

Circles of Mobility

Travel Survey Data for Predicting Mobility Behaviours

Clara Peiret-García

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Contents

- **The aim:** Deriving profiles from data
- **The theory:** Circles of Mobility
- **The data:** The Dutch National Travel Survey
- **The clusters:** From individuals to groups
- **The model:** Predicting behaviours
- **The app:** A decision-making tool
- **Conclusions**

The aim

To estimate the probability of an individual presenting a mobility profile based on their personal characteristics, and the characteristics of their neighbourhood.

We employ **travel survey** data to generate **mobility profiles**, and estimate a **statistical model** to predict cluster belonging based on individual and environmental factors.

We aim for this research to assist policy-makers and planners with new methods and data in order to implement transport policies targeted at specific population groups.

The theory

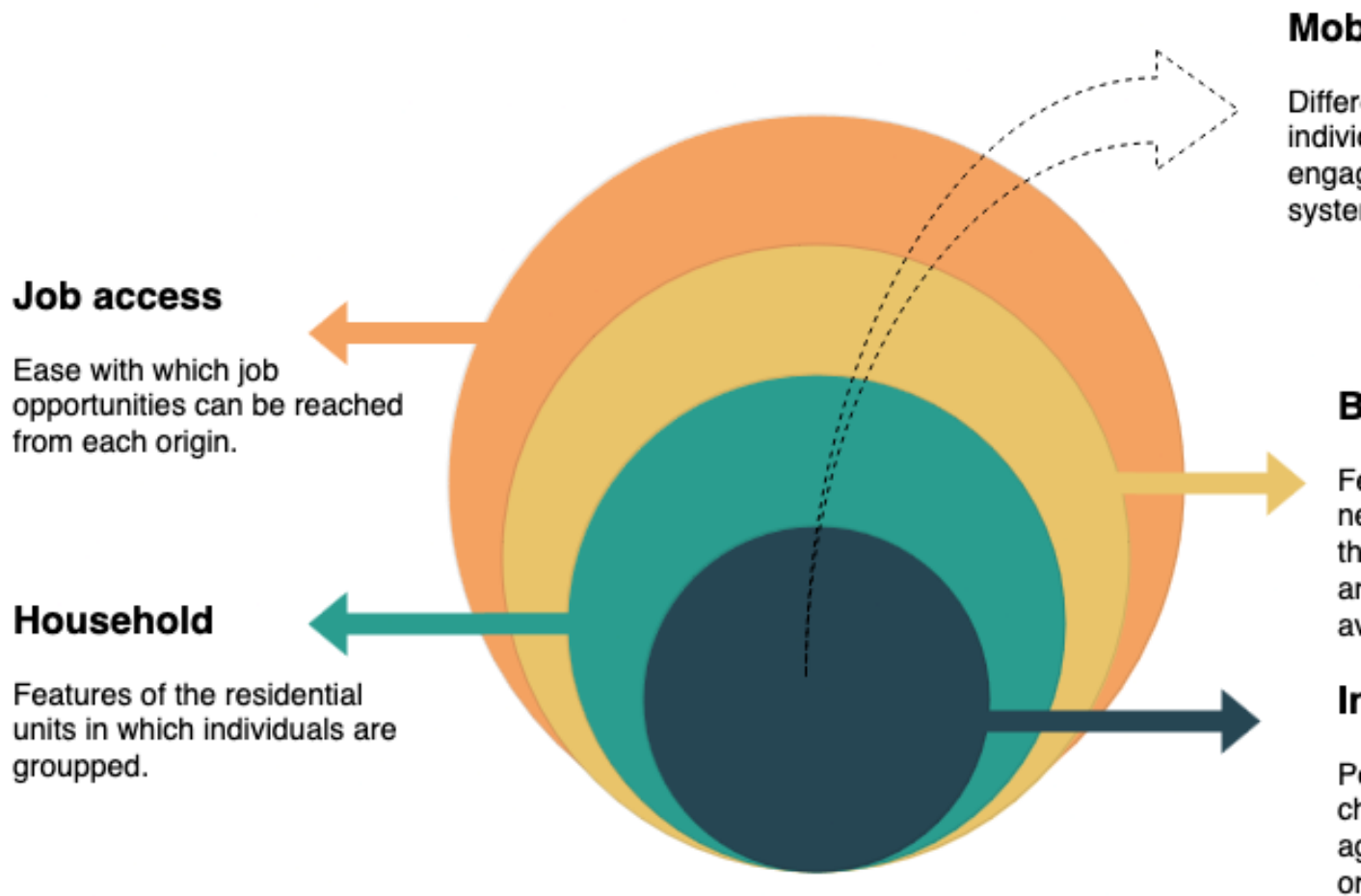


Figure 1: *Circles of Mobility*. We consider factors at four different levels: individual, household, neighbourhood, and region.

