Computational Auditory Scene Analysis: Principles, Algorithms, and Applications

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How can we engineer systems capable of "cocktail party" listening?

Human listeners are able to perceptually segregate one sound source from an acoustic mixture, such as a single voice from a mixture of other voices and music at a busy cocktail party. How can we engineer "machine listening" systems that achieve this perceptual feat?

Albert Bregman's book Auditory Scene Analysis, published in 1990, drew an analogy between the perception of auditory scenes and visual scenes, and described a coherent framework for understanding the perceptual organization of sound. His account has stimulated much interest in computational studies of hearing. Such studies are motivated in part by the demand for practical sound separation systems, which have many applications including noise-robust automatic speech recognition, hearing prostheses, and automatic music transcription. This emerging field has become known as computational auditory scene analysis (CASA).

Computational Auditory Scene Analysis: Principles, Algorithms, and Applications provides a comprehensive and coherent account of the state of the art in CASA, in terms of the underlying principles, the algorithms and system architectures that are employed, and the potential applications of this exciting new technology. With a Foreword by Bregman, its chapters are written by leading researchers and cover a wide range of topics including: Estimation of multiple fundamental frequencies Feature-based and model-based approaches to CASA Sound separation based on spatial location Processing for reverberant environments Segregation of speech and musical signals Automatic speech recognition in noisy environments Neural and perceptual modeling of auditory organization

The text is written at a level that will be accessible to graduate students and researchers from related science and engineering disciplines. The extensive bibliography accompanying each chapter will also make this book a valuable reference source. A web site accompanying the text, http: //www.casabook.org, features software tools and sound demonstrations.

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