Abstract

Single image super resolution is a classic and active image processing problem, which aims to generate high resolution (HR) image from a low-resolution input image. Due to the severely under-determined nature of this problem, an effective image prior is necessary to make the problem solvable, and to improve the quality of generated images. In this paper, we proposed a novel image super resolution algorithm is based on gradient profile sharpness (GPS). GPS is an edge sharpness metric, which is extracted from two gradient description models that is a triangle model and a Gaussian mixture model for the description of different kinds of gradient profiles. Then, the transformation relationship of GPSs in different image resolutions is studied statistically, and the parameter of the relationship is estimated automatically. Based on the estimated GPS transformation relationship, two gradient profile transformation models are proposed for two profile description models, which can keep profile shape and profile gradient magnitude sum consistent during profile transformation. Finally, the target gradient field of HR image is generated from the transformed gradient profiles is added as the image prior in HR
image reconstruction model. Extensive experiments are conducted to evaluate the proposed
algorithim in subjective visual effect, objective quality, and computation time. The experimental
results demonstrate that the proposed approach can generate superior HR images with better
visual quality, lower reconstruction error, and acceptable computation efficiency as compared
with state-of-the-art works. We compared before applying the GPS and also after apply the
GPS and for an image the results shows the after applying GPS give high resolution.

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