

TOWARDS A LESS AGGREGATE WAY OF ANALYZING SPATIO-TEMPORAL EYE MOVEMENT DATA

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Eye tracking is a method for recording the movement of the gaze and it is widely utilized in several fields of applications, especially in psychology. The popularity of this method is based on the fact that the eye movements are reflections of cognitive processes taking place in the brain and hence reveal information about those processes, e. g. how do we read or look advertisements. In most of the applications the statistical methods used for the analysis are based on strong aggregation, usually it is done by dividing the target space into to areas of interests. The problem is that aggregation loses information about the spatio-temporal nature of an eye movement process. Our aim is to take a step closer to a less aggregated way of summarizing and analyzing the data by using point process statistics.

Eye movements can be measured by electronic eye trackers which produce spatio-temporal data with high resolution. As an output we get an eye tracking data consisting of stops of the gaze, called fixations, and jumps between them, called saccades. Now we can think fixation location as a point in the plane and its duration as a mark for that point. Hence a set of fixations constitute a marked point pattern, or more specifically, an ordered marked point pattern. The family of point processes offers a range of statistical tools, which can be used for eye movement data analysis. However, we should keep in mind that the fixation pattern is rarely homogeneous in space.

In this talk we introduce a data related to arts: participants of the experiment were looking at pictures of paintings on a computer screen while their eye movements were recorded. The interesting question is, how people are looking at paintings. We approach this problem by using functional summary statistics, e. g. based on convex hull, which reveal interesting aspects about how the painting has been looked: first globally and then more locally?

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