Accepted Manuscript

Regular article

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PII: S1350-4495(17)30411-5
DOI: https://doi.org/10.1016/j.infrared.2017.11.006
Reference: INFPHY 2410

To appear in: *Infrared Physics & Technology*

Received Date: 8 July 2017
Revised Date: 25 October 2017
Accepted Date: 4 November 2017

Please cite this article as: N. Paramanandham, K. Rajendiran, Infrared and visible image fusion using discrete cosine transform and swarm intelligence for surveillance applications, *Infrared Physics & Technology* (2017), doi: https://doi.org/10.1016/j.infrared.2017.11.006

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INFRARED AND VISIBLE IMAGE FUSION USING DISCRETE COSINE TRANSFORM AND SWARM INTELLIGENCE FOR SURVEILLANCE APPLICATIONS

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ABSTRACT

A novel image fusion technique is presented for integrating infrared and visible images. Integration of images from the same or various sensing modalities can deliver the required information that cannot be delivered by viewing the sensor outputs individually and consecutively. In this paper, a swarm intelligence based image fusion technique using discrete cosine transform (DCT) domain is proposed for surveillance application which integrates the infrared image with the visible image for generating a single informative fused image. Particle swarm optimization (PSO) is used in the fusion process for obtaining the optimized weighting factor. These optimized weighting factors are used for fusing the DCT coefficients of visible and infrared images. Inverse DCT is applied for obtaining the initial fused image. An enhanced fused image is obtained through adaptive histogram equalization for a better visual understanding and target detection. The proposed framework is evaluated using quantitative metrics such as standard deviation, spatial frequency, entropy and mean gradient. The experimental results demonstrate the outperformance of the proposed algorithm over many other state- of- the- art techniques reported in literature.

Keywords: Adaptive histogram equalization, DCT, infrared image, swarm intelligence, visible image, universal quality index.

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