On the different flavours of practical identifiability

Info

PUBLISHED DATE
2025-12-01

JOURNAL
Current Opinion in Systems Biology

LINK
https://doi.org/10.1016/j.coisb.2025.100556

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Abstract

Identifiability is fundamental to any parameter estimation process and plays a role in a wide range of scientific research disciplines. Structural identifiability is a well-defined and purely model-based property that can be analysed in the absence of experimentally measured data with various methods. In contrast, practical identifiability lacks a concise technical definition that is agreed upon, leading to conflicting assessments. We focus on the practical identifiability analysis of ordinary differential equation models in systems biology and point out the differences between definitions and their implications. We differentiate between classifications based on sensitivity and classifications based on confidence intervals. We advocate for precise wording in discussions of practical identifiability analysis results so that the employed method is clear from the terminology. We propose that model parameters should be termed a priori or a posteriori sensitive if sensitivity-based methods are used and finitely identified if the assessment is based on confidence intervals.