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A point-wise average approach in dose-response meta-analysis of summarized data for binary outcomes

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Abstract

In this thesis we propose a point-wise averaging approach for doseresponse meta-analysis of aggregated data. Relative to the common approach of averaging regression coefficients the method proposed allows for more flexibility. Recently proposed, the point-wise approach is a new strategy to perform meta-analysis on individual patient data, but has not been investigated in the context of aggregated data. Each individual study is allowed to follow a different dose-response trend using predictor transformations such as splines or fractional polynomials. The predicted outcomes are then averaged across studies at specific values of the quantitative predictor. The methodology is described in detail and is applied to survival data from 9 Registries of the Surveillance, Epidemiology, and End Results Pro- gram (SEER) of the United States, involving breast cancer patients. The performance of the method is evaluated against the dose-response meta-analysis of individual patient data analysis. The method has been tested using simulated studies of common dose-response relations (i.e. linear, Ushaped, J-shaped). Overall, the point-wise approach on aggregated data produces similar results in comparison with the same analysis on individual patient data and comparable results with the true underlying shapes of simulated studies.

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