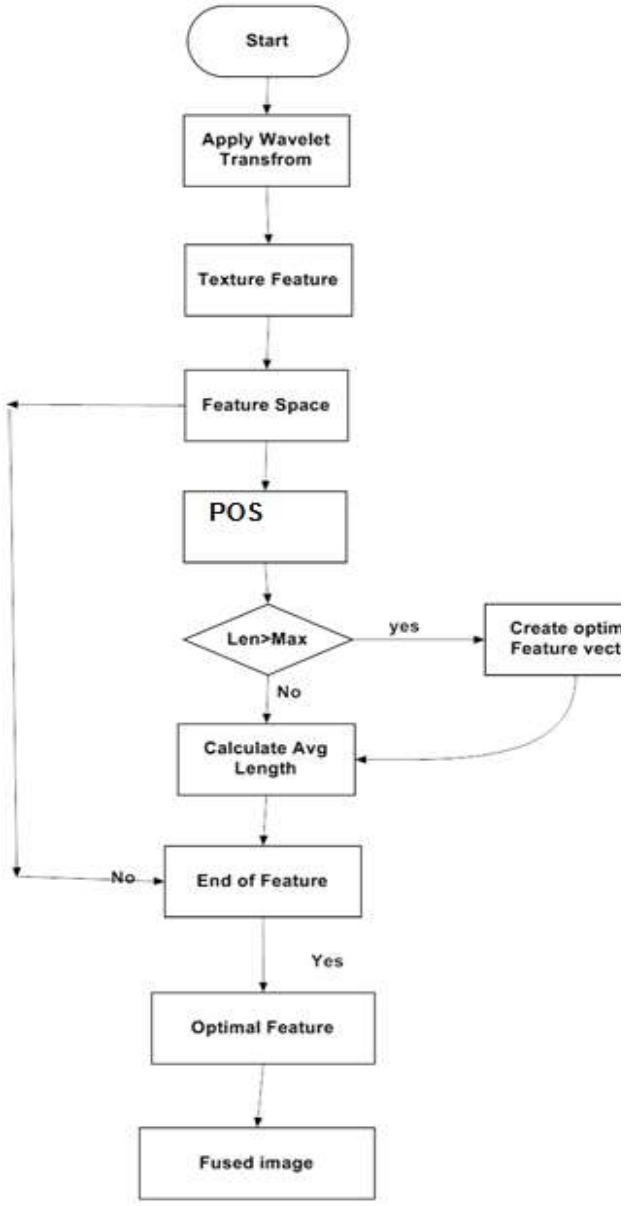

Figure 1 proposed model for feature based image fusion

5. EXPERIMENTAL RESULT ANALYSIS

In this section a number of experimental results of our work on feature optimsation Image Fusion are mentioned. Input image information is taken totally different} atmosphere through a digital camera; the multi targeted atmosphere is generated victimisation different light-weight effects. Within the planned hybrid technique, 1st riffle decomposition of the input supply pictures is performed up to level second level victimisation discrete wavelet transform.

Evaluation parameter

For the valuation of experimental method used some customary parameter. There are differing types of object quality or distortion assessment approaches. The united pictures are evaluated, taking the subsequent parameters into thought.

Root Mean sq. error (RMSE) [8]

The root mean sq. error (RMSE) between every dull MS band and corresponding sharpened band may be computed as a live of spectral fidelity. It measures the quantity of amendment per pixel because of the process. The RMSE between a reference images R and also the united image F is given by [9]

There are totally different approaches to construct reference image victimisation input pictures. In our experiments, we tend to use the subsequent procedure to reckon RMSE. First, RMSE value El is computed between source image A and united image F.

Similarly E2 is computed as RMSE between sources image B and united image F.

Then the RMSE value is obtained by taking the typical of E1 and E2.[11]

Smaller RMSE value indicates smart fusion quality. Peak Signal to Noise magnitude relation PSNR are often calculated by victimisation the formula[12]

Where MSE is that the mean sq. error and L is that the range of grey levels within the image. Image Quality Index IQI measures the similarity between 2 pictures (I1 & I2) and its value ranges from -1 to one. IQI is capable one if each picture are identical. IQI live is given by [14]

Where x and y denote the mean values of pictures I1 and I2 and, , and denotes the variance of I1 , I2 and variance of I1 and I2. Mutual data Mutual data (MI) measures the degree of dependence of 2 pictures. Its

value is zero once I1 and I2 are freelance of every different. MI between 2 source pictures I1 and I2 and united image F is given by and PA(a) ,PB(b) and PF(f) are histograms of pictures A, B and F,PFA(f,a) and PFB(f,b) square measure the joint histograms of F and A, and F and B severally. Higher MI value indicates smart fusion results.

