

Preface

Because of recent advances of hyperspectral imaging technology with hundreds of spectral bands being used for data acquisition, how to handle enormous data volumes using effective and efficient means is an important issue. This book is the result of my recent research work on design and development of algorithms for real-time processing of hyperspectral imagery. Its main theme is primarily focused on real-time processing, which has received considerable interest in recent years. In particular, it introduces a new concept, to be called Progressive HyperSpectral Imaging (PHSI), which has never been explored before. More specifically, it considers sample-wise PHSI which processes hyperspectral data sample by sample in a progressive manner with full bands of each data sample vector being processed. With PHSI, various operating forms of processing data can be interpreted under this umbrella—for example, on-board processing, on-line processing, sequential processing, iterative processing, causal processing, real-time processing, etc.

This book addresses applications of real-time PHSI to passive target detection where endmember finding and anomaly detection are of major interest. It can be considered as a new addition to my other two books, *Hyperspectral imaging* (Chang 2003) and *Hyperspectral data processing* (Chang 2013) as well as a new forthcoming book on *Recursive hyperspectral sample and band processing* (Chang 2016). It supplements material not covered in these books. It can therefore be best utilized in conjunction with these three books to give a better and more comprehensive treatment of hyperspectral imaging. However, to make individual chapters as self-contained as possible, some narratives in each chapter may be repeated over again. Image data sets used for experiments will also be reiterated in each chapter. I believe that this helps readers save time and avoids the need for them to refer back and forth between chapters. However, those who are already familiar with these descriptions and image data sets can skip these parts and go directly to where they wish to read.

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