Discrete Image Rescaling by Exploiting Case-specific Textures

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Abstract

With the revolution of digital multimedia, more and more research studies are tackling image processing by exploiting the potential of deep learning. Image rescaling that aims to adapt image resolution for different transmission purposes or to display on diverse resolution devices becomes critical as well. The state-of-the-art work, IRN [5], proposes a new sight of image rescaling, they have treated image downscaling and upscaling as a unified and mutual invertible task to alleviate the ill-posed mapping problem from low-resolution to high-resolution faced in image super-resolution. Nevertheless, the lack of considering the quantization effect happening in the downscaling procedure makes them less robust to practical scenarios. Furthermore, we found the possibility to predict the corresponding high-frequency component given the low-resolution counterpart if the quantization effect is properly addressed. To this end, we introduce a novel method called DIRECT, Discrete Invertible Rescaling with Enhancement from Case-specific Textures. DIRECT proposes a new way to construct case-specific high-frequency information for upscaling by leveraging the embedded textures in the downscaled image; moreover, a discrete invertible network is also adopted to relieve the quantization effect in the downscaling procedure. The quantitative experimental results show that both PSNR and SSIM are significantly improved. Furthermore, both visually pleasing high-resolution and low-resolution images can be constructed through DIRECT.
Keywords: Single Image Rescaling, Discrete Invertible Neural Network, Case-specific network.