IMAGE FUSION

Using DWT and DCT algorithms

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CONTENTS

ABSTRACT

The objective of image fusion is to combine relevant information from multiple images into a single image. Result of image fusion is a single image which is more suitable for human and machine perception or further Image-processing tasks. The objective in image fusion is to reduce uncertainty and minimize redundancy in the output while maximizing relevant information particular to an application or task. Fusion is an important technique within many disparate fields such as remote sensing, robotics and medical applications. Fused images can provide information that sometimes cannot be observed in the individual input images. Successful image fusion significantly reduces the amount of data to be viewed or processed without significantly reducing the amount of relevant information. This project uses Discrete Wavelet Transform (DWT) algorithm and Discrete Cosine Transform (DCT) in this process. The performance of the algorithms are compared and the experimental results are verified and found the output image qualities are improved.

INTRODUCTION

- Due to the limited depth of focus of optical lenses it is not possible to get an image that contains all relevant objects in focus.
- However, for accurately interpreting and analyzing images, it is desired to obtain images with every object in focus.
- Multifocus image fusion is an effective technique to solve this problem by combining two or more images of the same scene taken with different focus settings into a single all-in-focus image with extended depth of field.
- The resultant fused image is very useful for human or machine perception.

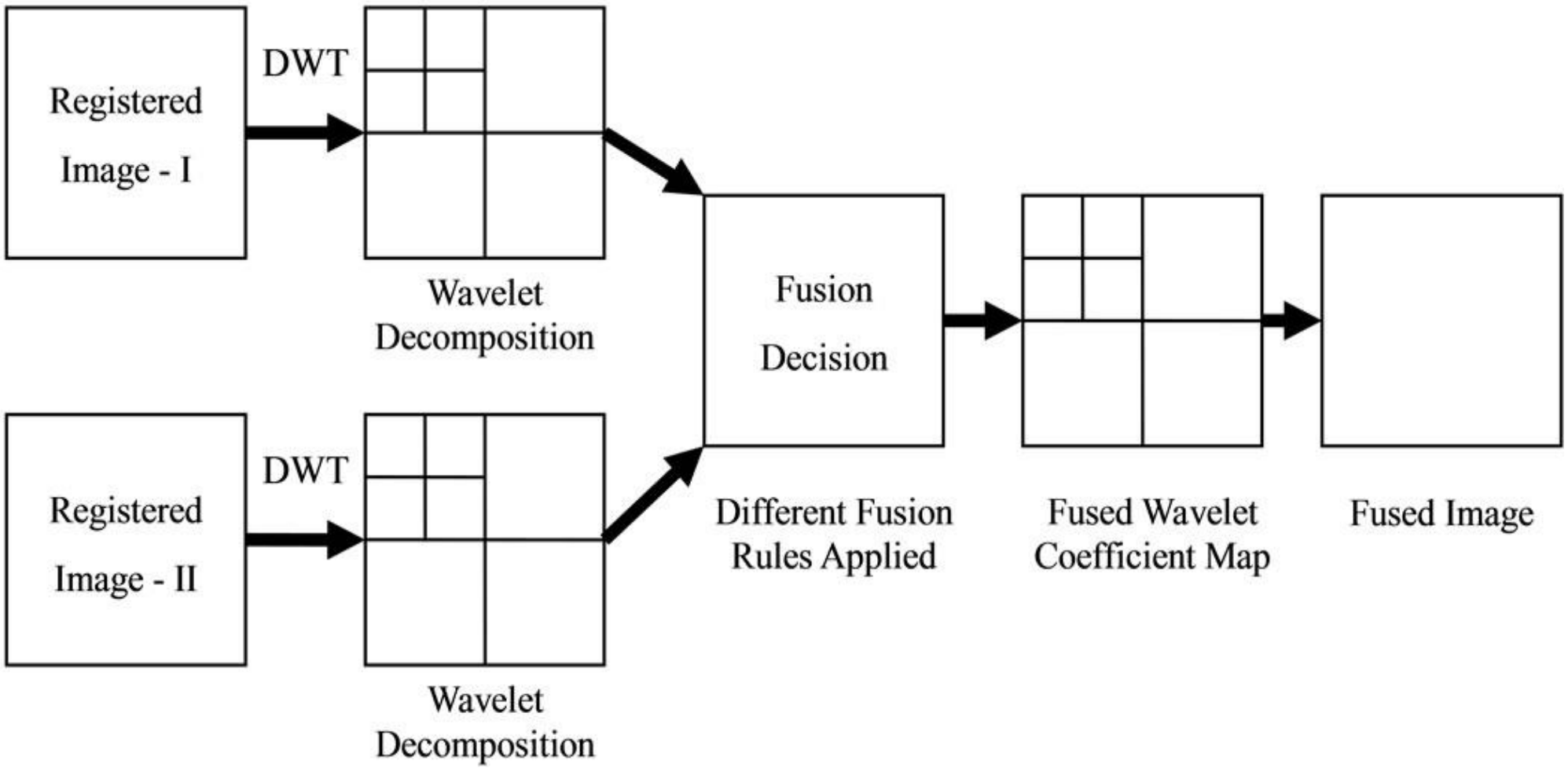
OBJECTIVE

- To reduce uncertainty and minimize redundancy in the output while maximizing relevant information particular to an application or task.
- Result of image fusion is a single image which is more suitable for human and machine perception or further Image-processing tasks.

METHODOLOGY

- Discrete Wavelet Transform (DWT)
- Discrete Cosine Transform (DCT) + consistency verification

Discrete Wavelet Transform (DWT)



