16 June 16:15

Title: Enhanced reconstruction of pseudo-individual patient data using quadratic programming

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Abstract

Extracting information from digitised Kaplan-Meier plots in published papers is increasingly common particularly within health technology assessment, for instance to allow secondary analysis for the purposes of survival extrapolation. It can also enable the use of patient-level meta-analysis techniques or facilitate the use of external data into clinical trial designs. Guyot et al's algorithm for obtaining pseudo-individual patient data (IPD) is by far the most used approach, but its ad hoc construction makes it difficult to extend.

In this presentation, reconstruction of IPD is framed as a constrained optimisation problem for which well-established quadratic programming methods can be applied. Under this framework additional information such as marked censoring times can easily incorporated when reconstructing IPD from a Kaplan-Meier curve while also ensuring the IPD is consistent with the reported numbers at risk and total events. Moreover, the same approach can be extended to allow reconstruction of IPD from cumulative incidence functions from competing risks analysis, reconstruction of left-truncated survival data and to ensure IPD reconstructed from progression-free survival and overall survival curves are mutually admissible. An R package, CIFresolve, has been developed to implement the methods, and will be illustrated on a range of examples.