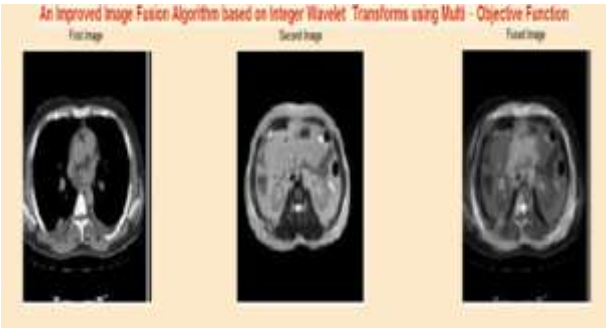

Figure 1 shows that two input image of head s in same mode of initial head and final area of stroke and fused both stroke with WT technique.

Figure 2 shows that two input image of head s in same mode of initial head and final area of stroke and fused both stroke with IWT technique.

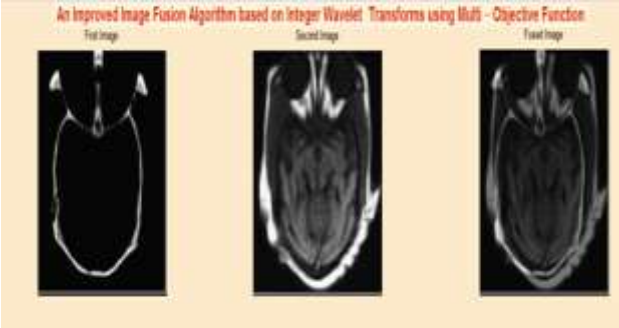

Figure 3 shows that two input image of head s in same mode of initial head and final area of stroke and fused both stroke with HBT technique. Performance table

METHOD	IQI	MI	RMSE	PSNR
WT	0.9234	1.1293	14.7688	24.6123
IWT	0.9668	1.1242	20.6849	28.7718
Proposed method	0.9668	1.6542	22.6849	33.981

Table 1 shows that comparative result analyses of transform function with optimization technique.

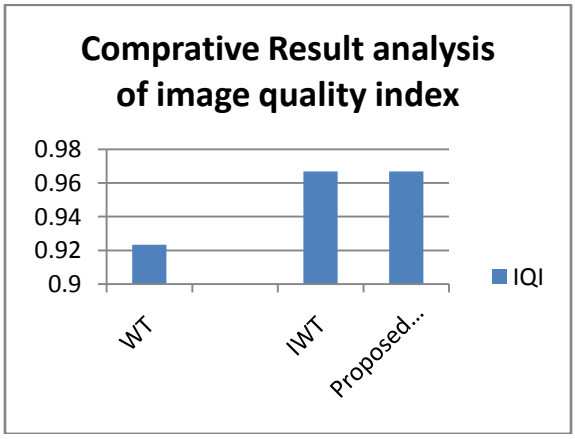

Figure 6 shows that comparative result analysis of image quality index value of fused image in all method the value of result is increased in proposed algorithm

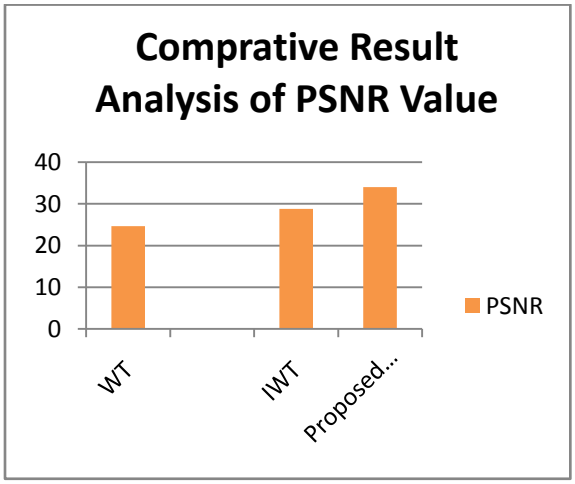

Figure 7 shows that comparative result analysis of image PSNR value of fused image in all method the value of result is increased in proposed algorithm

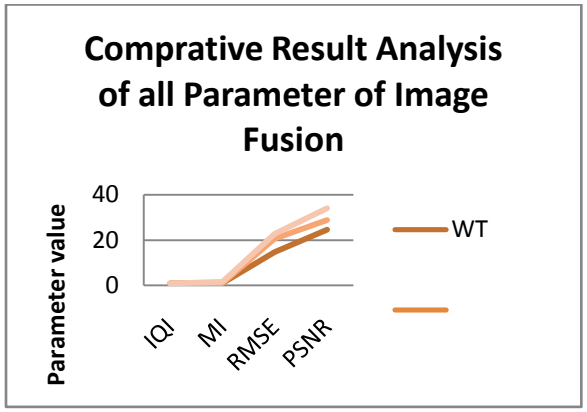

Figure 8 shows that comparative result analysis of all parameter considers in image fusion result analysis with respect to all technique.

