

IMAGE APPROXIMATION USING TRIANGULATION

Phichet Trisiripisal

Thesis Submitted to the Faculty of
Virginia Polytechnic Institute and State University
In Partial Fulfillment of the Requirements of the degree of

Master of Science
in
Electrical Engineering

A. Lynn Abbott, Chairman
A. A. (Louis) Beex
Dong S. Ha

May 16, 2003
Blacksburg, Virginia

Keywords: Image Approximation, Wavelet Transform, Multiresolution Analysis (MRA),
Level-of-Detail (LOD), Triangular Mesh, Segmentation, Image Compression, Object
Detection and Recognition, Region-of-Interest (ROI), Delaunay

IMAGE APPROXIMATION USING TRIANGULATION

Phichet Trisiripisal

ABSTRACT

An image is a set of quantized intensity values that are sampled at a finite set of sample points on a two-dimensional plane. Images are crucial to many application areas, such as computer graphics and pattern recognition, because they discretely represent the information that the human eyes interpret. This thesis considers the use of triangular meshes for approximating intensity images. With the help of the wavelet-based analysis, triangular meshes can be efficiently constructed to approximate the image data. In this thesis, this study will focus on local image enhancement and mesh simplification operations, which try to minimize the total error of the reconstructed image as well as the number of triangles used to represent the image. The study will also present an optimal procedure for selecting triangle types used to represent the intensity image. Besides its applications to image and video compression, this triangular representation is potentially very useful for data storage and retrieval, and for processing such as image segmentation and object recognition.