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# An Adaptive Regression Method for Infrared Blind-pixel Compensation

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**Abstract:** Blind pixel compensation is an ill-posed inverse problem of infrared imaging systems and image restoration. The performance of a blind pixel compensation algorithm depends on the accuracy of estimation for the underlying true infrared images. We propose an adaptive regression method (ARM) for blind pixel compensation that integrates the multi-scale framework with a regression model. A blind-pixel is restored by exploiting the intra-scale properties through the nonparametric regressive estimation and the inter-scale characteristics via parametric regression for continuous learning. Combining the respective strengths of a parametric model and a nonparametric model, ARM establishes a set of multi-scale blind-pixel compensation method to correct the non-uniformity based on key frame extraction. Therefore, it is essentially different from the traditional frameworks for blind pixel compensation which are based on filtering and interpolation. Experimental results on some challenging cases of blind compensation show that the proposed algorithm outperforms existing methods by a significant margin in both isolated blind restoration and clustered blind restoration.

**Key words:** blind pixel restoration; parametric model; nonparametric model; adaptive method; IR imaging.

## 1. Introduction

Infrared imaging technology has been widely used in both military and civil fields. In the military field, infrared imaging can be used for military target search, surveillance, detection, recognition and tracking. In the civil field, it is applied to industrial control, remote sensing, consumer electronics and many other areas. With visible light image sensors dominating the market of mobile phones and other electronic products in the past, the application of infrared

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