

Collapsibility of some association measures and survival models

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Abstract Collapsibility deals with the conditions under which a conditional (on a covariate W) measure of association between two random variables Y and X equals the marginal measure of association. In this paper, we discuss the average collapsibility of certain well-known measures of association, and also with respect to a new measure of association. The concept of average collapsibility is more general than collapsibility, and requires that the conditional average of an association measure equals the corresponding marginal measure. Sufficient conditions for the average collapsibility of the association measures are obtained. Some interesting counterexamples are constructed and applications to linear, Poisson, logistic and negative binomial regression models are discussed. An extension to the case of multivariate covariate W is also analyzed. Finally, we discuss the collapsibility conditions of some dependence measures for survival models and illustrate them for the case of linear transformation models.

Keywords Average collapsibility · Conditional distributions · Linear and non-linear regression models · Measures of association · Linear transformation model

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