Discrete Cosine Transform (DCT) + consistency verification

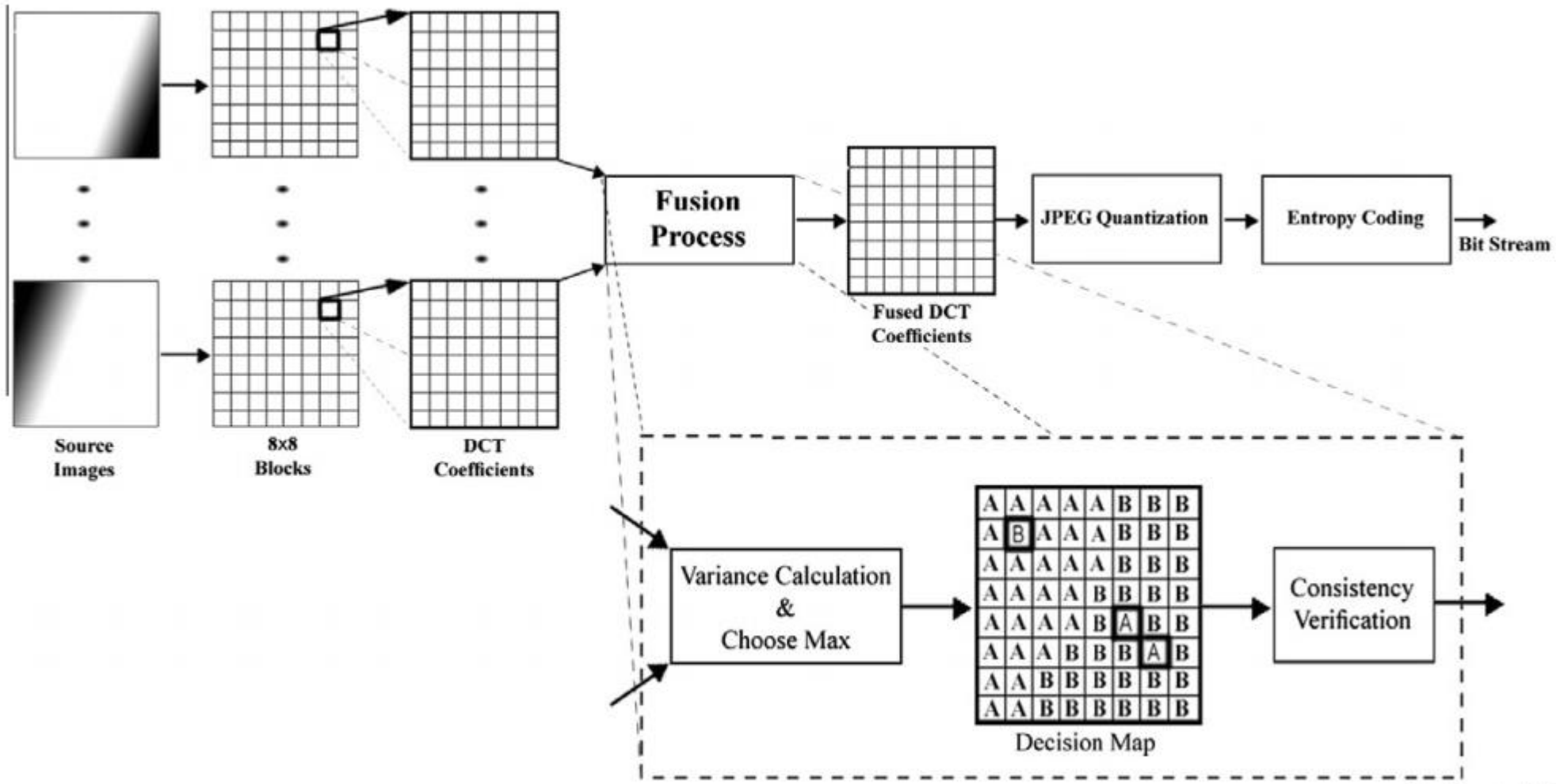
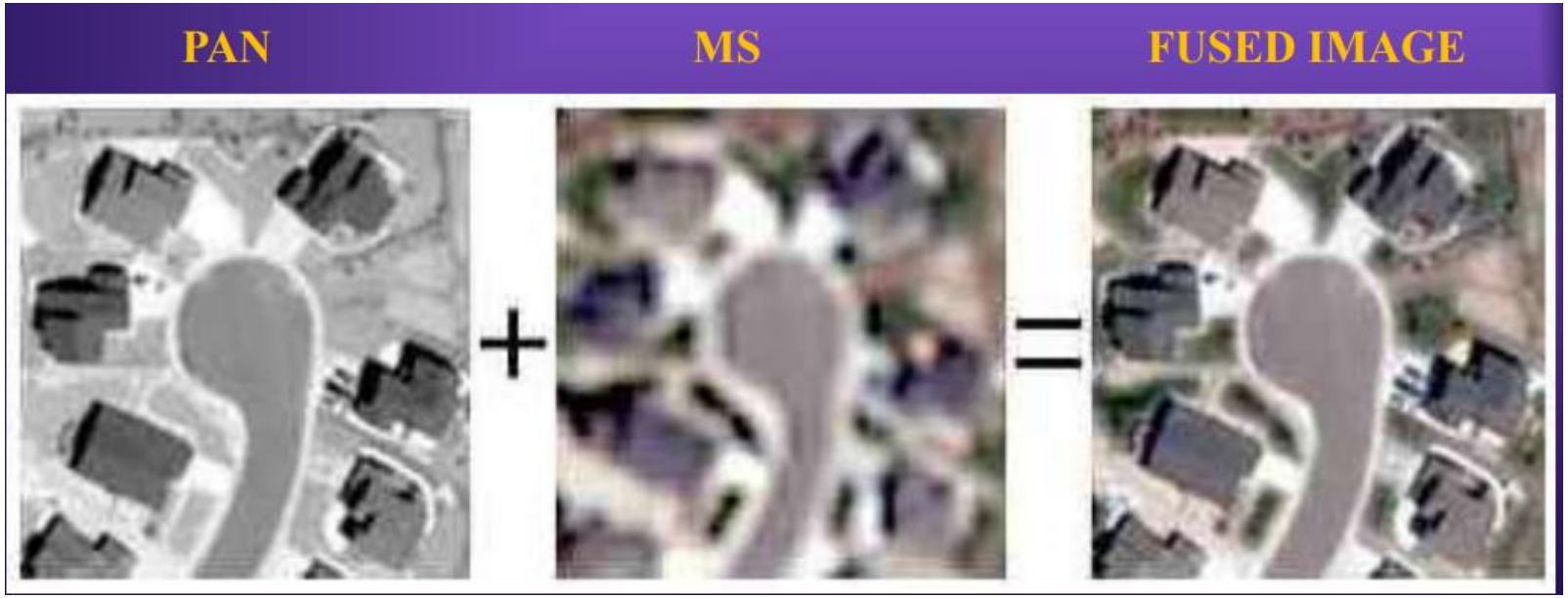


