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An analytical optimization model for infrared image enhancement via local context

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Abstract

The requirement for high-quality infrared images is constantly increasing in both military and civilian areas, and it is always associated with little distortion and appropriate contrast, while infrared images commonly have some shortcomings such as low contrast. In this paper, we propose a novel infrared image histogram enhancement algorithm based on local context. By constraining the enhanced image to have high local contrast, a regularized analytical optimization model is proposed to enhance infrared images. The local contrast is determined by evaluating whether two intensities are neighbors and calculating their differences. The comparison on 8-bit images shows that the proposed method can enhance the infrared images with more details and lower noise.

Keywords: Infrared, Histogram Enhancement, Analytical Model, Context-sensitive

1. Introduction

Infrared techniques are applied widely in various areas, such as military field, precision agriculture, power patrol inspection, security, and others [1, 2, 3]. The requirement for high-quality infrared images is constantly increasing in these areas. However, due to the sensitivity limit and high dynamic range of infrared imaging devices, infrared images commonly have some shortcomings such as

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