Advanced Discrete Event Simulation in R

TA Trikalinos, F Alarid-Escudero, Y Sereda, SA Chrysanthopoulou

SMDM 2024 (Boston MA)

Disclosures

- We have no financial or other conflicts to declare
- Supported by the NCI CISNET Incubator and CISNET programs:
  - All by U01 CA265750-02 (CISNET bladder cancer)
  - Alarid-Escudero also by U01 CA265729 (CISNET gastric cancer); and U01 CA253913 (colorectal cancer)
- Trikalinos and Sereda developed and maintain the **nhppp** R package

Sunday 27th of October 8:30 to 12:00

Time	Description	Discussant
[15 min]	(0) Introductions and administrivia	Trikalinos
[25 min]	(1) DES as a composition of point processes	Alarid-Escudero
[30 min]	(2) NHPPPs – key properties	Trikalinos
[30 min]	(3) Sampling from NHPPPs	Sereda
[15 min]	**Break**	
[80 min]	(4) Guided exercise: - Implement a simple cancer natural history DES for one person - The many-person case - Packaging	[All] Chrysanthopoulou Sereda/Alarid-Escudero Trikalinos
[10 min]	(5) Advanced Topic Teaser on self-excitatory processes: point processes that are not NHPPPs and when you may need them	Trikalinos
[15 min]	General Q & A	All

Administrivia

- Professional conduct
  - https://smdm.org/hub/page/smdm-conduct-policy
- Bathroom locations
- WiFi network SSID: “BU Guest”. No password needed.
- Format of the course

For the hands-on part,

- You need R, preferably with an IDE such as R Studio.
- Install packages `data.table` and `nhppp (>=1.0.0)`.
  To install them from CRAN,

```
> install.packages("data.table")
> install.packages("nhppp")
```

- All materials are available at
  - Through this Dropbox link (full link in the email) through 26/11/2024.
    Password "**smdm_boston**",
  - https://github.com/ttrikalin/des-R-course

  (`smdm_2024` release)

Learning objectives

Be able to discuss:

- How a basic DES is organized
- Three properties of NHPPPs (memorylessness, composability, and transmutation by transforming the time axis) that are important for simulation
- Sampling algorithms and their use via `R`'s **nhppp** package