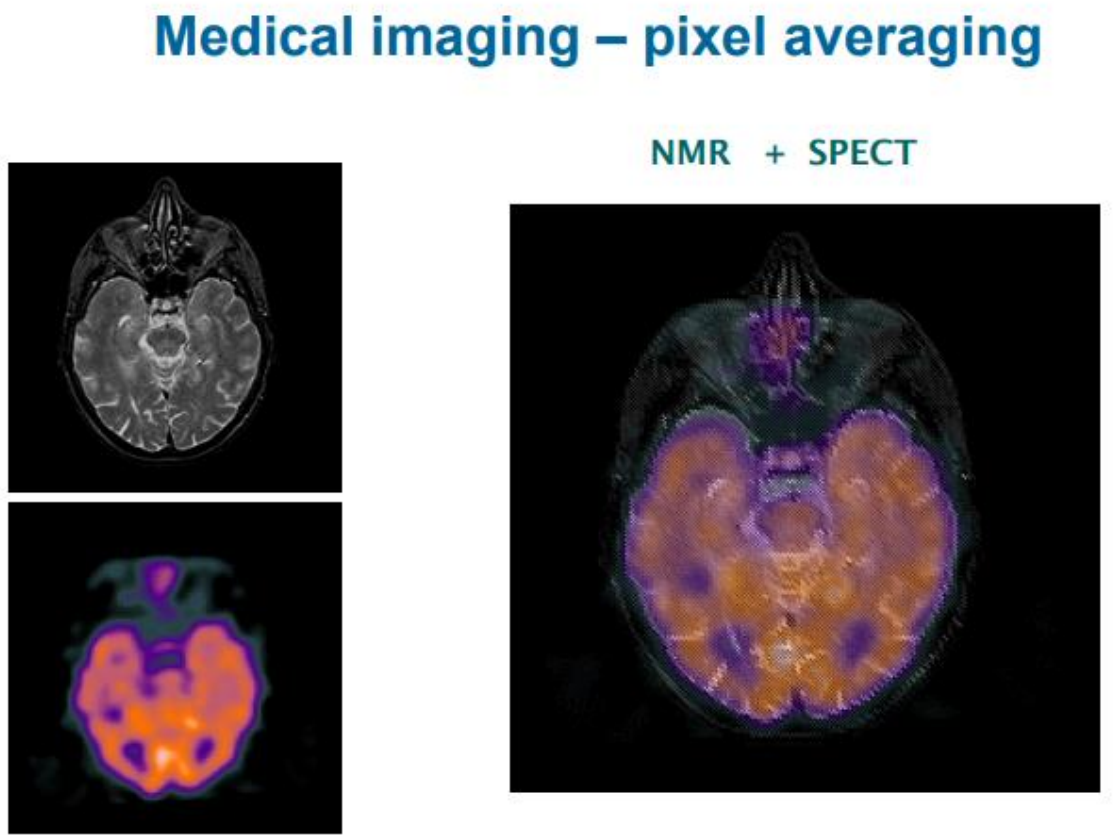
Fig. 1. A general framework of a JPEG encoder combining with proposed image fusion method.

APPLICATIONS

- Remote sensing - Image fusion in remote sensing has several application domains. An important domain is the multi-resolution image fusion. In satellite imagery we can have two types of images:
  - Panchromatic image
  - Multispectral image



- Medical Image Fusion - Image fusion has become a common term used within medical diagnostics and treatment. Fused images may be created from multiple images from combining information from multiple modalities, such as
  - magnetic resonance image (MRI)
  - computed tomography (CT)
  - positron emission tomography (PET)



Conclusion

- The comparative study of DWT and DCT Image fusion approaches and the related work was done till now is presented.
- It is observed that high spatial resolution is obtained in traditional image fusion techniques which result in image blurring problem.
- To overcome these issues wavelet based image fusion technique is proposed. Wavelets provide a high quality spectral content with least spectral distortion.
- The DCT fusion method is based on the definition of variance in DCT domain. Simplicity of this method makes it appropriate for real-time applications.
- Furthermore, utilization of variance in the proposed algorithm leads to better quality of the fused image.
- In this article different transform are applied on pixel level based image fusion and the results are compared using different objective based performance measures.

SOFTWARES

- MATLAB – 2018 A

REFERENCES

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THANK YOU