

Some interpolation properties of digital images using morphological operations and the application of morphological filtering to enhance the quality of poor-quality document images.

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Abstract: This thesis investigates the application of morphological image processing techniques for interpolation and quality enhancement of degraded document images. The first part of the study explores novel properties of morphological operators in the context of image interpolation. Unlike conventional linear methods that often introduce blurring or artifacts, the proposed morphological approach preserves essential structural features, such as edges and fine text details, by leveraging non-linear operations like dilation and erosion. The second part focuses on the practical application of morphological filters to enhance low-quality document images. By employing a sequence of opening and closing operations, the method effectively removes noise, fills small gaps in characters, and corrects uneven background illumination without compromising textual integrity. Experimental results demonstrate that the proposed morphological framework significantly improves visual clarity and readability, outperforming standard interpolation and filtering techniques. This work provides a robust solution for restoring historical or degraded documents, offering a balance between noise suppression and detail preservation.

Keywords: digital image interpolation, morphological operations, morphological filtering, document image quality enhancement