University of Victoria | Graduate Studies

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

of

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BSc (University of Victoria, 2014)

"On Ridge Regression and Lasso"

Department of Mathematics and Statistics

Wednesday, August 2, 2017
2:00 P.M.
David Turpin Building
Room A136

Supervisory Committee:
Dr. Jane Ye, Department of Mathematics and Statistics, University of Victoria (Co-Supervisor)
Dr. Julie Zhou, Department of Mathematics and Statistics, UVic (Co-Supervisor)

External Examiner:
Dr. Hong-Chuan Yang, Department of Electrical and Computer Engineering, UVic

Chair of Oral Examination:
Dr. Sybille Artz, School of Child and Youthcare, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

This thesis focuses on ridge regression (RR) and the lasso (least absolute shrinkage and selection operator). Ridge properties are being investigated in great detail which include studying the bias, the variance and the mean squared error as a function of the tuning parameter. We also study the convexity of the trace of the mean squared error in terms of the tuning parameter. In addition, we examined some special properties of RR for factorial experiments. Not only do we review ridge properties, we also review lasso properties because they are somewhat similar. Rather than shrinking the estimates toward zero in RR, the lasso is able to provide a sparse solution, setting many coefficient estimates exactly to zero. Furthermore, we try a new approach to solve the lasso problem by formulating it as a bilevel problem and developing a new algorithm to solve this bilevel problem.