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

of

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BSc (Xi’An University of Posts and Telecommunications, 2014)

“A Machine Learning Approach to Fundraising Success in Higher Education”

Department of Computer Science

Thursday, April 13, 2017
1:30 P.M.
Engineering and Computer Science Building
Room 467

Supervisory Committee:
Dr. Kui Wu, Department of Computer Science, University of Victoria (Supervisor)
Dr. Alex Thomo, Department of Computer Science, UVic (Member)

External Examiner:
Dr. Kin F. Li, Electrical and Computer Engineering, University

Chair of Oral Examination:
Dr. Marc Lapprand, Department of French, UVic

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

New donor acquisition and current donor promotion are the two major programs in fundraising for higher education, and developing proper targeting strategies plays an important role in both programs. This thesis presents machine learning solutions as targeting strategies for both programs based on readily available alumni data in almost any institution. The targeting strategy for new donor acquisition is modeled as a donor identification problem. The Gaussian naïve bayes, random forest, and support vector machine algorithms are used and evaluated. The test results show that having trained with enough samples, all three algorithms can distinguish donors from rejectors well, and big donors are identified more often than others. While there is a trade off between the cost of soliciting candidates and the success of donor acquisition, the results show that in a practical scenario where the models are properly used as the targeting strategy, more than 85% of new donors and more than 90% of new big donors can be acquired when only 40% of the candidates are solicited. The targeting strategy for donor promotion is modeled as a promising donor (i.e., those who will upgrade their pledge) prediction problem in machine learning. The Gaussian naïve bayes, random forest, and support vector machine algorithms are tested. The test results show that all the three algorithms can distinguish promising donors from non-promising donors (i.e., those who will not upgrade their pledge). When the age information is known, the best model produces an overall accuracy of 97% in the test set. The results show that in a practical scenario where the models are properly used as the targeting strategy, more than 85% of promising donors can be acquired when only 26% candidates are solicited.