Speech Enhancement: Theory and Practice, Second Edition
Philipos C. Loizou
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Philipos Loizou's second edition of his Speech Enhancement book is indispensable for anyone trying to further his or her understanding in the field of digital speech processing. This book is critical in helping the professional address the growing demand to design algorithms that can improve speech intelligibility, in the presence of noise, without sacrificing quality for hearing aids and cochlear implants and address the equally important growing need to design rooms in which we can hear better naturally.

Loizou's clarity of presentation of the mathematical foundation of different algorithms for speech enhancement has a comprehensibility that can only come with the level of expertise possessed by Loizou and serves well for all professionals from acoustical engineers to audiologists. This book provides an exceptional foundation and insight into past, present and future innovative processing techniques. This book is valuable for students and professionals of all experience levels. Loizou was an innovator in speech enhancement and noise reduction in cochlear implants. The insights into the strengths, weaknesses and implementations of each algorithm could only come from someone who pioneered the field and had first-hand knowledge of the algorithms in real world applications.

This book includes objective and subjective methods used to process and evaluate speech quality and intelligibility. Additionally, the text is supplemented with examples and figures designed to help readers understand the theory and its application. To further facilitate comprehending the subject matter, the book also contains a CD that not only provides MATLAB® code for the implementation of intelligibility measures, but also has a speech and noise databases. These databases provide the community of users a standard by which to compare and understand the algorithms. Understanding the intricacies of what enhances speech and reduces noise also helps those engineering acoustically improved classrooms, hospitals, auditoriums and all rooms where audibility of speech is critical.

The second edition is organized into four parts. The table of contents lists the subject content in a well-defined manner for ease of use. The book begins with a review of the fundamentals of digital signal processing, speech production and perception, and the characteristics of various noise sources needed to understand and design speech enhancement algorithms. Part II describes all major enhancement algorithms, inclusive of subspace algorithms that incorporate psychoacoustic models. Since signal processing requires an understanding and estimate of the noise spectrum, this part also covers noise and noise estimation algorithms. Part III of the book examines the methods and measures used to assess the algorithm performance, in terms of speech quality and intelligibility. Part IV presents future steps to incorporate into algorithms for improving speech intelligibility. It suggests insightful actions that can be taken to realize the full potential of these algorithms under realistic conditions, including multiple and competing talkers in noise.

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