Experimental results: The effectiveness of the strategy is evaluated in the first instance on the basis of how well an utterance can be characterized. This is possible by means of resynthesis of the original signal from the characterization accomplished by the model. Where there are intrusive sources, the criteria relate to how well the group represents all the evidence for the first source and how effectively it separates speech from the intruding signal, say other speech.

When no intrusive noise is present, the group formed by the model captures 67–79% of the strands characterizing the whole of the utterance. Generally, the high frequency components are missed. In the presence of intrusive noise (such as noise bursts, siren, telephone, other speech, etc.), 84–96% of the elements in the group pertain to the speech source (and the rest from the intruding noise). (On the other hand, when groups are assembled by picking up strands purely randomly, this figure varies between 46–88%.) Intrusion is worst where the other source is music and is least for tone burst sequences. Intrusion remains under 18% for groups formed by the model but rises upto 46% for random grouping. The system performed well in separating speech from other speech. With laboratory noise, only the first few harmonics of the pitch frequency could be grouped. The quality of speech resynthesized from the groups ranged from totally intelligible to almost incomprehensible (particularly in the presence of white noise). Segregating a rhythmic structure from a mixture left a set of rhythmic gaps which were noticeable.

To sum up, the model evolves groups which are better than randomly assembled ones, but overall, its performance falls short of promise. There is, however, much scope for improvement, since the field is as yet evolving. The author suggests several avenues for improvement.

For instance, the author uses a bottom up or data driven strategy; a schema driven strategy could be tried. Competition for elements between groups is not incorporated because no detailed perceptual investigations have been done in this area. Of all principles discussed for grouping, only two are implemented: subsumption (removing groups whose elements are contained in larger groups) both before and after fusion of groups based on pitch contours and simultaneous integration (of groups whose derived properties are similar).

It is possible to take recourse to sequential organization or relating primitives or groups across time. Better grouping strategies such as pitch contour continuity and spectral continuity could be used. The assumption regarding atomicity of auditory primitives is a limitation, since it may become necessary to share properties associated with the same object between streams. The model can be extended to allow the investigation of auditory as opposed to acoustic phonetic coding. This is still to be done.

The synchrony strands are a vehicle of convenience and do not have any basis in human speech processing. The process of forming synchrony strands assumes that there is a single dominant resonance in each frequency channel and that a summary of the dominance can be obtained from a contiguous section of the filter bank. This is an approximation. Also, synchrony strands do not make explicit every kind of acoustic source component. Whispered speech is adequately represented by strands for resynthesis but this is achieved through using many objects; a more descriptive representation may be better. Offsets and onsets are not explicitly modeled.

Because the model summarizes a single dominance in each frequency region, it will tend to represent the most dominant harmonics in any harmonic series. Thus, there would be no difficulty in determining pitch contours, even if the fundamental frequencies cross, provided the first formants are reasonably separated. Frame by frame analysis would present problems relating to pitch correspondence in this case.

The thesis seeks organization in representations derived from a model of the auditory system. The link with the auditory model, however, is quite weak; in fact, substantially the same methodology could have been evolved even without inspiration from the auditory model. The author himself states that further development of the model should reflect what is known of auditory processing.

The volume cites extensively from earlier work in related areas and is therefore a rich source of reference material. The facts, concepts and methodologies used are precisely articulated and rigorously treated. The reader is given a clear insight into the process of evolving research strategies and implementing them. He is also provided with an objective analysis of the limitations of the approach and an outline of future directions for research. The book would therefore be a good addition to a researcher's library but might disappoint a reader looking for exposure to the broad perspective of the field.

Also, a number of questions come up. Would it be easier to group objects because of similarity or remove components from a mixture because of dissimilarities? Should the grouping be schema driven rather than data driven? One might also ask: how elegant is the implementation? Does it show an innovative spark or is it merely a patchwork of motley strategies?

In all, the author raises more questions than he answers, but that is the way research moves ahead.

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JOHN GORDON (editor)
Practical Data Security. Ashgate, 1993, £49.50, 160 pp hardbound, ISBN 1-85742-145-0

This book is a collection of papers, most of which were presented at a Unicom seminar on data security in the summer of 1992. The papers cover a variety of topics falling under the general heading of data security. However, due to the breadth of the subject and the

number of different authors, the papers vary considerably in their depth and their attention to detail.

