Double Wavelet Transform Method Utilized Picture Compression and Assortment

P. Sethupriyan*
Department of ECE, Bharath University, Selaiyur, Chennai - 600073, Tamil Nadu, India; se2mees@gmail.com

Abstract
With the development of information technology, the rapid development of microelectronics technology, picture information acquisition and use is also increasing, sensor technology also uneasily to reform. A single sensor information obtained is limited, often can not meet the actual needs, in addition, different sensors have the advantage of the imaging principle and its unique, as in color, shape characteristics, band access, spatial resolution from the aspects of all have their own characteristics. Registration algorithm is proposed in this paper has better robustness to picture noise, and can achieve sub-pixel accuracy; the registration time has also been greatly improved. In terms of picture fusion, the pictures to be fused through double wavelet transform of different resolution sub picture, using a new picture fusion method based on energy and correlation coefficient. The high frequency picture decomposed using new energy pixels of the window to window energy contribution rate of fusion rules, the low frequency part by using the correlation coefficient of the fusion strategy, finally has carried on the registration of simulation experiments in the Matlab.

1. Introduction
With the development of science and technology, more and more sensors used in various fields, but the single sensor picture obtained information, often cannot meet the actual needs, picture fusion is the use of different imaging mode of various sensors, provide complementary information, increase the amount of information of the picture, in order to obtain more reliable, more accurate information for observation or further processing, which is widely applied in the field of military, medicine, remote sensing, machine vision, target recognition.(1, 2, 3) Picture is an important media of information transmission, in order to make the limited symbols to express more information, picture compression is very necessary, but also possible, therefore has produced a variety of picture compression method, the existence of redundant great general in the original picture (such as by adjacent pixels correlation caused); or the user due to various reasons, and the original picture information are not interested; or when the channel resolution than the original picture resolution, reducing the input original picture resolution has little influence on output picture resolution; or is a large amount of picture information (such as satellite remote sensing picture) short transmission processing.(4, 18) All of this requirement in the picture processing process, must abandon the useless information, retain the useful part, the number of bytes exhausted may be less representation of the original picture, in order to improve the efficiency of picture transmission and reduce the storage capacity of the picture.(5) All information is often the existence of redundant picture data, such as spatial redundancy, information redundancy, gun visual redundancy and the redundant structure etc. The so-called compression, is the idea to remove all kinds of redundancy, retain truly useful information.(6, 7). The signal compression process is often referred to as the coding process to restore the original picture is often referred to as the decoding with the development of multimedia technology and communication technology, has put forward higher requirements of

*Author for correspondence
multimedia entertainment and information expressway and constantly on the information of the data storage and transmission, but also to the existing bandwidth limited to a severe test, especially digital picture communication with the huge amount of data, more difficult to transport and storage, greatly restricts the development of picture communication, so the picture compression technology has been paid more and more attention. The purpose of picture compression is the original large picture with less bytes and transmission, and required with good picture recovery quality.

The use of picture compression, picture can reduce the burden of storage and transmission; realize the fast transmission and real-time processing in the network picture making. Hierarchical double wavelet tree proposed by Said and Pearlman (SPIHT) is a collection of segmentation algorithm using spatial tree hierarchical segmentation approach, effectively reduces the bit plane coding symbol set scale. Compared to EZW, SPIHT algorithm construct two different types of space zero tree double wavelet coefficient, the amplitude attenuation better use. As with the EZW encoder and SPIHT encoder algorithm complexity is low, also had embedded bit stream, but the performance of the encoder is greatly improved compared with EZW. This paper based on introduction of SPIHT algorithm on the standard of the standard SPIHT algorithm are analyzed and discussed, to find its shortcomings. SPIHT algorithm has the advantage of high compression ratio, compression speed, the algorithm is simple; but the drawback is that the storage space demand, quantization sometimes is not optimal, not explicitly given a unit pixel the number of bits for encoding and decoding times SPIHT and the relationship between the scanning process, fine enough concise, code more complex.

2. Related Theory and Method

2.1 The related theory of picture registration

At present, picture registration has been widely used in picture fusion, pattern recognition, data fusion gathering, medical diagnosis, map correction. Following on the issue, the main purpose of the picture registration and corresponding application example are summarized (12, 19).

Picture from different observation points, the picture registration can obtain a two-dimensional scene or 3D scene pictures, such as picture edge technology, or 3D graphic shape recovery etc.

Picture from different time or in different conditions, through the registration techniques, can find out the change of displacement of an object in the pictures, such as lesion detection in medical picture change detection technology, or land use status.

Pictures from different sensors, registration can complete the preprocessing of multi sensor fusion between doctors, such as multi modality medical picture fusion, a more comprehensive understanding of the pathological information of patients.

A model and the picture registration, registration can locate in the model or are compared, such as product quality detection, map location or sample classification etc. According to the different picture sources, needs, different imaging modes, and the scope of application, registration methods used are not static.

2.2. The common methods of picture fusion

Picture registration in the mathematical formula (1) can be shown. Among them, \( I_1 \) and \( I_2 \) represent the two fusing picture representation of the two-dimensional matrix, \( I_1(x, y) \) and \( d \) represent the two pictures in \( I_2(x, y) \) where \( \delta \) is one-dimensional gray value, gray level transformation, \( f \) represents a two-dimensional coordinate transformation.\(^{15, 16, 17} \) The original picture signal for embedding hypothesis representation, \( x_n \) representation of signal SNR is expressed was shown in formula (1):

\[
\text{SNR} = 10 \log_{10} \left( \frac{L}{n} \right) \text{dB}
\]

Robustness is an important standard to measure the robustness of picture system, more robust against attacks that ability is stronger. The robustness of the level is divided into the following categories: zero (no beast stick), junior, senior, intermediate, advanced, senior and senior. Objective to evaluate the beast bar standard usually use the bit error rate (Bits Error Rate, BER) said. The calculation of BER as shown in formula (3):

\[
\text{BER} = \frac{n}{L}
\]

Wherein, \( L \) represents the original frequency signal length, \( n \) represents the signal sampling points, and the range of \( n \) is \( 0 < n < L \), the unit of signal-to-noise ratio is dB.

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2.3. Standard of picture fusion evaluation

So far, the domestic and foreign experimental research and on the picture registration method has quite a few for registration, a variety of methods, according to the selection of picture of the element. Picture registration methods are
divided into two basic categories: one category is the picture registration method based on feature; another kind is the picture registration method based on pixel.

**Figure 1.** For Rotation and Translation Transformation of the Original Camera Man.

**Figure 2.** The Picture be Transformed as the Floating Picture.

Figure 2 is obtained in this paper in the transform of the curve, due to the comprehensive consideration on the picture characteristics, adjacent elements and spatial information, so can effectively restrain the influence of noise brings to the objective function, obtained the convex type curve is smooth, thereby saving the computational time.

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