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##
## spatstat 1.42-2       (nickname: 'Barking at Balloons')
## For an introduction to spatstat, type 'beginner'
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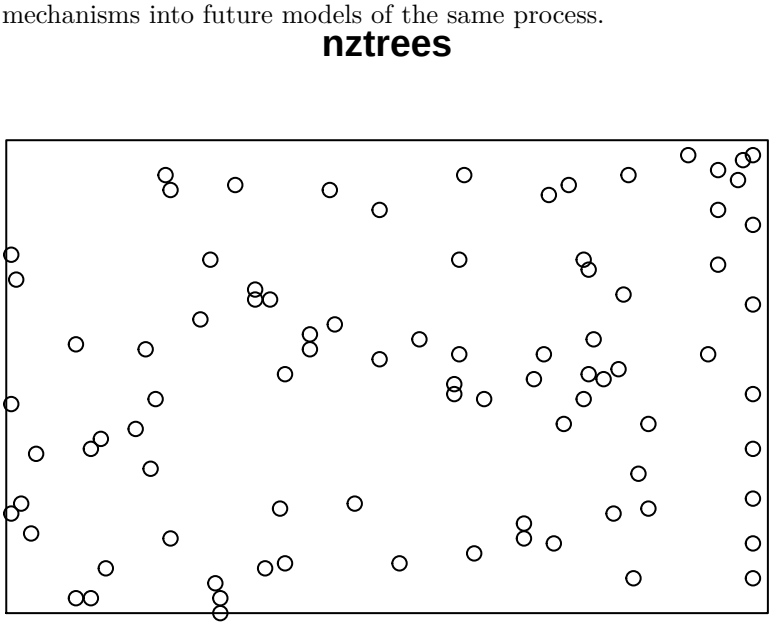
Introduction

Spatial point patterns, data in the form of a set of points on the plane, emerge frequently in practice. Their remarkable theorhetical properties permit a surprisingly unified study of data as seemingly disparate as the locations of stars in the sky, the dispersal of trees in a forest, and the occurences of crime in a neighborhood.

As a simple illustration, figure 1 presents the locations of trees in a New Zealand forest plot. Each point represents a tree and its location represents its position in an approximately 140 by 85 foot forest plot. These data were gathered from a complete sampling of the forest plot and do not contain additional information on the underlying features of the land quality, the type of treee, or the size of the tree. The uninformed statistician must proceed through inference solely based upon these events, their locations in the plot, and their locations relative to one another. This is actually a remarkably rich amount of information. Statistical models can detect clustering, regularity, variation in the underlying region, and event intensity. However, many methods rely on sampling that accounts for every event in an area. This form of sampling is often expensive, time-consuming, and error prone.

Cheaper, less time-consuming sampling methods exist. One in particular, T-square sampling, has a rich theorhetical literature which has found methods for detecting clustering and regularity. In this thesis, I hope to expand the, rather empty, corpus on an even simpler sampling scheme: k-trees sampling.

K-tree sampling schemes find the k-nearest events to points specified in a pre-determined array. Little research has been done to determine how clustering and regularity could be detected under such a sampling scheme. This derives from the inability to reliably compute point to point nearest neighors with incomplete sampling. I do not try and resolve this issue. Instead, I work with a number of datasets containing data collected through the 1-tree sampling of the same plant in a number of bogs. I assume both that there are two sources of clustering, event based and underlying region based, and that event based clustering is consistent from dataset to dataset, while underlying region clustering varies. We can then incorporate event based clustering mechanisms into future models of the same process.



The point pattern literature is rich with models dealing with clustering, regularity, and inhomgeneity.

Hopefully, you won't have much of a learning period to go through and you will reap the benefits of a nicely formatted thesis. The use of LaTeX in combination with *Markdown* is more consistent than the output of a word processor, much less prone to corruption or crashing, and the resulting file is smaller than a Word file. While you may have never had problems using Word in the past, your thesis is likely going to be about twice as large and complex as anything you've written before, taxing Word's capabilities. After working with *Markdown* and **R** together for a few weeks, we are confident this will be your reporting style of choice going forward.

Why use it? *R Markdown* creates a simple and straightforward way to interface with the beauty of LaTeX. Packages have been written in **R** to work directly with LaTeX to produce nicely formatting tables and paragraphs. In addition to creating a user friendly interface to LaTeX, *R Markdown* also allows you to read in your data, to analyze it and to visualize it using **R** functions, and also to provide the documentation and commentary on the results of your project. Further, it allows for **R** results to be passed inline to the commentary of your results. You'll see more on this later.

Who should use it? Anyone who needs to use data analysis, math, tables, a lot of figures, complex cross-references, or who just cares about the final appearance of their document should use *R Markdown*. Of particular use should be anyone in the sciences, but the user-friendly nature of *Markdown* and its ability to keep track of and easily include figures, automatically generate a table of contents, index, references, table of figures, etc. should make it of great benefit to nearly anyone writing a thesis project.