Cartograflow
Filtering Origin-Destination matrices For Flow Mapping Purposes in R

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Abstract:
Mapping flows to depict spatial interactions patterns raises specific problems related to the complexity of the information and its graphical representation (the so-called *spaghetti effect*). These problems are relate to the analysis of both statistical and geographical data, for thematic cartography purposes. If they can be solved from different perspectives, solutions that can be provided are either theoretical, methodological or lies in the development of specific tools as Tobler said (Tobler, 1967, 1970) to implement proposals in a given technological context.

Considering the general interest in research issues related to the visualization of large graphs, particularly in interactive environments, one might think that the cartography of spatial interactions patterns have benefited from this context. Unfortunately, this prospect is illusory, except in a few cases. *Geoweb* applications dedicated to flows remain in the minority. The existing ones are limited to the direct display of flow dataset: they do not allow data processing that would enhance the figure. On the Geographic Information Systems side, despite efforts, the main software solutions, whether free or not, do not really help in the production of significant flow maps. There is also a recurring problem related to the management of the intrinsic complexity of relational data, which need at least filtered procedures before graphic representation. If issues regarding matrix filtering are carry out outside the mapping process, it is important to consider it to make an interesting map, i.e. useful for analysis in the social sciences and humanities. This is why we offer a new R/Rtudio package: {Cartograflow} by structuring and extending the appendices of Bahoken (2016).

The purpose of this communication is to present the implementation of {Cartograflow}, an R/Rstudio package dedicated to filtering Origin-Destination matrices for flow mapping purposes. It’s first main interest is to combine the

preparation of flow dataset and their spatial representation within the same package. The second main interest of {Cartograflow} is that the proposed filtering functions are specifically part of the corpus of quantitative analysis methods in geography. This is why they are particularly interested, for examples, in the concentration of information, as well as the role of the geographic space in terms of the spacing of places of origin and destination by the distance travelled by the flow (in terms of distance and neighborhood). Finally, it is to be part of an open and reproducible research approach (Peng, 2011), compatible with existing solutions - mainly {sp}, {sf} and {cartography} (Giraud, Lambert, 2016), while opening possibilities to data describing spatial interactions patterns.

Key-words: OD matrices, spatial interactions, flow map, reproducible cartography, R/RStudio, Cartograflow.

References:

– Bahoken, F. (2016), Annexe : Programme R/Rstudio annexés, in : *Contribution à la cartographie d'une matrice de flux*, Thèse en Géographie - Sciences des territoires,: URL : https://halshs.archives-ouvertes.fr/tel-01273776 (https://halshs.archives-ouvertes.fr/tel-01273776).
– Giraud, T., Lambert, N. (2016) Cartography: Create and integrate maps in your r workflow. JOSS, 1(4). doi:10.21105/joss.00054 (https://doi.org/10.21105/joss.00054)
– Peng, R. D. (2011), Reproducible research in computational science, *Science*, 334 (6060), 1226–1227.
– Tobler, W. R. (1967), Computer use in Geography, *Behavioral Sciences*, n°12, pp. 57-58.
– Tobler, W. R. (1970), Experiments in migration mapping by computer, *The American Cartographer*, vol. 14, n°2, pp. 155-163.

Web links:

CRAN: https://cran.r-project.org/web/packages/cartograflow/index.html (https://cran.r-project.org/web/packages/cartograflow/index.html)
Github: https://github.com/fbahoken/ECTQG2019 (https://github.com/fbahoken/ECTQG2019)

tags: ECTQG2019 Session "Spatial interaction" Abstract