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Application of spatial point processes to the study of brain tumor localization

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Gliomas are the most common form of primary brain tumors. Diffuse Low-Grade Gliomas (DLGG) are slow growing tumors, and often asymptomatic during a long period. They turn into a higher grade, leading to the patients' death. Treatments are surgery, chemotherapy and radiotherapy, with the aim of controlling tumor evolution. Neuro-oncologists estimate the tumor size evolution by delineating tumor edges on successive MRIs. Localization of the tumor seams of great interest for both awake surgery and our attempt to characterize patterns of tumors having common features.

We considered a small local database of 161 patients, and extracted the coordinates of the tumor barycenter from the MRI at the time of diagnosis. Given the particular structure of the data (spatial data coupled with other more usual features), we intend to use the theory of Spatial Point Processes (SPP), to answer the question of randomness of barycenters, and the existence of an underlying spacial organization. We are using R packages for spatio-temporal point processes in dimension two and designing a method for using the 3-dimensionality of our data.

Type of presentation

Talk

Classification

Both methodology and application

Keywords

spatial point processes, gliomas

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