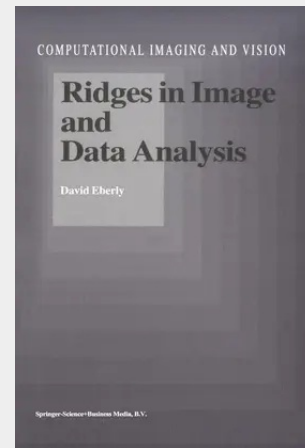


Ridges in Image and Data Analysis

The concept of ridges has appeared numerous times in the image processing literature. Sometimes the term is used in an intuitive sense. Other times a concrete definition is provided. In almost all cases the concept is used for very specific applications. When analyzing images or data sets, it is very natural for a scientist to measure critical behavior by considering maxima or minima of the data. These critical points are relatively easy to compute. Numerical packages always provide support for root finding or optimization, whether it be through bisection, Newton's method, conjugate gradient method, or other standard methods. It has not been natural for scientists to consider critical behavior in a higher-order sense. The concept of ridge as a manifold of critical points is a natural extension of the concept of local maximum as an isolated critical point. However, almost no attention has been given to formalizing the concept. There is a need for a formal development. There is a need for understanding the computation issues that arise in the implementations. The purpose of this book is to address both needs by providing a formal mathematical foundation and a computational framework for ridges. The intended audience for this book includes anyone interested in exploring the usefulness of ridges in data analysis.

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