PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Concluding Comments

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Phil. Trans. R. Soc. Lond. A 1988 **324**, 471-472
doi: 10.1098/rsta.1988.0035

Phil. Trans. R. Soc. Lond. A **324**, 471–472 (1988)
Printed in Great Britain

Concluding comments

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This has been a most stimulating meeting, not least of all because of the healthy mix of people attending. We have heard lively discussions between users and researchers, both in the formal sessions and during the breaks. Representation from widely diverse application areas and examples taken from a variety of images demonstrate that we represent a unified community of interest.

Many of us sense that this meeting has occurred at a watershed in the development of image-analysis as applied to applications as demanding as remote sensing. With an acute awareness of the limitations of pixel-based image-processing, it is easy to see the appeal of knowledge-based techniques that promise to build in some of the richness of human capability. If this can be achieved without including human limitations, such as the tendency to subjectivity and increasing error rates during repetitive operational tasks, then so much the better.

However, despite the emphasis of this meeting on operational applications, we have seen during the second day that the breakthrough may still be some way off in terms of 'intelligent' applications. This makes it difficult to predict future trends accurately, but there are a number of reasons why the subject has been slow to take off in terms of large-scale operational exploitation, not all of them technical.

I suspect that one of these barriers is that R & D is often not linked closely enough to the requirements of operational users. This creates a credibility gap, arising from doubts about cost effectiveness, reliability, performance, support and user friendliness. Another key organizational problem that must be overcome is associated with the management of knowledge itself. Knowledge is still power in many hierarchies and it may prove difficult to find experts willing to share their hard-won expertise. This may explain the preponderance of user-assistance rather than automatic applications in the presentations.

Given the rapidly increasing quantity of data available, however, we must expect to see a continuing trend towards more autonomous, real-time interpretation systems. Fortunately, the trends in computer power, with an order of magnitude improvement in cost–performance every five years, is in our favour. Developments in parallel processing will make knowledge-based image-understanding systems a reality within a few years. Already we are in an era where hardware is no longer the problem. The limiting factor is now our ability to organize information and handle software complexity. This, of course, is actually a management problem. Useful applications of remotely sensed data will require integration with other strategic management information.

Perhaps one of the most promising benefits of knowledge-based techniques will be the increase in flexibility. Modification of algorithm-based analysis systems is notoriously cumbersome and expensive, whereas expert systems can grow with the increasing experience and sophistication of the user. They also will correct the tendency of more rigid classification systems

to encourage the interpreter to close off options prematurely. Nevertheless, they suffer acutely from the problem of all computer systems that if you put garbage in, you will only get garbage out.

We should be grateful to all those who have worked to make this meeting such a success, but especially to Dr B. J. Conway of the Meteorological Office and Christine Johnson of the Royal Society.

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