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A Composite Objective Metric and Its Application to Multi-focus Image Fusion

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Abstract: The research is motivated by the conclusion that single metric can't give the best assessment in all situations. In this paper, a new method for objective no-reference (NR) image quality assessment (IQA) with multi-metric combination (MMC) is presented, and has four characteristics: 1) It is a NR assessment applicable for arbitrary multi-focus images; 2) The metric-selection based on segmentation consistency is effective to process various multi-focus images. 3) The linear and nonlinear conversion functions are constructed respectively to transform each pair of selected metrics into a set of basic probability assignment (BPA). 4) D-S evidence theory is introduced to exploit the advantage of performance evaluation and explore a resolution to the conflicting circumstance. Experiments conducted with five sets of multi-focus images confirm the effectiveness and robustness of our metric in contrast with single metric.

Keywords: performance evaluation, BPA, conflict, multi-focus image

1. Introduction

Due to the limited depth of field (DOF), the cameras can't acquire an all-in-focus image. Namely only the objects falling in DOF of the lens may be sharp, while the objects out of DOF may be blurred. For many applications, the sharper images are preferred to the blurred ones since the formers contain more visually information and be more suitable for further processing. Several images, which have the same scene

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