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RECENT DEVELOPMENTS IN POINT PATTERN ANALYSIS

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A spatial point pattern is a set of data presented as a map of point locations, termed events, in an essentially planar region. The pattern is called multivariate if the events are of several distinguishable types. At the conference I discussed a bivariate example, due to Dr W.A. Aherne. This consisted of a thin section from a laboratory-induced metastasising lymphoma in the kidney of a hamster, in which the events were visible cell nuclei, each identified as "pyknotic" or "arrested in metaphase".

Modern approaches to point pattern analysis use a variety of empirical functions to summarise the observed pattern. Second-order methods examine the covariance structure of the pattern using a function which is very loosely analogous to the correlogram of a time-series. Nearest neighbour methods rely on the empirical distribution functions of distances from arbitrary points or events to neighbouring events in the pattern. These functions provide more sensitive analyses than were previously available and there has been a consequent change in emphasis from "tests of randomness" to the formulation and fitting of parametric stochastic models. Monte Carlo methods feature prominently in this inferential process, as even simple stochastic models for spatial point patterns lead to intractable distribution theory.

The following references provide an introduction to recent developments. Note in particular the books by Ripley (1981, especially chapter 8) and Diggle (1983).

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