Notice of the Final Oral Examination
for the Degree of Master of Science

of

DANIEL REBAIN

BSc (University of Victoria, 2017)

“Construction of Approximate Medial Shape Representations by Continuous Optimization”

Department of Computer Science

Monday, December 16, 2019
10:00 A.M.
Clearihue Building
Room B007

Supervisory Committee:
Dr. Andrea Tagliasacchi, Department of Computer Science, University of Victoria (Co-Supervisor)
Dr. Kwang Moo Yi, Department of Computer Science, UVic (Co-Supervisor)

External Examiner:
Dr. Josh Giles, Department of Mechanical Engineering, UVic

Chair of Oral Examination:
Dr. Erica Woodin, Department of Psychology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

The Medial Axis Transform (MAT) is a powerful tool for shape analysis and manipulation. Traditional methods for working with shapes usually define shapes as boundaries between some “inside” and some “outside” region. While this definition is simple and intuitive, it does not lend itself well to the construction of algorithms for a number of seemingly simple tasks such as classification, deformation, and collision detection. The MAT is an alternative representation of shape that defines the “inside” region by its center and thickness. We present a method of constructing the MAT which overcomes a significant limitation of its use with real-world data: instability. As classically defined, the MAT is unstable with respect to the shape boundary that it represents. For data sources afflicted by noise this is a serious problem. We propose an algorithm, LSMAT, which constructs a stable least squares approximation to the MAT.