The data

- **Onderweg in Nederland** - Dutch national travel survey
 - Participants record their **daily movements**, **transport modes**, **trip purposes** and **duration**.
 - The data incorporates **demographic information** at individual and household levels.

- We derive neighbourhood and regional information from each individual’s **post-code**.

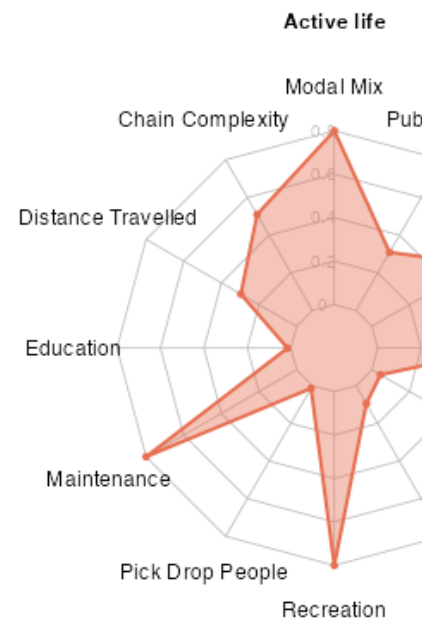
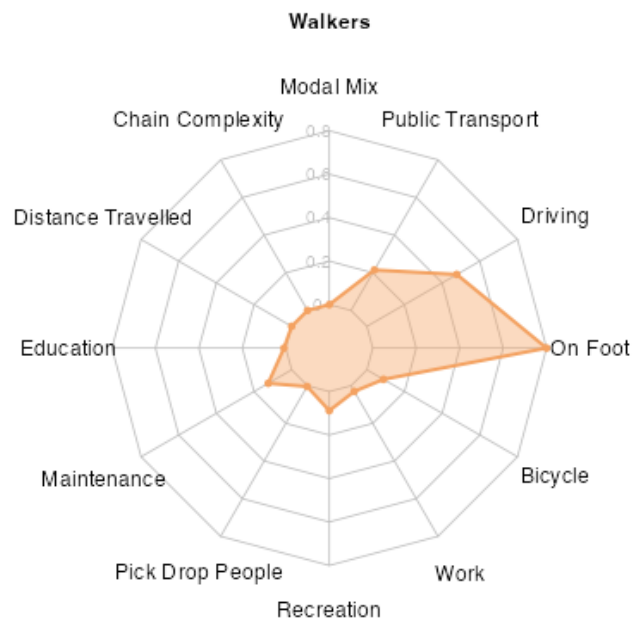
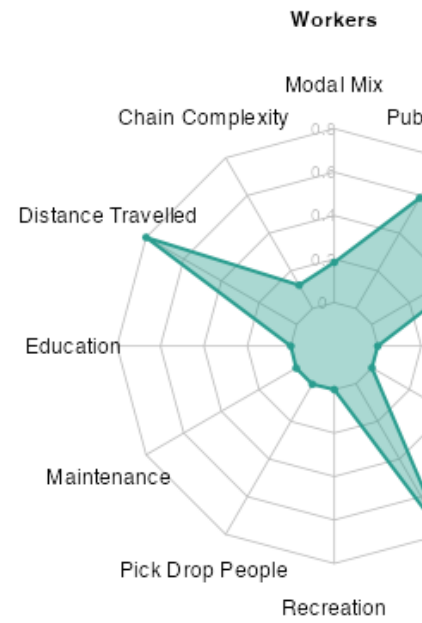
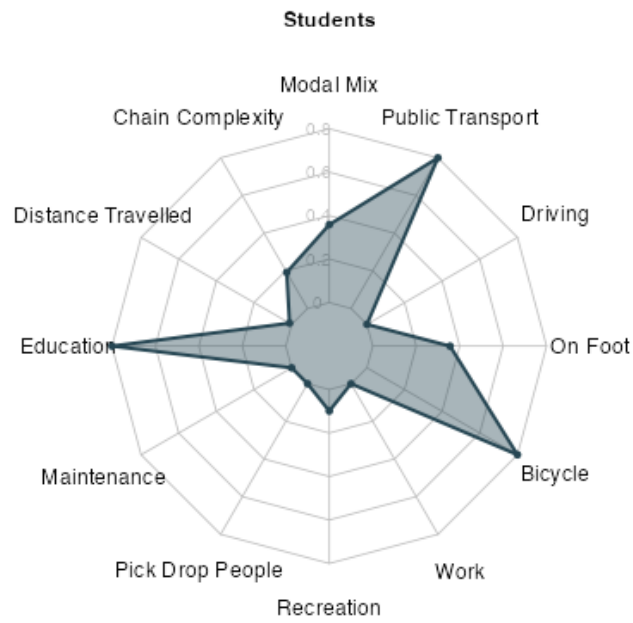
The data

