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Book reviews

Digital Pattern Recognition, edited by K. S. Fu, 1976; 206 pages. (Springer-Verlag Communication and Cybernetics, 10, US \$32.80)

Linear Prediction of Speech, by J. D. Markel and A. H. Gray, Jr, 288 pages. (Springer-Verlag Communication and Cybernetics, 12, US \$30.00)

Following an introductory chapter by the author, *Digital Pattern Recognition* has five chapters reviewing different aspects of pattern recognition as implemented using digital computers. Except one from Paris, all the authors are resident in USA.

The style throughout is crisp and authoritative, consistent with the impression given by the businesslike off-white stiff covers with black printing. At the same time it is very clear, and the subject matter should be comprehensible to a diligent non-specialist. Two of the chapters could in fact serve as teaching texts in their respective fields.

Despite Professor Fu's attempt to draw the threads together there is not much cohesion between individual contributions. This is almost inevitable in a multi-author work in a developing field. The most serious gap in the coverage is the absence of any discussion of the interpretation of scenes in terms of three-dimensional objects and space. A further criticism is that there is rather a dearth of references to applications. The diligent non-specialist who worked through the book would be left feeling somewhat disorientated, and uncertain what use he could make of his newly acquired knowledge.

As a collection of separate review papers the book will be of great value to workers in the field. Each chapter is followed by an extensive bibliography; for three of them this contains over 100 references each.

Notes on individual chapters are as follows. Chapter 2 deals with statistical pattern recognition. Unlike the other chapters, it is restricted to a set of specialised topics within its area, and probably for this reason a large part of the Introduction is devoted to a run-in to it. Chapter 3 deals with clustering analysis, with admirable clarity. Unfortunately there is no mention of applications. Both Chapter 3 and Chapter 4, on syntactic (linguistic) pattern recognition, could serve as teaching texts, and Chapter 4 does discuss some applications. Chapter 5, on picture recognition, deals with a number of rather basic aspects of pattern recognition, including the perception of texture, detection of edges and shapes, and description in suitable terms (connectedness, compactness, etc.) of the objects detected. Finally, Chapter 6 is on speech recognition and understanding, and is a timely survey of projects in progress which combine the speech recognition and understanding processes in the interactive fashion which is essential in any system which will remotely resemble the

human capability. This set of review articles is certainly extremely useful to have around.

Linear Prediction of Speech is in the same concise-yet-lucid style as *Digital Pattern Recognition* and, like it, provides a timely review of its subject area. What the subject area comprises is not obvious from the title; after all, one of the most important features of a means of communication is that it should not be predictable.

A more informative title would have been 'The Application of Linear Prediction Theory to the Analysis of Speech Waveforms'. The authors show how this approach permits a unified and rigorous treatment of topics which have been treated for a long time by rather *ad hoc* methods, including the analysis of speech sounds to allow subsequent synthesis, estimation of parameters of the vocal tract, formant and fundamental frequency tracking, and so on. There is no shortage here of references to practical applications and, in particular, new developments in Vocoders (devices allowing speech communication over channels of small information capacity) are exciting and likely to be remunerative.

Among the 'further topics' of the last chapter is that of speaker identification and verification, also the acoustical detection of laryngeal pathology, and hint that Kalman filter theory may in time prove more powerful in this area than the linear prediction methods. This is clearly a book which is important to anyone concerned with processing of speech.

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Macroprocessors, by A. J. Cole, 1976; 230 pages. (Cambridge Computer Science Texts 4, CUP, £3.95)

This is an introductory text on macroprocessors for first or second year undergraduates. After an introduction describing general concepts and uses the first half of the book is taken up with chapters describing macroprocessors in the fields of assembly languages and string handling. The latter uses TRAC, GPM and ML/1 as examples. The next three chapters are on the Mobile Programming System of Poole and Waite, MP/3 and a list processing system (WISP) and the final two cover syntax macros and their use in extensible compilers. There is an index as well as a full contents list.

The emphasis is mainly on the purpose and internal structure of macroprocessors; most chapters end with a bibliography and a set of exercises and the reader is urged to get involved in writing macros and looking up references. The style is very clear and most readable.

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