Super resolution reconstruction of infrared images based on classified dictionary learning

Fei Liu, Pingli Han, Yi Wang, Xuan Li, Lu Bai, Xiaopeng Shao

PII: S1350-4495(17)30857-5
DOI: https://doi.org/10.1016/j.infrared.2018.03.008
Reference: INFPHY 2511

To appear in: *Infrared Physics & Technology*

Received Date: 20 December 2017
Revised Date: 28 February 2018
Accepted Date: 5 March 2018

Please cite this article as: F. Liu, P. Han, Y. Wang, X. Li, L. Bai, X. Shao, Super resolution reconstruction of infrared images based on classified dictionary learning, *Infrared Physics & Technology* (2018), doi: https://doi.org/10.1016/j.infrared.2018.03.008

Super resolution reconstruction of infrared images based on classified dictionary learning

Fei Liu[a,b], Pingli Han[a], Yi Wang[a,c], Xuan Li[a], Lu Bai[a], and Xiaopeng Shao[a*]

[a]*School of Physics and Optoelectronic Engineering, Xidian University, Xi'an 710071, China*
[b]*State Key Laboratory of Applied Optics, Chang Chun Institute of Optics, Fine Mechanics and Physics, Chinese Academic of Science, Changchun, 130033, China*
[c]*Chinese Flight Test Establishment, Xi'an, 710089, China*

ARTICLE INFO

Article history
Received

Keywords
Infrared imaging
Super-resolution
Dictionary learning
Classified dictionaries

ABSTRACT

Infrared images always suffer from low-resolution problems resulting from limitations of imaging devices. An economical approach to combat this problem involves reconstructing high-resolution images by reasonable methods without updating devices. Inspired by compressed sensing theory, this study presents and demonstrates a Classified Dictionary Learning method to reconstruct high-resolution infrared images. It classifies features of the samples into several reasonable clusters and trained a dictionary pair for each cluster. The optimal pair of dictionaries is chosen for each image reconstruction and therefore, more satisfactory results is achieved without the increase in computational complexity and time cost. Experiments and results demonstrated that it is a viable method for infrared images reconstruction since it improves image resolution and recovers detailed information of targets.

* Corresponding author.
E-mail address: xpshao@xidian.edu.cn (Xiaopeng Shao)