

## Image resolution enhancement using improved edge directed interpolation algorithm

*Hossain, Md Shamim<sup>a</sup>; Jalab, Hamid A.<sup>a</sup>; Kahtan, Hasan<sup>b</sup>; Abdullah, Azma<sup>b</sup>*

<sup>a</sup> University of Malaya, Faculty of Computer Science and Technology, Kuala Lumpur, Malaysia

<sup>b</sup> Faculty of Computing, Universiti Malaysia, Pahang, Malaysia

### ABSTRACT

Image resolution enhancement is a process to convert the low-resolution (LR) image into a high-resolution (HR) image. This method is applied in many image processing field. One of the commonly used techniques for image resolution enhancement is interpolation. The results of pixel interpolation can vary significantly depending on the interpolation algorithm. Moreover, the conventional interpolation methods are not efficient to assign accurate interpolation value to the HR edge pixels. Therefore, in this study, we propose an improved edge directed interpolation (EDI) algorithm, which is able to preserve the sharpness of edges. The proposed method is divided into three main steps: edge pixel filtering; bi-cubic interpolation, and EDI. The edge pixels and non-edge pixels are separated by the adaptive edge filtering method. After that bi-cubic interpolation is applied for non-edge pixels. The Lagrange interpolation polynomial is used for bi-cubic interpolation. Finally, an improved EDI is applied to the edge pixels. The proposed method is tested on the several standard grayscale images and compared with the existing methods. According to the evaluation results, the proposed method provides the higher performance of the subjective and objective quality than the standing EDI methods.

### KEYWORDS

Edge pixel; Edge-directed; Enhancement; Image resolution; Interpolation; Non-edge pixel

**ACKNOWLEDGMENT**

This research is supported by Department of Research and Innovation of University Malaysia Pahang under research grants RDU190189.