The book begins with a general introduction to the subject, which succinctly covers the main areas of interest in enough depth to give the lay reader some grounding in topics with which he may not be familiar.

The concepts and issues behind a company policy for data security are dealt with in a very cursory, yet very straightforward, manner in the first of the papers. This is not a point that particularly counts against it, since it does avoid the repetition of material later in the book.

The topics of security evaluation and security modelling are considered at some length, with particular reference being made to the Information Technology Security Evaluation Criteria and the Logica CLEF scheme which attempts to lay down a procedure for designing products to meet ITSEC. By comparison, the paper on security modelling is much more general in content.

Computer viruses are examined in some detail in a pair of complementary papers which consider virus types and infection vectors, anti-virus procedures (both virus recovery and preventative measures) and the means by which viruses conceal themselves. I found this section to be of some interest, but I am a little unsure as to its general use, since it tended towards a discussion of the low-level characteristics of PC viruses.

The subject of cryptography and its relation to data security was dealt with in three papers which explained in a lucid manner with a minimum of technical detail the use of encryption for authenticity and integrity checking (by the use of digital signatures and stamping), and its applications to secure network management.

Surprisingly, there was only a single paper in this collection which covered the many legal aspects of data security. Although it was mainly based around a study of the Computer Misuse Act 1990, its interpretation and issues arising thereof, some consideration was given to other computer crime legislation, notably in the US and the EC, as well as to the relationship between the CMA and other laws. Unfortunately, this paper contained some factual errors, which should have been avoidable, notably with regards to the recent Steve Jackson Games *vs* US Secret Service case in the US in the aftermath of the controversial operation Sundevil; the author lists the FBI as a major participant when they had no involvement in the matter. This does tend to cast some doubt on the validity of the information in the rest of the paper.

In conclusion, this book provides a good overview of the field of data security; the papers form a cohesive whole, and while there is some duplication of material, this does not detract from its overall utility. I would consider the book to be suitable introductory reading for anyone with an interest in this field.

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NIKITAS ALEXANDRIDIS
Design of Microprocessor-based Systems. Prentice-Hall, 1993, £52.75, 541 pp hardbound, ISBN 0-13-588567-1

As the title accurately implies, this book is about the design of microprocessor-based systems. Its purpose is to present ways of building systems using commercial microprocessors. It is not just another textbook which considers the principles of machine architecture and microcomputer design but is aimed more specifically at the system designer who wishes to select the most appropriate microprocessor to satisfy a system requirement. The book is full of practical information, some of which would be difficult to assimilate without a sound knowledge of computer organization. Consequently, I believe the book is suitable for postgraduate courses in computer design, and for practising engineers. I expect few undergraduate courses consider microcomputer design at such an advanced level.

The book is based on a good selection of advanced microprocessors. Both CISC (Motorola 680×0 and Intel 80×86) and RISC architectures (Intel i860, Motorola 88000 series and MIPS R-series) are included. These examples are discussed extensively throughout the text, and essential technical data are included in separate appendices.

Separate chapters are devoted to microprocessor bus transfers, industry system buses, caches and memory management units. A comparative study of standard buses is an unusual but very welcome feature in a book of this type. Multibus, VMEbus and Futurebus are described in detail, and consideration of the 'trade-offs' in selecting the system bus forms a particularly useful section.

The chapters on microprocessor caches and memory management units contain a wealth of information for the system designer. Choice of design parameters, performance measurements and implementation details are considered. The final chapter titled 'Other relevant topics' covers interrupts, protection mechanisms, exception processing and pipelining, an unusual mixture of important topics not included in other chapters.

If I was forced to make some general criticisms it would be that the book tends to neglect underlying principles in favour of design and implementation details for the chosen set of processors, and perhaps some mention of software should have been made if only to consider the implications of choosing a specific architecture. However, these points are outweighed by many positive features. Rarely is so much information condensed into a book of this size, and using a good balance of text and diagrams the author has provided a very comprehensive volume which is easy to read. The wide range of important microprocessors discussed will ensure that the book does not date significantly for some years and I am sure it will be welcomed by many working in the field.

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