Clustering Analysis of Mobility Data

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Abstract. The abstract should briefly summarize the contents of the paper in 150–250 words.

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1 Introduction

2 Preprocessing

- max equal of 2038 for a strata
- max equal of 595 per persona in strata
- vector calc.

2.1 Vector

Instead of simple IDs for every person we expand the parsing by using a data encapsulating in a class called `Person`. This class stores the ID, the parameters defining a person , and all movements from that person.
Then we are able to compute the following vector, with 848 entries, for further usage, that combines all movements of the person:

$$\underbrace{\#o_1, \ldots, \#o_{413}, \#d_1, \ldots, \#d_{413}}_{2 \cdot 413}, \underbrace{AM, MD, PM, MN}_{4}, \underbrace{\#r_1, \ldots, \#r_7}_{7},$$
$$\underbrace{\#MoT_1, \ldots, \#MoT_7}_{7}, \underbrace{SDest, SDist, G, A, strata, strataGrouped}_{6}$$

with the following abbreviations ($1 \leq i \leq 413$, $1 \leq j \leq 7$):

o_i:	the i-th origin data point	MoT_j:	the j-th mean of transportation
d_i:	the i-th destination data point	$SDest$:	sum of all durations
AM:	movements at time stamp AM	$SDist$:	sum of all distances
MD:	movements at time stamp MD	G:	the gender
PM:	movements at time stamp PM	A:	the age
MN:	movements at time stamp MN	$strata$:	the strata (used for comparison)
r_j:	the j-th reason	$strataGrouped$:	the aggregated stratas

3 Predicting

3.1 Classification

3.2 Neural Net

Also we have a max. of 595 persons for strata 6 to have an equally distributed test set.
All using the vector data

We consider 3 neural nets $\mathcal{N}_1, \mathcal{N}_2$ and $\mathcal{N}_3$, all having 4 hidden layers, 50 epochs and 10 iterations. As an example of other strata aggregation we combine the stratas 1–2, 3–4 and 5–6 together and call them $\mathcal{N}_i^\star$, for $i \in \{5, 10, 20\}$. For that we take an equal distribution of all original stratas and map them correspondingly to the new stratas.

	#		Set size		
Name	Neurons	AG	100	200	595
$\mathcal{N}_5$	5	✗	60.03	59.92	60.18
$\mathcal{N}_5^\star$	5	✓	87.6	89.7	71.05
$\mathcal{N}_{10}$	10	✗	75.83	73.54	69.56
$\mathcal{N}_{10}^\star$	10	✓	92.93	93.48	74.58
$\mathcal{N}_{20}$	20	✗	75.45	71.14	61.87
$\mathcal{N}_{20}^\star$	20	✓	92.87	94.4	78.32

Fig. 1: The accuracy values of the neural nets. (See excel-spreadsheet)

If we take 50 neurons per layer we have $14 \cdot 50^4 \cdot 6 \approxeq 525.000.000$ synapses for which the input data set would be to small to have sufficient training.

The greater the population, the more the borders between the stratas blur.