

A crash course on Urban accessibility with R

Rafael H. M. Pereira



@UrbanDemog

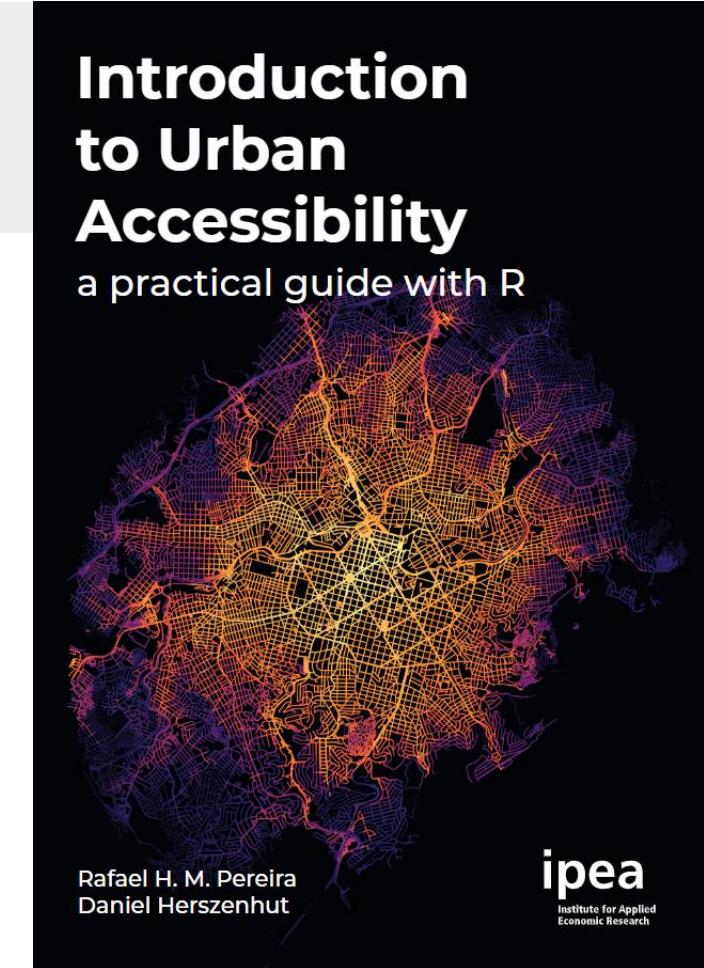
Core teaching material:

Aim:

To equip its readers with the fundamental concepts, the data analysis skills needed to perform urban accessibility analyses and project evaluations

Hands-on approach:

- Methodology and data analysis guide-book
- Reproducible examples in  R
- Open software and data



https://ipeagit.github.io/intro_access_book/

Overview of the book

Section 1:

Introduction to urban accessibility (concepts)

Section 2:

Calculating accessibility

Section 3:

Public transport data in GTFS

Section 4:

Impact assessment of transportation projects

Section 5:

Data from the Access to Opportunity Project (AOP)

