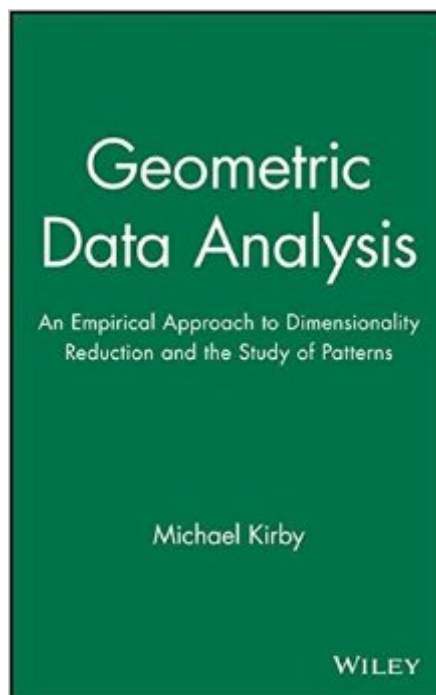


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# Geometric Data Analysis: An Empirical Approach To Dimensionality Reduction And The Study Of Patterns



## Synopsis

This book addresses the most efficient methods of pattern analysis using wavelet decomposition. Readers will learn to analyze data in order to emphasize the differences between closely related patterns and then categorize them in a way that is useful to system users.

## Book Information

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## Customer Reviews

Yes! This book explains the cutting edge techniques. I took this course (it is a graduate level book) at Colorado State from the author, and I think that this book is unique in many aspects. It organizes a very broad array of topics under the unifying theme of "dimensionality reduction", or the finding of patterns in data. This is why the book is unique- there are many books out there on linear algebra, many books on neural networks, wavelets, Fourier analysis, computational geometry (Kohonen's Map, LBG clustering, etc.). What is NOT out there is a book that shows the interconnections between all of these topics. This book does that. Look over the table of contents and you'll see what I mean. Furthermore, the book is unique in its perspective- explaining the topics by the mathematical underpinnings- not from a statistical perspective (like Chris Bishop's neural nets book), or from a signals processing point of view (like Simon Haykin's filtering book). Finally, the projects and problems that are discussed are really nice- For example, "The Rogues Gallery" is a face recognition problem (aka "Eigenfaces"); the techniques described are the ones in actual practice. And can a computer read lips? That's described here as well. Can you obtain equations of motion from data? Described here, too. The book is not only theoretical, there are many, many algorithms

listed that are explained clearly and are ready-for-implementation. If you are a mathematician, engineer, computer scientist, statistician, or just interested in pattern detection, this book is a must-have.

As a former student of Professor Kirby, I can attest to his dedication to the lucid communication of mathematical concepts while lecturing, and this dedication is also very apparent in his writing. When I took Dr. Kirby's course "Pattern Analysis for Mathematical Scientists" in 1994, we were using an early version of the notes upon which this book is based, and the subsequent continuous refinement (he teaches this course every year) has produced a text that is concise, yet thorough and very readable. This book offers a good blend of the rigorous presentation of the underlying mathematical concepts and the straightforward development of the data analysis/reduction methods. A key feature is the application of the methods to interesting "real world" problems, complimented nicely by pertinent and stimulating problem sets and computational projects. I can without hesitation recommend this book to anyone teaching a course on the mathematical analysis of large data sets, as well as for self-study. This is applied mathematics at its finest!

As an artificial intelligence researcher, I cannot begin to describe the numerous gems in this text. Not only is this an extremely useful "how-to" manual complete with algorithms and examples, but the theoretical treatment is precise, thorough and yet concise. One of the text's biggest draws is its atypical approach to so many commonly used techniques such as neural nets, basic and cutting edge linear algebra, wavelets, etc. The unique perspective has illuminated my intuitive understanding of the operation of these and other techniques. This graduate level text is a bargain addition to the shelf of any mathematician or computer scientist.

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