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## Case-Based Reasoning on Images and Signals

This book is the first edited book that deals with the special topic of signals and images within Case-Based Reasoning (CBR). Signal-interpreting systems are becoming increasingly popular in medical, industrial, ecological, biotechnological and many other applications. Existing statistical and knowledge-based techniques lack robustness, accuracy and flexibility. New strategies are needed that can adapt to changing environmental conditions, signal variation, user needs and process requirements. Introducing CBR strategies into signal-interpreting systems can satisfy these requirements. CBR can be used to control the signal-processing process in all phases of a signal-interpreting system to derive information of the highest possible quality. Beyond this CBR offers different learning capabilities, for all phases of a signal-interpreting system, that satisfy different needs during the development process of a signal-interpreting system. The structure of the book is divided into a theoretical part and into an application-oriented part. Scientists and computer science experts from industry, medicine and biotechnology who like to work on the special topics of CBR for signals and images will find this work useful. Although case-based reasoning is often not a standard lecture at universities we hope we also inspire PhD students to deal with this topic.

**Contents:** Theory.- Introduction to Case-Based Reasoning.- Similarity.- Learning Distance Functions for Supervised Similarity Assessment.- Induction of similarity measures for case based reasoning through separable data transformations.- Graph Matching.- Memory Structures and Organization in Case-Based Reasoning.- Learning a Statistical Model for Performance Prediction in Case-Based Reasoning.- Applications.- A CBP agent for monitoring the ocean CO<sub>2</sub> exchange rate.- Classification and Identification of Significant Information in Sensor Signals in Medical Applications.- Prototypes and Case-Based Reasoning for Medical Applications.- Case-based Reasoning for Image Segmentation by Watershed Transformation.- Similarity-based Retrieval and Indexing in the Biomedical Context.- Medical Imagery in Case-Based Reasoning.- Instance-Based Relevance Feedback in Image Retrieval Using Dissimilarity Spaces.

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