Wheeler et al. (2024).

Apr 3, 2025

Impact

- Cited 10 times.
- Not much impact, yet.
- This is a didactic article. Will the appropriate people read and learn from it?

How far could one get with TMB?

- The SpatPOMP model analyzed here is state-of-the-art methodologically, as a particle filter likelihood maximization task.
- If TMB can give a satisfactory approximation we'd like to know!
- If not, can one find a spectrum of models stretching continuously from situations where TMB succeeds to situations where it is unacceptable?

Deterministic vs stochastic

- Many papers postulate ODE models and fit by least squares. Why?

Reproducibility and extendability

- Basic reproducibility (of statistical results) is the provision of code and data with a script that can be run to generate the tables and figures in a published paper.
- This is good. But when code is complex, this is not enough to enable typical researchers to experiment with the methods and choice of analysis.
- Extendable code must learn from software engineering practices.
- This also helps to prevent errors in the published paper.

Use and abuse of methods

- Plug-and-play methods enable researchers to fit mechanistic POMP models.
- But nonlinear stochastic dynamic models can have complex behaviors - fitting a model is only a step toward a careful, correct and insightful data analysis.
- There are many pitfalls. How should we avoid them and help others avoid them?
- Complex statistical methods seem to suppress thought: people who work long and hard to find numbers that may support their conclusion are empirically predisposed to belive those numbers uncritically. Is this cognitive bias
    - Confirmation bias
    - Quantification bias
    - Sunk cost fallacy
    - Effort justification