

A Spatial Multinomial Case-Control Modeling Package

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Case control studies are one of the most important methodological contributions for efficiently population risk estimations in epidemiology¹. Spatial aspects of such studies have been supported by new geoprocessing tools, dissemination of digital maps and popularization of GPS devices. Concepts on spatial risk² and multinomial models theory³ were used for development of this R package, which is part of a theoretical project for interpretation on this kind of study.

Functions were developed in R (S4) language for modeling spatial case-control data and maps designing based on calculated risk and its significance limits of provided shape files using Kernel smoothers. These functions will compose a new R Package to be available on CRAN.

This work shows how these functions might be used, taking by example a case-control study realized in 2006-7 period. Work related accidents cases were classified in three levels (light, moderate and heavy/fatal), compared each other and against controls (no accident) obtained from a random sample in a 300,000 inhabitants city in Brazil. Maps of the spatial risk magnitude were made and its significant regions were calculated and showed on the maps.

The development of this package will bring the possibility of spatial case-control analysis, under multinomial distributions, where cases were classified in levels and automatic designing risk maps for each level in comparison to others.

References

- Cordeiro R (2005). The rare disease Myth. *Revista Brasileira de Epidemiologia*, 8:111-6.
- Bithell J (1990). An application of density estimation to geographical epidemiology. *Statistics in Medicine*, 9:691-701.
- Agresti A (2002). *Categorical data analysis*, 2nd ed, New York: John Wiley & Sons.