6. CONCLUSION AND FUTURE WORK

In this paper projected an optimized attribute based image fusion technique. The projected method used wavelet based attribute extraction technique, wavelet provide lossless attribute extraction. The extracted attribute used new born optimsation algorithm particle of swarm optimization. Our experimental result shows that higher performance in compression of old image fusion technique. The projected image fusion technique enhanced the value of PSNR and value of image quality index value. In future further explored this method and increase the value of PSNR and image quality index.

REFERENCES:-

[1]. Shutao Li , Bin Yang, Jianwen Hu "Performance comparison of different multi-resolution transforms for image fusion" Information Fusion Vol- 12, 2011. Pp 74-84.

[2]. V Jyothi ,B Rajesh Kumar ,P Krishna Rao , D V Rama Koti Reddy " image fusion using evolutionary algorithm (GA)" Int. J. Comp. Tech. Appl., Vol 2, 2011. Pp 322-326.

[3]. Max Mignotte "A Label Field Fusion Bayesian Model and Its Penalized Maximum Rand Estimator for Image Segmentation" ieee transactions on image processing, ieee Vol- 19, 2010. Pp 1610-1624.

[4]. Max Mignotte "A Multiresolution Markovian Fusion Model for the Color Visualization of Hyperspectral Images" ieee transactions on geoscience and remote sensing, VOL. 48, 2010. Pp 4236-4247."

[5]. J. J. Lewis, R. J. OCallaghan, S. G. Nikolov, D. R. Bull, C. N. Canagarajah "Region-Based Image Fusion Using Complex Wavelets" IEEE 2007. Pp 234-241.

[6]. Susmitha Vekkot,, Pancham Shukla "A Novel Architecture for Wavelet based Image Fusion" World Academy of Science, Engineering and Technology, 2009. Pp 372-377.

[7]. Lei Zhang , WeishengDong , DavidZhang , GuangmingShi "Two-stage image denoising by principal component analysis with local pixel grouping" Pattern Recognition, Vol-43, 2010. Pp 1531-1549.

[8]. Kalpana Seshadrinathan, Alan C. Bovik "unifying analysis of full reference image quality assessment" IEEE 2008. Pp 1200-1204.

[9]. Ce Liu, Richard Szeliski, Sing Bing Kang, C. Lawrence Zitnick "Automatic Estimation and Removal of Noise from a Single Image" transactions on pattern analysis and machine intelligence, IEEE, VOL. 30, 2008. Pp 299-315.

[10]. R. Redondo, F. Sroubek, S. Fischer, G. Cristobal "Multifocus image fusion using the log-Gabor transform and a Multisize Windows Technique" Information Fusion, Elsevier 2008. Pp 1-9.

[11]. Styliani Ioannidou , Vassilia Karathanassi "Investigation of the Dual-Tree Complex and

[12]. Shift-Invariant Discrete Wavelet Transforms on Quickbird Image Fusion" IEEE geoscience and remote sensing letters, VOL. 4, 2007. Pp 166-171.

[13]. Nikolaos Mitianoudis, Tania Stathaki "Image Fusion schemes using ICA bases" Elsevier Science, 2007. Pp 1-38.

[14]. Shutao Li, Bin Yang "Multifocus image fusion using region segmentation and spatial frequency" Image and Vision Computing, Vol-26, 2008. Pp 371-379.

[15]. A. Bastys, J. Kranauskas, and R. Masiulis, "Iris Matching by Local Extremum Points of Multiscale Taylor Expansion," Advances in Biometrics: Lecture Notes in Computer Science 2009, pp 1070-1079.

[16]. Suresh Chandra Satapathy, Anima Naik and K Parvathi" A teaching learning based optimization based on Orthogonal design for solving global optimization problems" in Springer Open Journal, 2013.

[17]. Image compression using Fast Fourier Transform by Parminder Kaur, Thapar Institute of Engineering and Technology, Patiala.

[18]. J.M. Shapiro, Embedded image coding using zerotrees of wavelet coef_cients, IEEE Trans. Signal Processing, vol. 41, pp.3445-3462, Dec. 1993.

[19]. J. Chen, M. Yang, Y. Zhang, and X. Shi, Ecg compression by optimized quantization of wavelet coefficients, ICIC 2006, LNCIS, vol.

345, Springer-Verlag Berlin Heidelberg, 2006, p. 809814.

[20]. D. Karaboga, An idea based on honey bee swarm for numerical optimization, Tech. Report TR06, Erciyes University, Engineering Faculty, Computer Engineering Department, 2005.

[21]. D. Karaboga and B. Akay, A survey: Algorithms simulating bee swarm intelligence, Artificial Intelligence Review 31 2009, no. 1, 68–55.