Person ID	Trip code	Distance	Transport mode	Destination	Purpose	Activity duration	Age	Gender	Income level
1	T001	5 km	Bus	Office	Work	8 hours	35	Male	Medium
2	T002	10 km	Car	Mall	Shopping	2 hours	28	Female	High
3	T003	3 km	Walking	Park	Leisure	1 hour	22	Male	Low
4	T004	8 km	Bicycle	Gym	Exercise	1.5 hours	30	Female	Medium
4	T005	15 km	Train	Station	Commute	45 minutes	30	Female	Medium
5	T006	12 km	Car	Restaurant	Dinner	2 hours	27	Female	High
6	T007	2 km	Bus	School	Education	6 hours	18	Male	Low
7	T008	7 km	Walking	Supermarket	Groceries	30 minutes	55	Female	Medium

The clusters

- Using just mobility-related variables, we extract mobility-behaviour profiles.
- We employ a machine learning algorithm to group individuals based on how similar their behaviours are.
- We identify five clusters: Students, Workers, Work-life balance, Walkers, and Active life

The clusters

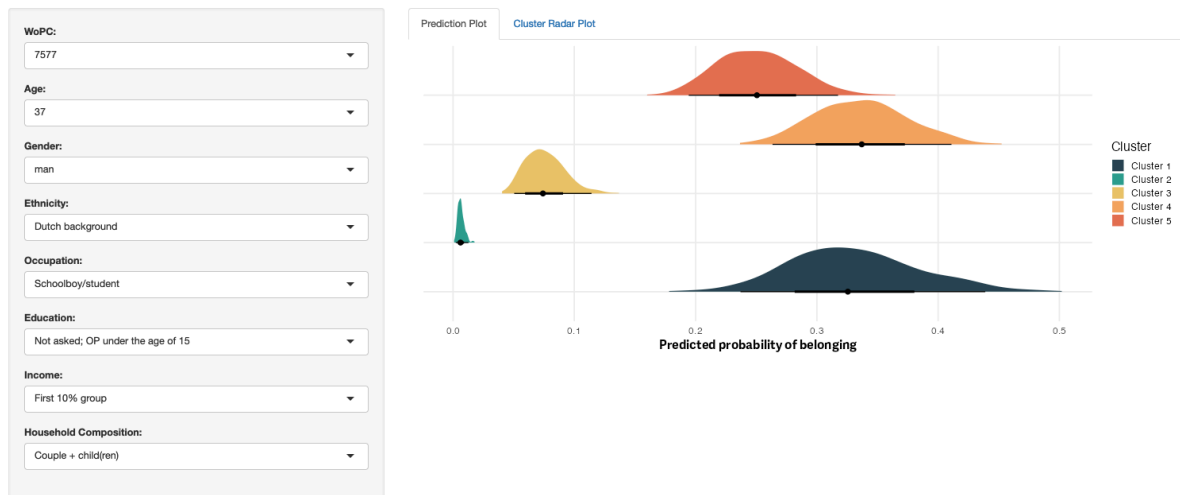


The model

- **Statistical model** to predict the probability of a person belonging to the different clusters.
- We consider **characteristics at four levels**: individual, household, neighbourhood, and regional.
- We provide a probability (with a confidence interval) of a person with XYZ characteristics **belonging to a specific cluster**.

The app

Model Prediction



Conclusions

- Our work employs travel survey data to generate mobility profiles and estimate behaviours based on four factors: individual, household, neighbourhood, and region.
- We estimate the likelihood of an individual with XYZ characteristics of belonging to a specific mobility profile.
- This study is fully reproducible in other contexts, given the availability of similar data.
- This study hopes to assist policy-makers with data-driven modelling derived from high spatial resolution mobility data.

Thank you

c.peiret-garcia2@newcastle.ac.uk