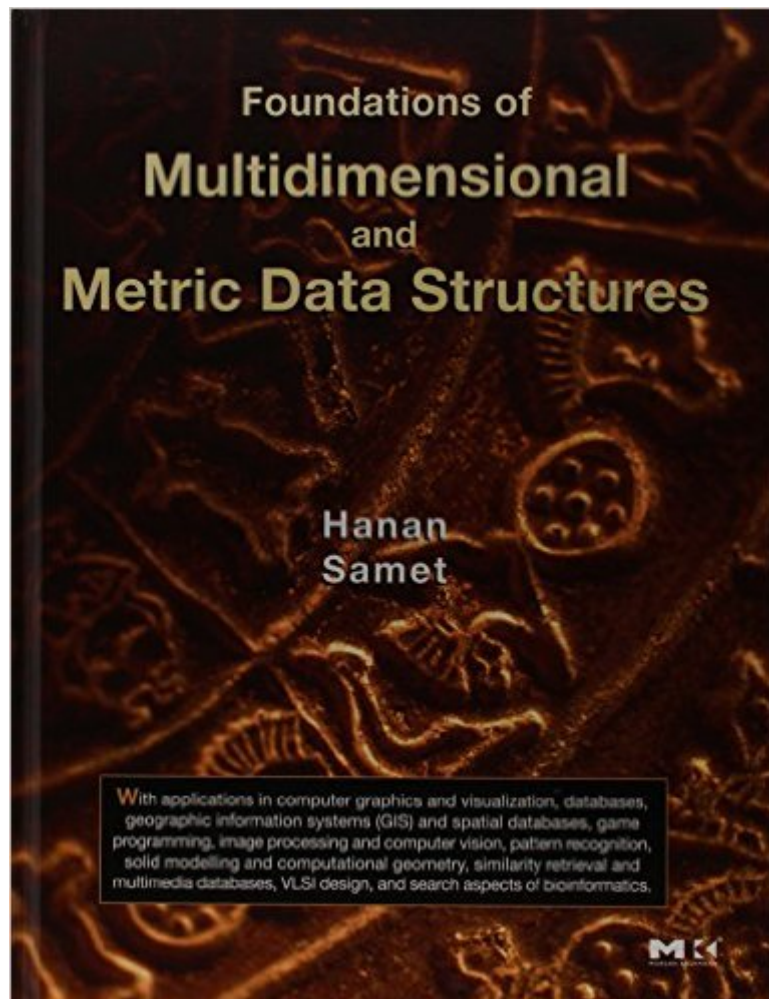# Foundations Of Multidimensional And Metric Data Structures (The Morgan Kaufmann Series In Computer Graphics)

Foundations of

Multidimensional
and
Metric Data Structures

Hanan
Samet

With applications in computer graphics and visualization, databases, geographic information systems (GIS) and spatial databases, game programming, image processing and computer vision, pattern recognition, solid modelling and computational geometry, similarity retrieval and multimedia databases, VLSI design, and search aspects of bioinformatics.

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Synopsis

The field of multidimensional data structures is large and growing very quickly. Here, for the first time, is a thorough treatment of multidimensional point data, object and image-based representations, intervals and small rectangles, and high-dimensional datasets. The book includes a thorough introduction; a comprehensive survey to spatial and multidimensional data structures and algorithms; and implementation details for the most useful data structures. Along with the hundreds of worked exercises and hundreds of illustrations, the result is an excellent and valuable reference tool for professionals in many areas, including computer graphics, databases, geographic information systems (GIS), game programming, image processing, pattern recognition, solid modeling, similarity retrieval, and VLSI design. Award Winner in 2006 â œBest Book” competition in Professional and Scholarly Publishing from the Association of American Publishers. Morgan Kaufmann would like to congratulate Hanan Samet on receiving the UCGIS 2009 Research Award! Read the announcement here: http://www.ucgis.org/summer2009/researchaward.htm * First comprehensive work on multidimensional data structures available, a thorough and authoritative treatment. * An algorithmic rather than mathematical approach, with a liberal use of examples that allows the readers to easily see the possible implementation and use. * Each section includes a large number of exercises and solutions to self-test and confirm the reader's understanding and suggest future directions. * Written by a well-known authority in the area of spatial data structures who has made many significant contributions to the field.The author's website includes: Spatial Index Demos

