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Linear Prediction; 4.2 Linear Prediction Analysis of Nonstationary Signals; 4.3 Examples of Linear Prediction Analysis of Speech; 4.4 The Levinson-Durbin Algorithm; 4.5 The Leroux-Gueguen Algorithm; 4.6 Long-Term Linear Prediction; 4.7 Synthesis Filters; 4.8 Practical Implementation; 4.9 Moving Average Prediction; 4.10 Summary and References; Exercises; 5 SCALAR QUANTIZATION; 5.1 Introduction; 5.2 Uniform Quantizer; 5.3 Optimal Quantizer; 5.4 Quantizer Design Algorithms; 5.5 Algorithmic Implementation; 5.6 Summary and References; Exercises; 6 PULSE CODE MODULATION AND ITS VARIANTS; 6.1 Uniform Quantization; 6.2 Nonuniform Quantization; 6.3 Differential Pulse Code Modulation; 6.4 Adaptive Schemes; 6.5 Summary and References; Exercises; 7 VECTOR QUANTIZATION; 7.1 Introduction; 7.2 Optimal Quantizer; 7.3 Quantizer Design Algorithms; 7.4 Multistage VQ; 7.5 Predictive VQ; 7.6 Other Structured Schemes; 7.7 Summary and References; Exercises; 8 SCALAR QUANTIZATION OF LINEAR PREDICTION COEFFICIENT; 8.1 Spectral Distortion; 8.2 Quantization Based on Reflection Coefficient and Log Area Ratio; 8.3 Line Spectral Frequency; 8.4 Quantization Based on Line Spectral Frequency; 8.5 Interpolation of LPC; 8.6 Summary and References; Exercises; 9 LINEAR PREDICTION CODING; 9.1 Speech Production Model; 9.2 Structure of the Algorithm; 9.3 Voicing Detector; 9.4 The FS1015 LPC Coder; 9.5 Limitations of the LPC Model; 9.6 Summary and References; Exercises; 10 REGULAR-PULSE EXCITATION CODERS; 10.1 Multipulse Excitation Model; 10.2 Regular-Pulse-Excited-Long-Term Prediction; 10.3 Summary and References; Exercises; 11 CODE-EXCITED LINEAR PREDICTION; 11.1 The CELP Speech Production Model; 11.2 The Principle of Analysis-by-Synthesis; 11.3 Encoding and Decoding; 11.4 Excitation Codebook Search; 11.5 Postfilter; 11.6 Summary and References; Exercises; 12 THE FEDERAL STANDARD VERSION OF CELP; 12.1 Improving the Long-Term Predictor; 12.2 The Concept of the Adaptive Codebook; 12.3 Incorporation of the Adaptive Codebook to the CELP Framework; 12.4 Stochastic Codebook Structure; 12.5 Adaptive Codebook Search; 12.6 Stochastic Codebook Search; 12.7 Encoder and Decoder; 12.8 Summary and References; Exercises; 13 VECTOR SUM EXCITED LINEAR PREDICTION

Sommario/riassunto

Speech coding is a highly mature branch of signal processing deployed in products such as cellular phones, communication devices, and more recently, voice over internet protocol. This book collects many of the techniques used in speech coding and presents them in an accessible fashion. Emphasizes the foundation and evolution of standardized speech coders, covering standards from 1984 to the present. The theory behind the applications is thoroughly analyzed and proved.