On Corrupted Image Restoration and Image Compression Using NURBS

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ABSTRACT

Due to their excellent property and their incorporation in international standards, " Non-Uniform Rational B-Splines", commonly referred to as " NURBS", is very popular among the CAD/CAM and computer graphics community. On the other hand, a 2D gray scale digital image can be viewed as a 3D surface. From this point of view, NURBS is clearly one of the candidates that are able to represent a set of digital image. Nevertheless, the applications of B-splines surfaces to the fields of image processing are most restricted to the problems of image interpolations. One of few exceptions was, in 1997, T. Watanabe proposed a novel idea to use B-spline surfaces as an image coding algorithm. Later on, in 1999, J. W. Park and S. U. Lee extended the idea of B-splines surfaces interpolation to deal with the corrupted gray level image restoration problem. While satisfactory results were reported in Park and Lee's paper, the formulas they adopted to determine the knot vectors and the control points are not appropriate. To overcome these aforementioned difficulties, this study attempts to use a bi-variate NURBS surface to study the corrupted image restoration problem and the image compression problem, respectively. In the proposed approach, a single-hidden layer neural network (NN) is employed to learn the appropriate control points of NURBS that can generate best 3D NURBS approximation surface to the image data. Experimental results suggested that the proposed approach exhibiting satisfactory performance.

Keywords : NURBS

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