Adaptive Image Interpolation using a Multi-layer Neural Network

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Abstract

Image interpolation is used for several purposes such as picture and document resizing for display and printing, image reconstruction, and geometrical distortions correction.

Common image interpolation methods apply an interpolation function indiscriminiately to the whole image. The resulting image in general suffers from edge blurring and aliasing, which is a particular problem for the text regions of electronic documents.

In this paper we present a resizing neural network for edge and detail preserving image interpolation. The multilayer neural network is trained by using pairs of high resolution and low resolution imagery.

The high resolution is an 8-bit image scanned at 600 dpi. The low resolution image (300 dpi) is either a processed version of the high resolution image, or it is scanned independently. Local texture and edge features are extracted from the low (high) resolution image and are used as inputs to the neural networks. The interpolated pixels obtained as output are compared with the high (low) resolution pixels and the error is used to train the neural network.

Simulation results show that the proposed approach produces noticebaly sharper edges than traditional interpolation techniques including bilinear and bicubic interpolation.