

NTIRE 2019 Challenge on Image Enhancement: Methods and Results

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Abstract

This paper reviews the first NTIRE challenge on perceptual image enhancement with the focus on proposed solutions and results. The participating teams were solving a real-world photo enhancement problem, where the goal was to map low-quality photos from the iPhone 3GS device to the same photos captured with Canon 70D DSLR camera. The considered problem embraced a number of computer vision subtasks, such as image denoising, image resolution and sharpness enhancement, image color/contrast/exposure adjustment, etc. The target metric used in this challenge combined fidelity scores (PSNR and SSIM) with solutions' perceptual results measured in a user study. From above 200 registered participants, 13 teams submitted solutions for the final test phase of the challenge. The proposed solutions significantly improved baseline results, defining the state-of-the-art for practical image enhancement.

1. Introduction

Image restoration and image enhancement are among the fundamental computer vision problems aiming at the improvement of different image quality aspects, including its perceptual quality, resolution, color rendition, etc. With a wide range of practical applications and challenges, these topics have witnessed an increased interest from the vision

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Figure 1. The rig with the four DPED cameras.

and graphics communities over the recent years [28, 4, 1, 5, 9, 2, 22, 10]. One of the key real-world problems in this area is photo enhancement — as the popularity of mobile photography is rising constantly, there is an increasing need for improvement of photos captured with tiny mobile camera sensors, leading to a number of research works targeting image enhancement on smartphones [14, 16, 17, 6].

The problem of comprehensive image quality enhancement has emerged quite recently [14, 15], though significant progress has been achieved over the last years. A further development in this field was facilitated by the PIRM challenge on perceptual image enhancement on smartphones [17] that produced a large number of efficient solutions that have substantially improved the baseline results [25, 8, 30, 13, 20].

The NTIRE 2019 Image Enhancement challenge is a step forward in benchmarking example-based single image