Introduction to Urban Accessibility

a practical guide with R



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Daniel Herszenhut

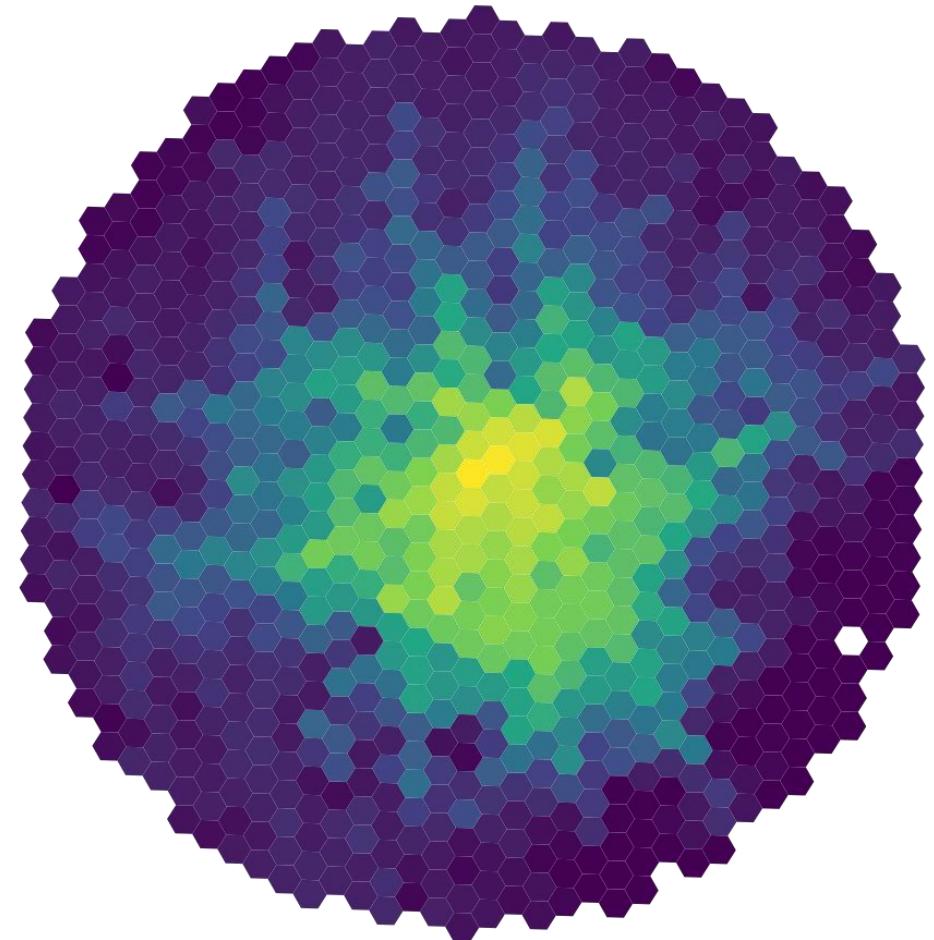
ipea
Institute for Applied
Economic Research

https://ipeagit.github.io/intro_access_book/

ipea

What we will cover:

- Data and computational requirements
- How to calculate:
 - Travel time matrices
 - Accessibility estimates
 - Accessibility poverty
 - Accessibility inequality



What we will *not* cover:



Intro-level content we assume you're already familiar with



Advanced topics we will not cover and which are not required to follow the workshop

