Bogdan Dumitrescu, Paul Irofti

Dictionary Learning Algorithms and Applications

- **Presents all relevant dictionary learning algorithms - for the standard problem and its main variations - in detail and ready for implementation**
- **Covers all dictionary structures that are meaningful in applications**
- **Examines the numerical properties of the algorithms and shows how to choose the appropriate dictionary learning algorithm**

This book covers all the relevant dictionary learning algorithms, presenting them in full detail and showing their distinct characteristics while also revealing the similarities. It gives implementation tricks that are often ignored but that are crucial for a successful program. Besides MOD, K-SVD, and other standard algorithms, it provides the significant dictionary learning problem variations, such as regularization, incoherence enforcing, finding an economical size, or learning adapted to specific problems like classification. Several types of dictionary structures are treated, including shift invariant; orthogonal blocks or factored dictionaries; and separable dictionaries for multidimensional signals. Nonlinear extensions such as kernel dictionary learning can also be found in the book. The discussion of all these dictionary types and algorithms is enriched with a thorough numerical comparison on several classic problems, thus showing the strengths and weaknesses of each algorithm. A few selected applications, related to classification, denoising and compression, complete the view on the capabilities of the presented dictionary learning algorithms. The book isaccompanied by code for all algorithms and for reproducing most tables and figures.

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