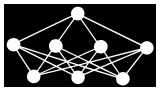

MULTIFOCUS IMAGE FUSION BASED ON NONSUBSAMPLED CONTOURLET TRANSFORM AND SPIKING CORTICAL MODEL

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Abstract: A novel image fusion algorithm based on nonsubsampled contourlet transform (NSCT) and spiking cortical model (SCM) is proposed in this paper, aiming at solving the fusion problem of multifocus images. The fusion rules of subband coefficients of NSCT are discussed, and a new maximum selection rule (MSR) is defined to fuse low frequency coefficients instead of using traditional MSR directly. For the fusion rule of high frequency coefficients, spatial frequency (SF) of each high frequency subband is considered as the gradient features of images to motivate SCM networks and generate pulse of neurons, and then the time matrix of SCM is set as criteria to select coefficients of high frequency subband. Experimental results and visual evaluation demonstrate the effectiveness of the proposed fusion method. Objective tests and analysis conducted under different noised source image environments proved the robustness of the proposed fusion method.

Key words: *nonsubsampled contourlet transform (NSCT), spiking cortical model (SCM), multifocus image fusion, pulse coupled neural network (PCNN)*

Received: February 28, 2013 **DOI:** 10.14311/NNW.2015.25.031
Revised and accepted: March 30, 2015

1. Introduction

Image fusion integrates the complementary information from two or more images into a single composite image. The result provides a more informative and comprehensive description, and is more suitable for human visual perception. Fused image benefits the image analysis in many fields, such as in remote sensing, intelligent robot, machine vision, clinical medicine and molecular biology.

There are many kinds of image fusion methods. Along them, those methods that based on multiscale decomposition (MSD) of source images become more popular and important tools in recent years. MSD methods decompose source images into high frequency and low frequency subbands. Detailed and coarse features remain in the two types of subbands, respectively [28].

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