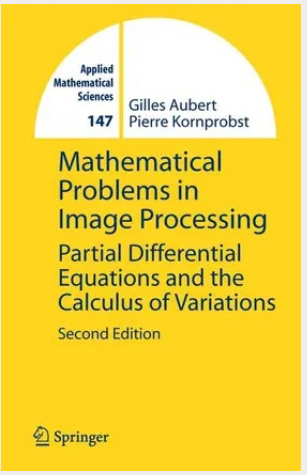
Aubert / Kornprobst

Mathematical Problems in Image Processing

Partial Differential Equations and the Calculus of Variations



Partial differential equations (PDEs) and variational methods were introduced into image processing about fifteen years ago. Since then, intensive research has been carried out. The goals of this book are to present a variety of image analysis applications, the precise mathematics involved and how to discretize them.

Thus, this book is intended for two audiences. The first is the mathematical community by showing the contribution of mathematics to this domain. It is also the occasion to highlight some unsolved theoretical questions. The second is the computer vision community by presenting a clear, self-contained and global overview of the mathematics involved in image procesing problems. This work will serve as a useful source of reference and inspiration for fellow researchers in Applied Mathematics and Computer Vision, as well as being a basis for advanced courses within these fields.

During the four years since the publication of the first edition, there has been substantial progress in the range of image processing applications covered by the PDE framework. The main goals of the second edition are to update the first edition by giving a coherent account of some of the recent challenging applications, and to update the existing material. In addition, this book provides the reader with the opportunity to make his own simulations with a minimal effort. To this end, programming tools are made available, which will allow the reader to implement and test easily some classical approaches.

In its updated 2nd edition, this book presents a variety of image analysis applications, reviews their precise mathematics and shows how to discretize them. The book is intended for two audiences. First, the mathematical community, showing the contribution of mathematics to this domain, and highlighting some unsolved theoretical questions. The second is the computer vision community, presenting a clear, self-contained and global overview of the mathematics involved in image procesing problems. This work will serve as a source of reference and inspiration for researchers in Applied Mathematics and Computer Vision, as well as being a basis for advanced courses within these fields. The second edition offers a coherent review of progress in the range of image processing applications covered by the PDE framework, and updates the existing material. In addition, the book provides readers with the programming tools to create simulations of their own with minimal effort.

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