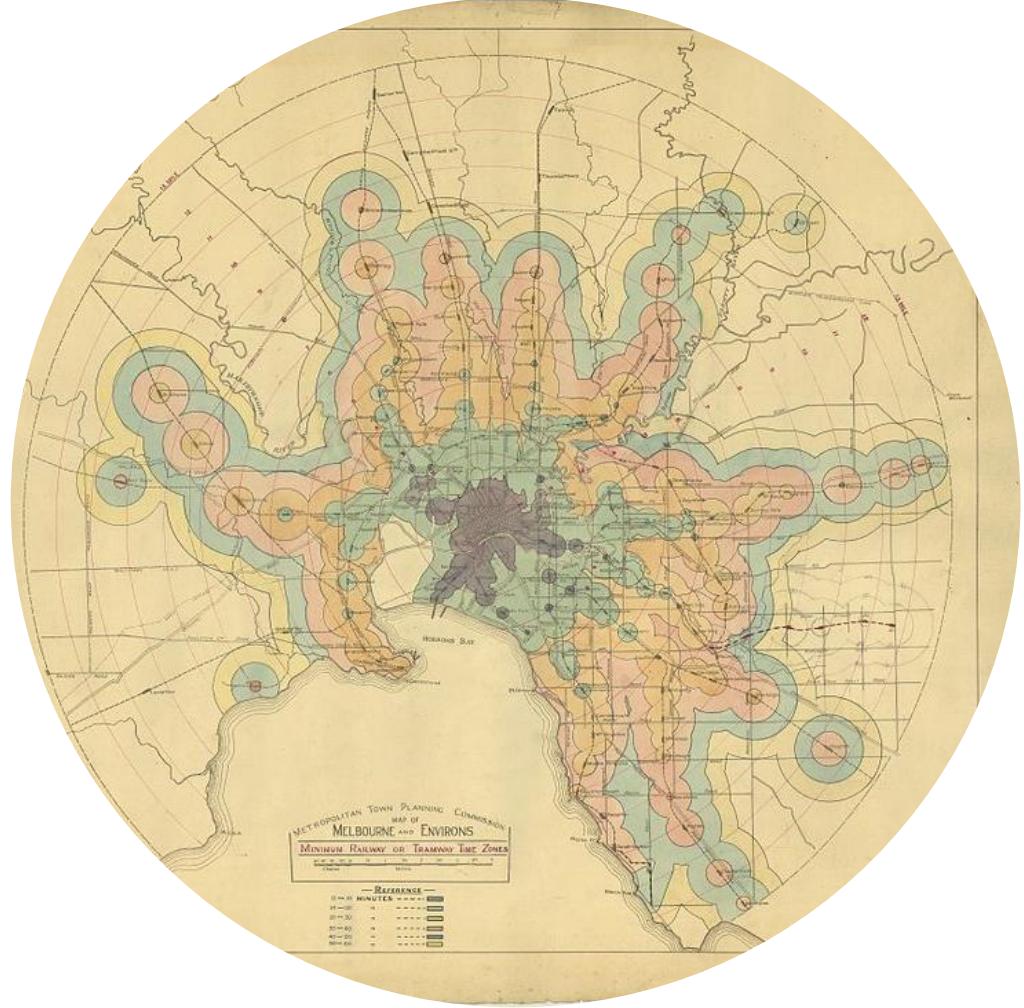


Image: isochrone map of Melbourne by rail,
1910-1922

Why does accessibility matter?

the role of access in inclusive and sustainable cities



Sufficientarian:

It is essential for the satisfaction of **basic needs**

Egalitarian:

It reveals the spatial dimension of **inequality of opportunities**

Human development:

It provides the **freedom** necessary to **participate in activities** and
develop other human capabilities

Environmental:

It shapes travel choices towards more (or less) **sustainable mobility patterns**

Types of accessibility measures

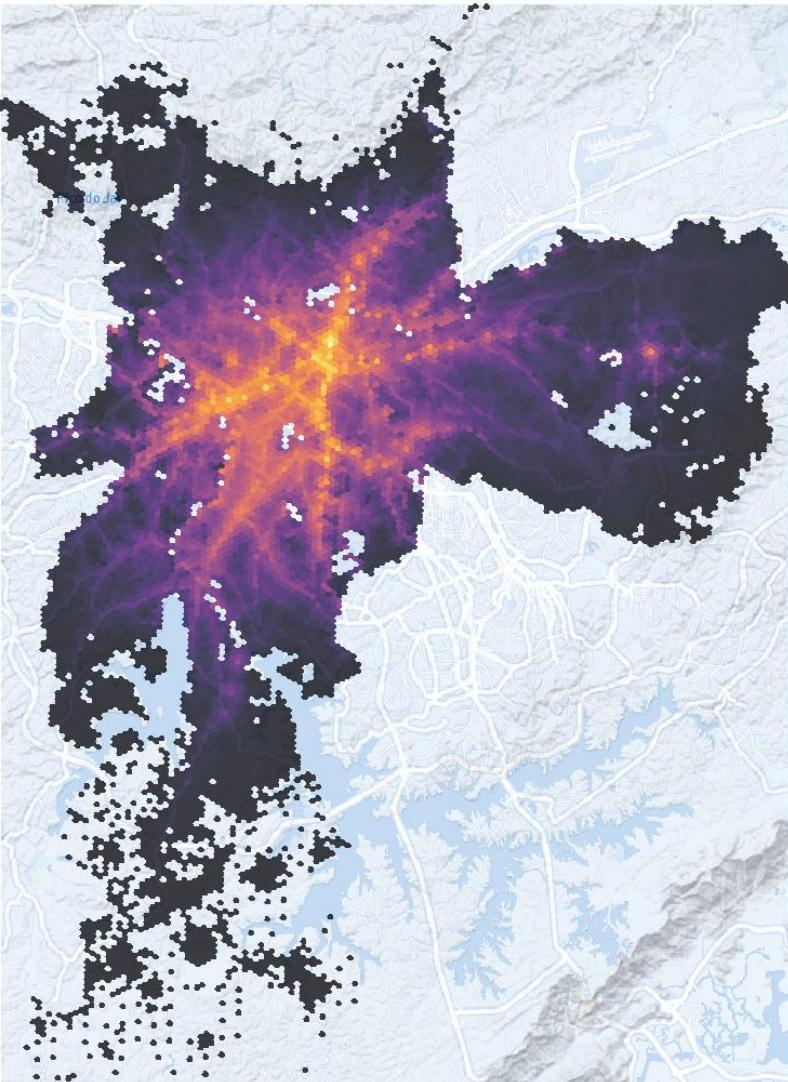


Place-based metrics



Person-based metrics

Cumulative accessibility metric



Cumulative opportunity measures:

The number of opportunities that can be reached within a given travel cost limit

Advantages:

- Easy to calculate and communicate
- Little data requirements



Disadvantages:

