

NTIRE 2019 Challenge on Real Image Denoising: Methods and Results

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Abstract

This paper reviews the NTIRE 2019 challenge on real image denoising with focus on the proposed methods and their results. The challenge has two tracks for quantitatively evaluating image denoising performance in (1) the Bayer-pattern raw-RGB and (2) the standard RGB (sRGB) color spaces. The tracks had 216 and 220 registered participants, respectively. A total of 15 teams, proposing 17 methods, competed in the final phase of the challenge. The proposed methods by the 15 teams represent the current state-of-the-art performance in image denoising targeting real noisy images.

1. Introduction

Image denoising is a fundamental and active research area (e.g., [28, 38, 40, 11]) with a long-standing history in computer vision (e.g., [19, 21]). A primary goal of image denoising is to remove or correct for noise in an image, either for aesthetic purposes, or to help improve other downstream tasks. For many years, researchers have primarily relied on synthetic noisy image for developing and evaluating

image denoisers, especially the additive white Gaussian noise (AWGN)—for example, [6, 9, 38]. Recently, more focus has been given to evaluating image denoisers on real noisy images [1, 25]. It was shown that the performance of learning-based image denoisers on real noisy images can be limited if trained using only synthetic noise. Also, hand-engineered and statistics-based methods have been shown to perform better on real noisy images. To this end, we have proposed this challenge as a means to evaluate and benchmark image denoisers on real noisy images.

This challenge is based on the recently released Smartphone Image Denoising Dataset (SIDD) [1] that consists of thousands of real noisy images with their estimated ground-truth, in both raw sensor data (raw-RGB) and standard RGB (sRGB) color spaces. Hence, in this challenge, we provide two tracks for benchmarking image denoisers in both raw-RGB and sRGB color spaces. We present more details on both tracks in the next section.

2. The Challenge

The NTIRE 2019 Real Image Denoising Challenge is aimed to gauge and advance the state-of-the-art in image denoising. The focus of the challenge is on evaluating image denoisers on *real*, rather than synthetic, noisy images. In the following, we present some details about the dataset used in the challenge and how the challenge is designed.

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Appendix A contains the authors' teams and affiliations.

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