

3D Image Segmentation Implementation on FPGA Using EM/MPM Algorithm

[Login \(/login\)](#)

[IUPUI ScholarWorks Repository](#)

→

[Theses, Dissertations, and Doctoral Papers](#)

→

[Electrical & Computer Engineering Department Theses and Dissertations](#)

→

[View Item](#)

3D Image Segmentation Implementation on FPGA Using EM/MPM Algorithm

[Sun, Yan](#)



Name: 3DImageSegmentati ...

Size: 1.325Mb

Format: PDF

Description: Thesis

[View/Open](#)

Permanent Link: <http://hdl.handle.net/1805/2485>

Date: 2011-03-09

Committee Chair: [Christopher, Lauren](#)

Committee: Rizkalla, Maher E.

Members: Salama, Paul

Degree: M.S.E.C.E.

Degree Year: 2010

Department: Electrical & Computer Engineering

Grantor: Purdue University

Keywords: [3D Image](#); [FPGA](#); [Hardware Implementation](#); [EM/MPM Algorithm](#)

LC Subjects: [Three-dimensional imaging](#); [Field programmable gate arrays](#); [Bayesian statistical decision theory](#)

Abstract:

In this thesis, 3D image segmentation is targeted to a Xilinx Field Programmable Gate Array (FPGA), and verified with extensive simulation. Segmentation is performed using the Expectation-Maximization with Maximization of the Posterior Marginals (EM/MPM) Bayesian algorithm. This algorithm segments the 3D image using neighboring pixels based on a Markov Random Field (MRF) model. This iterative algorithm is designed, synthesized and simulated for the Xilinx FPGA, and greater than 100 times speed improvement over standard desktop computer hardware is achieved. Three new techniques were the key to achieving this speed: Pipelined computational cores, sixteen parallel data paths and a novel memory interface for maximizing the external memory bandwidth. Seven MPM segmentation iterations are matched to the external memory bandwidth required of a single source file read, and a single segmented file write, plus a small amount of latency.

Description:

Indiana University-Purdue University Indianapolis (IUPUI)

This item appears in the following Collection(s)

[Electrical & Computer Engineering Department Theses and Dissertations \(/handle/1805/2087\)](/handle/1805/2087)



[Show Statistical Information \(#\)](#)

My Account

[Login](#)

[Register](#)

Statistics

[Most Popular Items](#)

[Statistics by Country](#)

[Most Popular Authors](#)

[About Us \(/page/about\)](/page/about) | [Contact Us \(/contact\)](/contact) | [Send Feedback \(/feedback\)](/feedback)

[_\(/htmlmap\)](#)

FULLFILLING *the* PROMISE

[Privacy Notice \(http://ulib.iupui.edu/privacy_notice\)](http://ulib.iupui.edu/privacy_notice)



Copyright (<http://www.iu.edu/copyright/index.shtml>) ©2015

The Trustees of Indiana University (<http://www.iu.edu/>),

[Copyright Complaints \(http://www.iu.edu/copyright/complaints.shtml\)](http://www.iu.edu/copyright/complaints.shtml)