

NTIRE 2019 Challenge on Video Deblurring and Super-Resolution: Dataset and Study

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Abstract

This paper introduces a novel large dataset for video deblurring, video super-resolution and studies the state-of-the-art as emerged from the NTIRE 2019 video restoration challenges. The video deblurring and video super-resolution challenges are each the first challenge of its kind, with 4 competitions, hundreds of participants and tens of proposed solutions. Our newly collected REalistic and Di-verse Scenes dataset (REDS) was employed by the challenges. In our study, we compare the solutions from the challenges to a set of representative methods from the literature and evaluate them on our proposed REDS dataset. We find that the NTIRE 2019 challenges push the state-of-the-art in video deblurring and super-resolution, reaching compelling performance on our newly proposed REDS dataset.

1. Introduction

Example-based video deblurring and super-resolution aim to recover the rich details and the clear texture from blurry and low-resolution video frames, based on prior examples under the form of degraded blurry and low-resolution (LR) and corresponding sharp and high-resolution (HR) videos. The loss of contents can be caused by various factors such as quantization error, limitations of the sensor from the capturing camera, shakes from hand-held cameras, fast moving objects, compression at saving time, or other degrading operators and the use of downscaling operators to reduce the video resolution for storage purposes. Video deblurring and video super-resolution are representative ill-posed problems in visual quality restoration problems as the space of the corresponding sharp HR video is very large.

Video deblurring [37, 12, 28, 35, 13, 15] as well as video super-resolution [27, 22, 3, 29, 9, 26, 36] have received

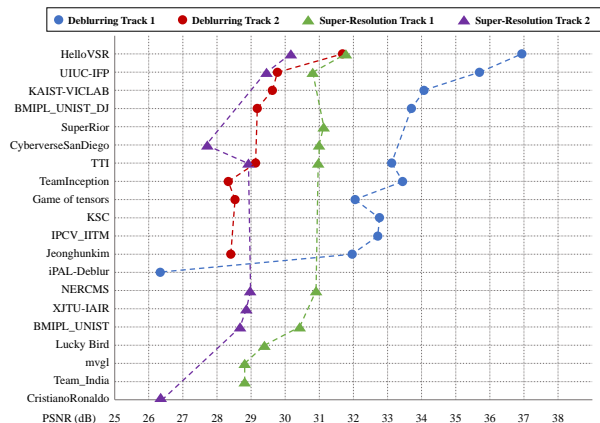


Figure 1: Representative methods from the challenges and their average PSNR performance on REDS dataset for each competition track.

much interest in the literature of research. Still, as seen in the single image super-resolution literature [30, 8, 32, 1, 31, 2, 4] for further progress in video deblurring and SR, standardized benchmarks are essential to allow comparison of different proposed methods under the same conditions.

In recent video deblurring works, [23, 28, 35] datasets that synthesize realistic motion blurs are popular for training and evaluation. However, there are different pros and cons in the blur synthesis techniques for each dataset. For video super-resolution, Vid4 dataset [21] with 155 frames is commonly used for comparison and each work employs different training datasets [26, 9, 29, 3].

In this work, we propose a novel REDS dataset with REalistic and Dynamic Scenes of 720×1280 resolution high-quality video frames collected by ourselves. It has 30000 frames with various contents, locations, natural and hand-made objects. Moreover, we organized the first example-

