

Book reviews

Advances in GIS Research II. Edited by M. J. KRAAK and M. MOLENAAR. (London: Taylor & Francis, 1997.) ISBN 0-7484-0591-7 [Pp. xvi + 968]. Price \$59.00 paperback.

This book is the edited proceedings of the Seventh International Symposium on Spatial Data Handling, held in Delft in August of 1996. My credentials to review it may be a little suspect, since I was a member of the conference steering committee and co-author of a paper presented at the meeting—I can only plead that since I was not able to attend the conference, the comments that follow may help others who similarly weren't there to appreciate the value of the proceedings as a substitute. In what follows I have singled out some of the more memorable papers, but it is impossible in the space of this review to give a comprehensive overview of what is undoubtedly a rich collection of new research.

When the SDH series began in 1984 they were the only meetings on spatial data handling and geographical information systems to attract an international audience. The organizers of the Zürich meeting in that year (and particularly Duane Marble and Kurt Brassel) took a great risk in sponsoring an international gathering, and were rewarded with an excellent response and an exciting and stimulating meeting. Seven meetings later, SDH remains the principal international forum for GIS research. Other series, notably the International Symposia on Spatial Databases (SSD) and the Conferences on Spatial Information Theory (COSIT) have emerged to serve more specialized interests, but SDH remains the focus for mainstream GIS research.

The book contains the two keynote papers (by François Salgé and Jonathan Raper) and 66 others. They appear in the order in which they were presented in the programme, and apart from a short preface, nothing else has been added—this is, essentially, a volume of proceedings, and the papers are organized much as they were at the conference itself.

That focus on GIS, and the sense that 'spatial data handling' encompasses the more technical aspects of the field, explains in broad terms the subject matter of the book. Representation is very important, particularly in recent efforts to extend the basic GIS data models to include time, described in six papers, including notable contributions from Donna Peuquet's group at Penn State and Chris Jones's group at Glamorgan. Representation of terrain remains a persistent problem, notably in questions about accuracy, the relative advantages of different representations (including the importance of data volume, represented by a paper on lossy compression by Randolph Franklin and Amir Said), and the ability to generate properties such as slope and hydrology from raw digital elevation models (including a comprehensive paper on drainage extraction from TINs by Sidi Yu, Marc van Kreveld, and Jack Snoeyink). Comparatively new paradigms for representation are reflected in papers on object orientation, qualitative spatial reasoning, and topology. The physical design of spatial databases remains an issue, as does the effective indexing of its contents for high performance (with notable contributions from Peter van Oosterom and Tom Vrijbrief, and a novel tree from Weiping Yang and Chris Gold).

Several papers present new algorithms. The problem of matching between data sets is of increasing importance now that multiple digital representations of the same geographical phenomena are increasingly common. Sometimes the emphasis is on conflation, or the combination of information from different sources. In other cases it is on search, in the form of algorithms designed to identify similarities in disparate data sets. Methods of regionalization, or grouping of basic spatial units into aggregates, remain a strongly motivated area for GIS research, with applications in the design of political districts, sales territories, or school districts (a comprehensive review of new methods from Stan Openshaw's groups at Leeds and Newcastle-upon-Tyne is included). Methods of analysis on networks continue to be one of the more fruitful research areas, also perhaps explained by strong applications. Three papers in the collection address spatial decision support systems, often considered to be the eventual objective of much GIS application.

Generalization is clearly an unsolved problem in spatial data handling. No less than nine papers address the issue in various ways, ranging from basic research on line generalization

(including a new typology from Rob Weibel) and surface representation (a novel approach to variable-scale TINs from Gunnar Misund) to designs for hierarchical and multiscale databases. Clearly we have not solved the generalization problem, and the ability to build and sustain truly multi-scale representations of the world remains a largely elusive goal, despite the abundance of excellent research on the topic. Although remote sensing specialists have a long tradition of implementing algorithms for aggregation and scale change, the equivalent in the vector domain is clearly far more complex and problematic.

The problem of uncertainty is related to generalization, since one way of defining the uncertainty of a spatial database is through the information that is not present—in other words, the information that is lost through generalization. Six papers in the collection address various aspects of uncertainty, and its related issues of data quality and accuracy. They run the full gamut from papers on the measurement and characterization of quality, to models of its propagation and visualization. Other papers address more general aspects of visualization, and the strongly related area of user interface design (including a discussion of the WallBoard approach from Max Egenhofer's group at Maine).

The overwhelming majority of the 68 papers in the collection thus present an effective cross-section of the best technical research in spatial data handling circa 1996. As in previous SDH collections, however, it is the two keynotes that stand out, and buck the general trend. François Salgé, in the first, which also opens the collection, looks at the entire series of SDH proceedings from the perspective of a national mapping agency, and adds a practical and strategic context to the collection that is otherwise largely missing. While the needs of national civilian and military mapping do much to drive research in spatial data handling, the context they provide is notably absent from almost every other paper in the collection. Although much has been written about the relative importance of the social, economic, and institutional issues that provide the context of technical GIS research, this collection follows the pattern established by the previous ones of confining attention to these issues largely to the keynotes. SDH is clearly not seen as the appropriate venue for reporting progress in these areas.

In the closing keynote, Jonathan Raper similarly departs from the overwhelmingly technical focus of the collection, but in a very different direction. While the more technical issues of representation are addressed in many papers, only this closing keynote opens the problem of representation fully, by asking important underlying questions about the nature of space itself, and the role of representations in the broader context of GIS and geography. While we can deplore the absence of time in many GIS data models, and devise technical solutions, we must also be aware of the broad philosophical context of time, and of the social implications of static data structures. Again, it is notable that these issues appear only in the keynote. Will future SDH conferences give them greater attention, or will a new conference series emerge to fill the gap?

So in summary, you will want to think about buying this book if you missed the conference, and if your interests lie in the outstanding technical research problems of spatial data handling and GIS, and recent progress in solving them. This is an excellent compendium, presented with high professional quality, with papers selected from a much larger set of submissions by a thorough process of peer review.

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GIS and Environmental Modeling: Progress and Research Issues. Edited by M. F. GOODCHILD, L. T. STEVAERT, B. O. PARKS, C. JOHNSTON, D. MAIDMENT and S. GLENDINNING (Fort Collins: GIS World Books, 1996) ISBN: 1-882610-11-3 [Pp. 486]. Price \$55.00.

If one judged the current state of geography on the recent British and Australian Association meetings one could be forgiven for asking what had happened to society's concerns about the global environment, population growth and climate change. Surely these major topics were things geographers are concerned about? Everyone else is, why not the intellectual descendants of Humbolt, von Richthofen and Griffith-Taylor? I suspect the answer is that they were at another meeting altogether. This volume, *GIS and Environmental Modeling*, is a compilation