



Department of Biostatistics

BIostatISTICS SEMINAR

Test of Association Between Two Ordinal Variables While Adjusting for Covariates

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Abstract

We propose a new set of test statistics to examine the association between two ordinal categorical variables X and Y after adjusting for continuous and/or categorical covariates Z . Our approach first fits proportional odds models of X and Y , separately, on Z . For each subject, we then compute the conditional distributions of X and Y given Z . If there is no relationship between X and Y after adjusting for Z , then these conditional distributions will be independent, and the observed value of (X, Y) for a subject is expected to follow the product distribution of these conditional distributions. We consider two ways of testing the null of conditional independence. The first approach adds these product distributions across all subjects to obtain the expected distribution of (X, Y) and then contrasts this distribution with the observed unconditional distribution of (X, Y) . Our second approach computes "residuals" from the two ordinal logistic models and then tests for correlation between these residuals. We present methods for computing p-values using either the empirical or asymptotic distributions of our test statistics. Through simulations, we demonstrate that our test statistics perform well in terms of power and Type I error rates when compared to proportional odds models which treat X as either continuous or categorical. We apply our methods to data from a study of visual impairment in children and to a study of cervical abnormalities in HIV-infected women.

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