

BOOK REVIEW

Computing with spatial trajectories, edited by Yu Zheng, Xiaofang Zhou, Berlin, Springer, 2011, 1st ed., £84.99 (hardcover), 308 pp. ISBN-10: 1461416280; ISBN-13: 978-1461416289

A first glance at the title of this book might suggest it to be very specialised. Indeed this perhaps reflects my own expectations before opening it. However, once I start reading it I first realised that the topic in itself has a broad portfolio of applications. For example, the ideas used in this book allow the modelling of movements of people, vehicles or animals. These topics then lead to other application areas – for example, tracking people’s movements via mobile phone Global Positioning System (GPS) signals allows monitoring of census-based travel-to-work data or allows novel approaches to the estimation of daytime populations of cities to be carried out.

This book itself has a very clear structure – although at times the quality is marred by poor proofreading. Initially, it sets out to introduce the underlying theories and techniques used to process trajectory data – tackling issues such as thinning out GPS tracks in real time and filtering out noise in the tracks via Kalman filters and the more recent particle filter approaches (Lee and Krumm). These GPS tracks are essentially the trajectories mentioned in the title of this book. Having obtained, filtered and cleaned the trajectories, the second chapter in this book goes on to consider building spatial databases to store and retrieve the kind of information that the processes in the first chapter are likely to produce. These two chapters constitute part one of this book. For those not familiar, or possibly out of practice, with mathematical notation or spatial database theory, these may prove a steep hill to climb, but diligent reading will provide a sound basis for the rest of this book.

The remainder of this book, labelled as part two, goes on to consider more advanced issues stemming from the basic ideas. The first of these considers uncertainty. Of note is the way that this chapter is structured – beginning with a historical overview of logic and how it has handled the notion of uncertainty – and then linking to an overview of the way artificial intelligence and database researchers have addressed this – quite an ambitious approach. Following this is a chapter considering privacy of spatial trajectories. This is an important ethical issue – many applications of this technology, such as estimating daytime populations of cities for emergency planning, are beneficial when the data are in aggregate form, but risk intrusion on individual privacy if released in their finest detail. In some senses, census organisations face the same issue when distributing their data.

In fact, I would argue that these two chapters could easily be placed in section one, as both uncertainty and ethical considerations are both basic elements in a trajectory researchers toolkit – it is virtually impossible to imagine a real-world application in which these did not feature (at least if the subjects of the research were people). The next two chapters focus on data analysis techniques and, in particular, on the detection of patterns.

The final chapters focus on specific applications – tracks obtained from drivers and on the analysis of location-based social networks. The driving chapter provides some interesting examples of the use of the techniques set out earlier for this specific application and also some examples of data visualisation (a topic not allocated as a chapter in the basic section, perhaps a surprising omission). Similarly, the chapters on social networking (from the viewpoints of both location and user) demonstrate interesting ways in which the techniques outlined earlier in this book may be put into practice.

In summary, this book provides a good grounding in both the theory and the application surrounding the analysis of GPS tracks – although perhaps there are a small number of areas that might have made interesting further reading – for example, the visualisation of evolving space–time patterns or an application based on animal tracking. Possibly one notable omission was that although algorithms were discussed in detail, no example code was supplied. If this book is to be used as a springboard for research, then some open source code would be a good practical starting point to allow readers apply similar techniques to their own data.

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