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R workflow integration by example: studying daily mobility

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Introduction: Daily mobility and transport demand have always been described and forecast through the concept of trip, defined since early transportation studies [1] as the movement linking two activities. Over the last thirty years a growing number of studies have tried to change the perspective in order to better grasp daily mobility. Among these approaches one deserve a particular attention: the so called "activity based" approach. This approach, closely linked to Swedish time-geography, aims to comprehend daily mobility not as a juxtaposition of trips but as a chain of interdependent trips and activities [2].

Time-geographic and activity-based studies require the processing of a wide variety of objects (activities, individuals, spatial units) and the computing of a wide variety of measurements: spatial, temporal and ordinary (i.e. non spatial, non temporal). That is the reason why, until a few years ago, geographers needed to manipulate several software packages, one for each kind of information:

- Geographic Information System (GIS) such as ArcGIS or QGIS,
- Traditional statistical analysis software such as SAS or SPSS,
- Graph manipulation software such as Tulip or Gephi,
- Sequential analysis software such as Optimize or CHESA.

With the R software, combined with the growing number of specialized packages, it is now possible to manipulate all kinds of geographical and non geographical information into the same platform, and to produce nice graphical outputs without any post-production. **The poster aims to highlight this efficient workflow integration** by describing all the stages necessary to build a description and classification of mobility patterns.

Data and methods: The study focuses on daily mobility of Île-de-France (IdF) region's inhabitants. Two kinds of information sources are used: first, the IdF region municipalities base map, released by the regional urbanism and planning institute (IAU-IdF, Institut d'Aménagement et d'Urbanisme d'Île-de-France). It is a polygon shape file representing the 1300 municipalities of the region. Second, the 2002 global travel survey (EGT, Enquête Globale Transport), which is a classical household travel survey existing since the 1960s. It is a questionnaire face-to-face survey producing an information on the trips made by a sample of 22000 IdF inhabitants. It collects all the trips made the day before the interview.

Data are processed in two main ways to achieve a description and classification of mobility patterns: on the one hand, the municipalities base map is used to create an adjacency matrix

(with the `spdep` package), then a topological distance matrix (with the `igraph` package). This processing avoid absolute zonal classification (e.g. Paris, 1st crown, 2nd crown) in order to propose a relative classification peculiar to each individual: home, adjacent, nearby and faraway municipalities. On the other hand the table of trips produced by the EGT survey is processed in order to create sequences of trips and activities made during the day by sampled individuals. The created sequence object is then manipulated with the `TraMineR` package and used as a basis for description and classification of mobility patterns of individuals [3].

Finally, the whole exercise is an illustration of the possibilities offered by **R as a unique platform providing efficient workflow integration**. It makes possible the processing of all kinds of objects and it produces high quality graphic and cartographic representations, which is crucial for geographers.

References

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