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A multinomial quadrivariate D-vine copula mixed model for diagnostic studies meta-analysis in the presence of non-evaluable subjects

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**ΑΙΘΟΥΣΑ 607, ΚΤΙΡΙΟ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ
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ΠΕΡΙΛΗΨΗ

Diagnostic test accuracy studies observe the result of a gold standard procedure that defines the presence or absence of a disease and the result of a diagnostic test. They typically report the number of true positives, false positives, true negatives and false negatives. However, diagnostic test outcomes can also be either non-evaluable positives or non-evaluable negatives. We propose a novel model for meta-analysis of diagnostic studies in the presence of non-evaluable outcomes that assumes independent multinomial distributions for the true and non-evaluable positives, and, the true and non-evaluable negatives, conditional on the latent sensitivity, specificity, probability of non-evaluable positives and probability of non-evaluable negatives in each study. For the random effects distribution of the latent proportions, we employ a drawable vine copula that can successively model the dependence in the joint tails. Our methodology is demonstrated with an extensive simulation study and applied to data from diagnostic accuracy studies of coronary computed tomography angiography for the detection of coronary artery disease. The comparison of our method with the existing approaches yields findings in the real data application that change the current conclusions.



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ABSTRACT

Diagnostic test accuracy studies observe the result of a gold standard procedure that defines the presence or absence of a disease and the result of a diagnostic test. They typically report the number of true positives, false positives, true negatives and false negatives. However, diagnostic test outcomes can also be either non-evaluable positives or non-evaluable negatives. We propose a novel model for meta-analysis of diagnostic studies in the presence of non-evaluable outcomes that assumes independent multinomial distributions for the true and non-evaluable positives, and, the true and non-evaluable negatives, conditional on the latent sensitivity, specificity, probability of non-evaluable positives and probability of non-evaluable negatives in each study. For the random effects distribution of the latent proportions, we employ a drawable vine copula that can successively model the dependence in the joint tails. Our methodology is demonstrated with an extensive simulation study and applied to data from diagnostic accuracy studies of coronary computed tomography angiography for the detection of coronary artery disease. The comparison of our method with the existing approaches yields findings in the real data application that change the current conclusions.