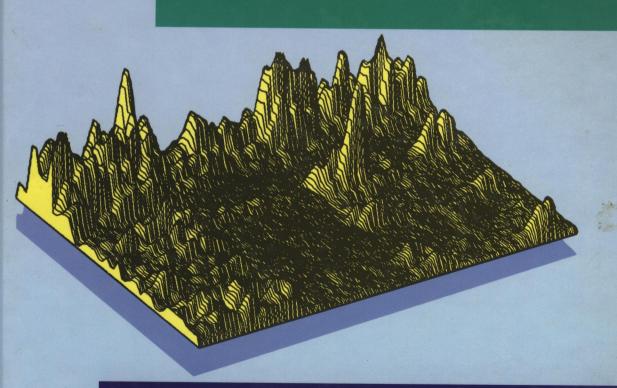


**VISUAL** 

REPRESENTATIONS

**OF SPEECH** 

**SIGNALS** 





Edited by Martin Cooke, Steve Beet and Malcolm Crawford

## **Contents**

Contents

| Preface   | ix  |
|---|-----|
| Contributors  | xi  |
| PART I — TUTORIALS  |     |
| 1 Pitch analysis Dik J. Hermes  | 3   |
| 2 Advanced time-frequency representations for speech processing P.J. Loughlin, L.E. Atlas and J.W. Pitton   | 27  |
| 3 Comparing phonetic, articulatory, acoustic and aerodynamic signal representations  K. Nicolaidis, W.J. Hardcastle, A. Marchal and N. Nguyen-Trong | 55  |
| 4 Artificial neural networks: the mole-grips of the speech scientist Tony Robinson  | 83  |
| 5 On the importance of time — a temporal representation of sound Malcolm Slaney and Richard F. Lyon   | 95  |
| PART II — SPECIALISED REPRESENTATIONS   |     |
| 6 Speech analysis by means of a physiologically-based model of the cochlear nerve and cochlear nucleus William Ainsworth and Georg Meyer            |     |
| 7 Representation of frequency variations in time in speech signals Federico Albano-Leoni, Francesco Cutugno and Pietro Maturi                       | 125 |
| 8 Auditory-based wavelet representation Christophe d'Alessandro   | 131 |

| 9    | Estimation of the glottal excitation of speech with pitch-synchronous iterative adaptive inverse filtering Paavu Alku                       | 139 |
|------|---|-----|
| 10   | Analysis and synthesis: a hybrid solution for speech parameter extraction J. R. Andrews and K. M. Curtis                                    | 147 |
| 11   | Perceptually-based dynamic spectrograms Ted H. Applebaum and Brian A. Hanson  | 153 |
| 12   | Advantages of general quadratic detectors for speech representations<br>L. Atlas and J. Fang  | 161 |
| 13   | The time-scale transform method as an instrument for phonetic analysis P. Basile, F. Cutugno, P. Maturi and A. Piccialli                    | 169 |
| 14   | Time and frequency resolution in the reduced auditory representation S. W. Beet and I. R. Gransden  | 175 |
| 15   | Physiologically-motivated signal representations for computational auditory scene analysis  Guy J. Brown and Martin Cooke                   | 181 |
| 16   | Modelling the representation of speech signals in the peripheral auditory system  M. F. Cheesman, D. G. Jamieson, S. Krol and I. Kheirallah | 189 |
| 17   | Tracking spectral dominances in an auditory model Martin Cooke and Malcolm Crawford   | 197 |
| 18   | Auditory modelling for speech analysis and recognition<br>P. Cosi   | 205 |
| 19   | On the robustness of two signal preprocessors in the task of semi-automatic label alignment Paul Dalsgaard and Flemming K. Fink             | 213 |
| 20 ′ | Time-instantaneous frequency representation C. Demars   | 221 |
| 21   | Comparative evaluations of auditory representations of speech Phillip Dermody, George Raicevich and Richard Katsch                          | 229 |
| 22   | Segmentation by means of temporal decomposition P.J. Dix and G. Bloothooft  | 237 |
| 23   | Speech innovation characterisation by higher-order moments Alessandro Falaschi and Ivo Tidei  | 243 |

| Contents  | vii |
|---|-----|
| 24 Distortion maps for speech analysis M. Falcone, S. Ragazzini and A. Paoloni  | 251 |
| 25 Speech analysis using a nonlinear cochlear model with feedback regulation C. Giguère and P.C. Woodland                               | 257 |
| 26 Speech representations in the SYLK recognition project P.D. Green, N.R. Kew and D.A. Miller  | 265 |
| 27 Using cochlear information for speech feature analysis and interpretation Z. Kačič and B. Horvat                                     | 273 |
| 28 Temporal factors in speech signals Richard Katsch and Phillip Dermody  | 279 |
| 29 Phase representations of acoustic speech waveforms Eric Keller   | 285 |
| 30 The use of symbolic speech representations in continuous speech recognition research  M.A. de Leeuw and J. Caelen                    | 293 |
| 31 Normalised correlation features for speech analysis and pitch extraction R. De Mori and M. Omologo                                   | 299 |
| 32 Auditory representations of speech sounds Roy D. Patterson, Michael Allerhand and John Holdsworth                                    | 307 |
| 33 The representation of temporal information in time-frequency distributions and the auditory nerve  James W. Pitton and Les Atlas     | 315 |
| 34 The representation of speech in a computer model of the auditory nerve and dorsal cochlear nucleus Michael J. Pont and Seyed Mashari | 321 |
| 35 The state space and "ideal input" representations of recurrent networks Tony Robinson  | 327 |
| 36 Nonlinear operators for speech analysis  Jean Rouat  | 335 |
| 37 Speech representation and analysis by the use of instantaneous frequency A. Tsopanoglou, J. Mourjopoulos and G. Kokkinakis           | 341 |
| 38 Speech analysis using higher-order statistics J. Vidal, E. Masgrau, A. Moreno and J.A.R. Fonollosa                                   | 347 |

| 39 On the time-frequency display of speech signals using a generalised time-frequency representation with a cone-shaped kernel Hisashi Wakita and Yunxin Zhao | 355 |
|---|-----|
| 40 Group delay processing of speech signals B. Yegnanarayana and V.R. Ramachandran  | 363 |
| 41 The effects of noise on connected speech: a consideration for automatic speech processing  Keith Young, Stevie Sackin and Peter Howell                     | 371 |
| Appendix: The Sheffield signals   | 379 |
| Index   | 381 |