

ABSTRACT

THESIS: A GENERALIZED LINEAR MODEL FOR MULTIVARIATE CORRELATED BINARY RESPONSE VARIABLES FOR TESTING DEPENDENCE: AN APPLICATION TO MOBILITY INDEX OF ELDERLY PEOPLE IN USA

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Motivation: Dependence of multivariate binary outcomes in longitudinal data is challenging to study. Dependence in binary responses can be tested using different techniques. Marshall-olkin correlation coefficient and logistic regression model are two of the popular techniques. However, these approaches do not elucidate the true relationship between the predictors and responses if the responses are correlated. Numerous studies have been performed to test the dependence in binary responses either using conditional or marginal probability models. The conditional and marginal approach provide inadequate or misleading results due to the use of only conditional or marginal model.

Method: A generalized linear model (GLM) is proposed using both conditional and marginal probabilities. This is an extended model of bivariate correlated binary responses to tri-variate correlated binary responses. The link function of the GLM is used to test the dependence of response variables.

Results: Marshall-olkin correlation coefficients and logistic regression coefficients provide moderate correlation in the mobility index which implies the dependence of response variables. The analysis of the proposed model for both datasets implies that this dependence is statistically significant.