Book Information

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Customer Reviews

A stunning 1000 page encyclopedia of spatial, multidimensional, and metric data structures and algorithms presented in the Knuth tradition. The general coverage is broader than an older, now out of print and expensive: "Design and Analysis of Spatial Data Structures". In a surprise, the new book is not only the size of a telephone directory, but it has double the number of useful pages. 4 extensive chapters cover data structures and algorithms for: points, objects and images, intervals and small rectangles, and the same data types in higher +dimensions. Within each chapter, the algorithms and clearly presented and are accompanied by an extensive use of figures. The algorithms which run from the expected to the exotic are summarized by the table of contents at the publisher's web site. Unexpected algorithms are also covered including: nearest neighbor finding which is useful for clustering applications, image pyramids, and object pyramids or hierarchies such as R-trees.The book has a textbook flavor with exercises at the end of each section where specifics are left for the student; however, solutions and pseudo-code for many of the exercises are in a 300+ page appendix maintaining the book as a useful reference. This book is comprehensive, inexpensive, and in my mind - a must have.

The most complete book on the subject to date. In addition, to the huge amount of information covered, it also contains a thorough bibliography with over 2000 entries. The author uses an algorithmic approach with plenty of pseudo-code without resorting to complicated mathematical formulae. Clear explanations are given with more than 450 figures illustrating the ideas. The result is a wonderful place to explore spatial, multidimensional, and metric data structures on one's own or as part of a class. It has more than 1200 exercises that test the readers' understanding of the covered material, while many also develop the material in the text further. Solutions are provided to most of the exercises and also contain detailed pseudo code for many of the representations. The book is easily accessible to a wide range of readers who need not be programmers or computer scientists. Sample pages for the opening discussion in each of the book's four chapters are available at the publisher's web site.This book goes far beyond Hanan Samet's previous books containing completely new material such as a thorough discussion of image- and object-based representations, as well as an entire chapter on high-dimensional and metric data representations which together comprise almost two-thirds of the book. In addition, the new book expands

considerably the discussion of point data in his out of print book titled "The Design and Analysis of Spatial Data Structures," which though still contains some material that is not in the new book. The new book has no overlap with his other out of print book titled "Applications of Spatial Data Structures: Computer Graphics, Image Processing and GIS".To summarize, this is another wonderful book from the most respected authority in the field. From novice to expert, everyone can learn something from this true masterpiece.

Hanan Samet, the world-reknown authority on multi-dimensional data, has written a comprehensive and stunningly beautiful book. The illustrations that appear in the margins of almost every page serve to wonderfully augment the text and convey the essence of the topic under discussion. If you enjoy the clarity and broad coverage of Knuth's classics, or the elegance and wonder of Tufte's monographs, you will love this book.Samet has distilled a lifetime of work understanding the algorithms of others and inventing major new algorithms and data structures into this very readable survey. The annotated bibliography and multiple indexes are amazing accomplishments in their own right. The book is very reasonably priced, making it accessible. This delightful book deserves to be on the bookshelf of every computer science scholar and programmer. X. Hao is right: this is truly a masterpiece.

The best possible scenario for a reader buying a tech book is to have1) a single author, rather than an "editor" so the conceptual presentation and perspective of the product is consistent throughout2) an author that knows the field inside out and can speak and think about it naturally with no hint in the presentation that he or she has hit upon a topic they're shaky with, and needs to resort to "high concept hand waving" to skate over the subject.3) an author whose command of language is first rate - precise without being pedantic, and whose tone and level of exposition remains consistent throughout.4) an author who spares himself nothing in terms of effort, cuts no corners and leaves nothing out for the student to "fill in" when explaining difficult concepts.In this book, you get all that and more.It's an encyclopedia of multi-d DS, written by a top researcher in the field, and addresses the subject matter at every level, from the panoramic to the implementation details. This book is on par with Jim Gray's near-perfect Transaction Processing.If you think you don't need to know the subject matter in this book, you might want to think again. If you're developing anything that needs to find, index or classify information of any sort, graphic, text or otherwise and you're developing the basic technology, then this book is going to pay you the following dividends:-save you time by getting you firmly grounded in the field,-confirm and elevate your existing approach,-make you

aware of approaches, concepts and results that you just can't live in ignorance of and succeed.

I found this to be a very well-written and complete text, with good explanations and useful references. I found it a good almanac for anything on spatial data structures, and it really gives an in-depth understanding of every topic.

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