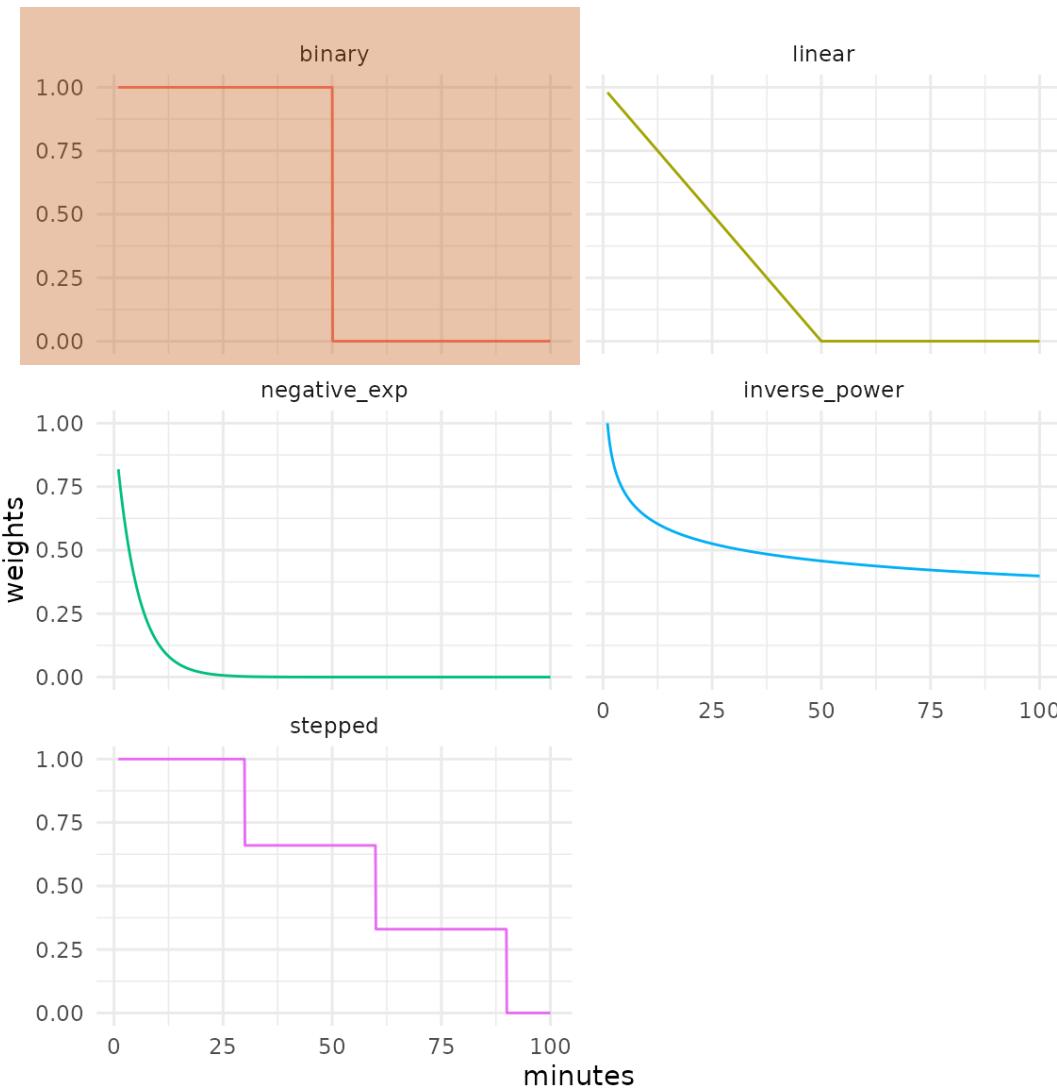
- Does not consider the competition for opportunities
- Requires choosing a single (arbitrary) travel time threshold
- Ignores cost gradients within time threshold

$$A_i = \sum_{j=1}^n O_j \times f(c_{ij})$$

$$f(c_{ij}) = \begin{cases} 1 & \text{if } c_{ij} \leq C \\ 0 & \text{otherwise} \end{cases}$$

in which A_i is accessibility at origin i , O_j is the number of opportunities at destination j , n is the total number of destinations in the study area, $f(c_{ij})$ is a binary function that assumes the values 0 or 1, depending on the travel cost c_{ij} between origin i and destination j and C is the travel cost threshold.

Access metrics and decay functions



Advanced topics in accessibility

These will be covered in a new book (in progress)

Under contract with Routledge

- Spatial biases - MAUP
- Temporal biases - MTUP
- Access metrics with competition
- Calibration of impedance functions
- Monetary costs
- Single Vs Multiple Cost Measures
- Big (larger-than-memory) data

