

Introduction to Spatial Microsimulation with R

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Introduction

- ▶ Housekeeping
- ▶ About the course and its teachers
- ▶ Lectures and practicals
- ▶ Getting help

Housekeeping

- ▶ Thanks to the hosts, the JRC

Spatial Microsimulation with R

Aims:

1. To provide a solid understanding of the method and applications
2. To teach its implementation in R in general terms
3. To provide guidance on next steps

Objectives:

- ▶ Become proficient with R and RStudio for handling data
- ▶ Understand some applications where spatial microsimulation is useful
- ▶ Realise the limitations of the method
- ▶ Know about a range of packages for doing spatial microsimulation with R
- ▶ Understand code for generating spatial microdata with **mipfp**
- ▶ Have ideas for trying the methods on your own datasets

About the course and its teachers

The request to teach at the EU

- ▶ Links with much of the research taking place at the JRC
- ▶ Big Data
- ▶ Modelling
- ▶ Social impact assessment
- ▶ Scenarios of the future

The course materials

- ▶ Based on our book, (Lovelace and Dumont 2016). Digital versions available on-line
- ▶ Slides available on-line
- ▶ We'll be making small 'code chunks' and scripts available during the course
- ▶ Any feedback welcome

A bit about us

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- ▶ Environmental Geographer turned Computational and Transport Geographer

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- ▶ Creator of the **stplanr** package
- ▶ Lead developer of the Propensity to Cycle Tool (PCT)

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- ▶ Applied Mathematician with coding, algorithmic and statistics background
- ▶ Now on a project of the Wallonia Region developping an evolutionary spatial microsimulation to forecast health needs of elderly in 2030 for Belgium
- ▶ Teach statistics in R to the master's student in applied mathematics at university of Namur

A bit about you

- ▶ Go-around - who you are, interests in the course
- ▶ With your neighbour:
 - ▶ Experience with R
- ▶ What you hope to get out of the course

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- ▶ Go-around - who you are, interests in the course
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What is spatial microsimulation and its applications

What is spatial microsimulation?

1. A method
2. An approach

Applications

- ▶ Wide variety of potential applications
- ▶ So far main applications have been in health, poverty mapping and transport
- ▶ What do you want to use spatial microsimulation for?
- ▶ Tomintz, Clarke, and Rigby (2008) The geography of smoking in Leeds: estimating individual smoking rates and the implications for the location of stop smoking services.
- ▶ Exploration of the energy costs of transport (Lovelace and Philips 2014)

Agriculture

Hynes et al. (2008) is a classic example

Had 2 datasets:

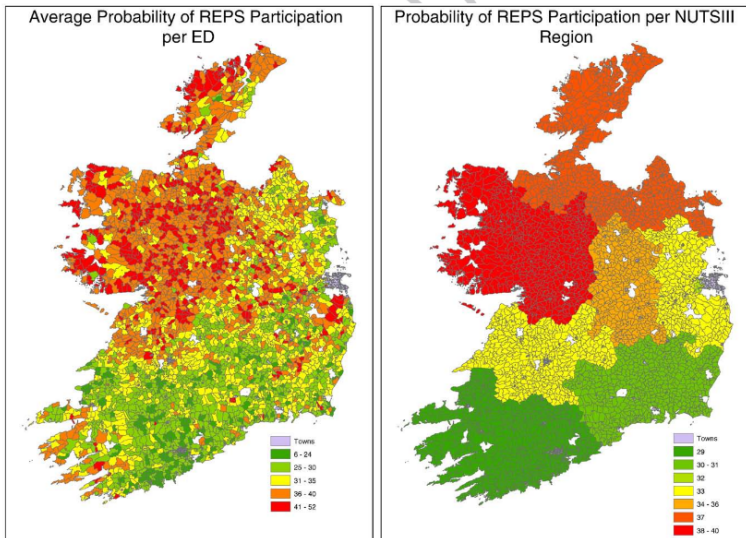
- ▶ Individual level data on farmers participating in agri-environment scheme
- ▶ Farm level data with many attributes about the farms
- ▶ Geographical data on farms at the Enumeration District (ED) level

For confidentiality reasons, the individual-level datasets could not be linked

Spatial microsimulation used to create a synthetic dataset

Agriculture II

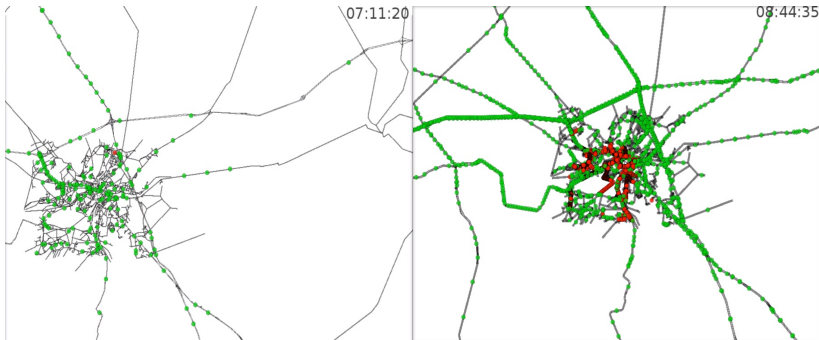
Results show the probability of participation across Ireland:



Calculated using Spatial Microsimulation results contained in Table 4

Transport

A simulation of the car's traffic for Namur (Barthélemy 2014)



Used tools : spatial microsimulation, agent based modelling, activity chains,...

What's next:

- ▶ The RStudio Graphical User Interface (GUI)
- ▶ Using R
- ▶ Project management
- ▶ GitHub

References

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