A semi-parametric model for the meta-analysis of diagnostic tests accounting for multiple thresholds

Annika Hoyer[1,2]
(joint work with Oliver Kuß[2])

[1] Vertretungsprofessur Institut für Statistik, LMU München

[2] Deutsches Diabetes-Zentrum, Leibniz-Zentrum für Diabetes-Forschung an der Heinrich-Heine-Universität Düsseldorf, Institut für Biometrie und Epidemiologie

07.11.2018, 16:00 (s.t.)
Institut für Statistik, Ludwigstr. 33, Seminarraum

Methods for the meta-analysis of diagnostic test accuracy studies are manifold and still a vivid research area in recent years. This is due to the increased complexity of diagnostic studies as they report on a bivariate outcome of sensitivity and specificity. The situation becomes even more challenging in case the single studies report on full ROC curves with several pairs of sensitivity and specificity, each corresponding to a different threshold. However, researchers frequently ignore this information and select only a single pair of sensitivity and specificity per study to arrive at meta-analytic estimates. Although there exist methods that incorporate all observations from the single studies, most of them come along with disadvantages as, for example, they ignore the concrete threshold values or allow only for the same numbers of thresholds across studies. In extension of our previous approach using bivariate time-to-event models for interval-censored data [1], we propose a further development for the meta-analysis of ROC curves based on the principle of piecewise constant modeling [2]. This approach avoids the mentioned disadvantages and allows additionally for a more flexible, semi-parametric modelling of the underlying distribution of continuous diagnostic test values. The model is illustrated by the example of population-based screening for type 2 diabetes mellitus.

References:

1 Hoyer, A., Hirt, S., Kuss, O. (2018) Meta-analysis of full ROC curves using bivariate time-to-event models for interval-censored data. Research Synthesis Methods, 9(1):62-72

2 Gong, Q., Fang, L. (2013) Comparison of different parametric proportional hazards models for interval-censored data: A simulation study. Contemporary Clinical Trials, 36:276-283