UNIVERSITY GRADUATE SCHOOL BULLETIN
ANNOUNCEMENT

Florida International University
University Graduate School

Master’s Thesis Defense

Abstract

Simulation and Application of Binary Logic Regression Models

by

Jobany Jose Heredia Rico

Logic regression (LR) is a methodology to identify logic combinations of the binary predictors in the form of intersections (“and”), unions (“or”) and negations (“not”) that are linearly associated with an outcome variable. Logic regression uses the predictors as inputs and enables us to identify important logic combinations of independent variables using a computationally efficient tree-based stochastic search algorithm, unlike the classical regression models, which only consider pre-determined conventional interactions (the “and” rules). In the thesis, we focus on LR with binary outcome in a logistic regression framework. Simulation studies are conducted to examine the performance of LR under the assumption of independent and correlated observations, respectively, for various characteristics of the data sets and parameters of LR. We found that the proportion of times that LR selects the correct logic rule is usually low when signal and/or prevalence of the true logic rule are relatively low. The method performs satisfactorily under easy learning conditions such as high signal, simple logic rules and/or small numbers of predictors. Given the simulation characteristics and correlation structures tested, we found some but not significant difference in performance when LR was applied to dependent observations compared to the independent case. In addition to simulation studies of LR, an advanced application method is proposed to integrate LR and resampling methods in order to enhance the performance. The proposed method is illustrated using two simulated data sets as well as using a dataset from a real-life situation. The proposed method showed some evidence of being effective in discerning the correct logic rule even for unfavorable learning conditions.

Date: April 1, 2016
Time: 12:00 p.m.
Place: University Park, VH 133

Department: Mathematics and Statistics
Major Professor: Dr. Wensong Wu