**Book Review for Journal of Applied Spatial Analysis and Policy, June 2015**

**Lovelace, R., Dumont, M.** Spatial Microsimulation with R, CRC Press, Boca Raton, Florida USA, 2016, 260 pages, £57.99, ISBN 9781498711548.

Spatial microsimulation can mean very different things to different people and disciplines. It could be the simulation of scenarios (e.g. tax changes on income levels or traffic changes based on modifications to the road network) to evaluate their impact geographically, or the generation of synthetic spatial microdata through combining geographical and individual level data (not to be confused with small area estimation). Lovelace and Dumont’s book focuses on the latter of these approaches.

There are multiple books on spatial microsimulation (e.g. Tanton and Edwards, 2013), and hundreds more research papers detailing the various applications of studies. However, bar a few exceptions, they lack transparency and reproducibility. It creates a situation whereby researchers simultaneously encourage the uptake of the method, whilst also creating barriers by obscuring methodologies. Lovelace and Dumont’s book sets to address this flaw through demonstrating how to undertake a spatial microsimulation.

The progression of content starts off simple, guiding the reader through the basics towards moving to more complex analytical procedures. It begins by introducing what spatial microsimulation is (and isn’t), making it clear what the book will cover and the potential applications of the approach (Chapters 1-3). Chapter 4 discusses data preparation before introducing Iterative Proportional Fitting (IPF) (Chapter 5), as well as briefly describing alternative methods (Chapter 6). The focus on IPF is understandable and while certainly useful for teaching spatial microsimulation, the authors ignore wider critical discussions over the methodology and present a slightly one-sided argument over its usefulness. Of course, this may have not been in the scope of the book, but readers should be aware of such debates when learning about any methodology.

The book then reinforces the material taught by using the memorable example of estimating cake consumption for small areas in Leeds. The writing style of the book reflects this example; informative but playful. It is a joy to read! Chapter 8 details validation approaches for estimates, an important and necessary part of any spatial microsimulation. Multiple approaches of ‘internal validation’ (i.e. checking that the input data make sense) are presented in detail. Less room is given towards ‘external validation’ (i.e. verification and ground truthing) and whilst this is often difficult to undertake, guiding the reader through principles to adhere to would have been nice. Chapters 9, 10 and 11 discuss ways of applying methods when there is a lack of individual level data or producing the data for households. The book ends with detailing how to use the outputs from spatial microsimulation as inputs to an Agent Based Model for more complex analyses (Chapter 12).

Where the book sets itself apart from other books is in its applied nature. At the centre of their approach is a ‘learn by doing’ mentality which serves the book well. Examples are used to demonstrate approaches and the authors encourage thinking beyond the material presented. Of note, Lovelace and Dumont show step-by-step what is happening when using IPF and how to code this, rather than jumping straight to bespoke R packages that can run it in single lines of code (which are also covered). Content is always clearly set out, with each step explained in detail. The approach helps to guide the reader along in understanding fairly complicated methods.

All of this is taught using R, an open source statistical software package allowing anyone to freely learn and reproduce the examples from the book. These open science principles are further demonstrated with the additional materials available to individuals with and without the book. A lot of the content including text, code and data are freely available both on the companion website (<http://robinlovelace.net/spatial-microsim-book/>) and GitHub repository (<https://github.com/Robinlovelace/spatial-microsim-book>). Indeed the scope of the material made available freely would suggest that there is little need to actually purchase the book itself.

Whilst admirable, the materials provided (which the authors encourage you to download and follow as you progress through the book) can be difficult to follow in places. R scripts provided need greater context within the scripts themselves and it may have been easier to the reader if they were organised in chapter order. Disappointingly, occasional lines of code produced errors if followed in the order of the book and some parts of the companion website remain unfinished. It should not distract from what is an excellent book (these issues can also be easily addressed by the authors in the free online materials), but the book itself lacks a little polish.

Overall, these issues are minor and Lovelace and Dumont’s book is a fine addition to the library of anyone interested in quantitative methods, let alone those wanting to generate their own spatial microdata.

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References

Tanton, R., Edwards, K. (Eds.). (2013). Spatial Microsimulation: A Reference Guide for Users. Netherlands: Springer.