THOMSON, J. M. (1967). Speeds and Flows of Traffic in Central London, Part 2. Speed-Flow Relations, *Traffic Engineering and Control*, Vol. 8, pp. 721-5.
TILLOTSON, H. T. (1971). Some aspects of traffic simulation, *Surveyor* (14 May 1971), pp. 20-21.
WEBSTER, F. V. and COBBE, B. M. (1966). *Traffic Signals*, Road Research Technical Paper No. 56, HMSO.
WOHL, M. and MARTIN, B. V. (1967). *Traffic Systems Analysis*, McGraw-Hill.
WRIGHT, C. C. and HYDE, T. (1972). The measurement and interpretation of speed-flow relationships, *Traffic Engineering and Control*, Vol. 13, pp. 507-11 and 525.

Book reviews

Digital Image Processing, by R. C. Gonzalez and P. Wintz, 1977; 431 pages. (*Addison-Wesley Advanced Book Program*, $29.50, $19.50 paper)

There are certain areas in image processing which present difficulties to non-mathematicians. In particular, the various two-dimensional transforms, such as the Fourier and Walsh transforms, and some of the more obscure digital filters may be seen as a complete mystery to those whose mathematical training stopped soon after their 'A' level studies. Professor Wintz and Dr Gonzalez have prepared an excellent text which carries the reader through such difficult areas with the minimum of pain. The expositions are thorough and eminently readable, even enjoyable. There are many worked examples and a wealth of relevant illustrations. Much of the text was originally taught to seniors and graduate students at the University of Tennessee and Purdue University; it would be equally useful for M.Sc. or Ph.D. students in this country as an introductory text and as a text book for reference.

The topics covered include fundamentals of digital images (sampling, quantisation, photography), image transforms, image enhancement and restoration, image encoding and image segmentation and description. A useful feature of the book is an evaluated list of references for further reading with every chapter. This book is highly recommended.

M. J. B. DUFF (London)

Machine Intelligence 8, edited by E. W. Elcock and Donald Michie, 1977; 630 pages. (*Ellis Horwood Limited*, £24)

The Machine Intelligence workshops started at the University of Edinburgh just over ten years ago, and they quickly became an established venue for leading workers in the field. Contributions to the published proceedings were allowed to be long, detailed and civilised enough to include excerpts from poems. The authors responded appropriately with well rounded presentations that included useful surveys and considered discussion rather than scrappy snippets of 'original results'. This eighth workshop was held at the Santa Cruz campus of the University of California; the list of participants has many names familiar from previous workshops and the contributions keep the same flavour, so that it is little changed by a 6,000 mile trip.

There are twenty-seven papers classified into nine sections, and by their nature it is impossible to give a detailed summary of individual papers. It is possible to sense a distinctive trend over the past ten years. In the early days researchers often developed tools for specific limited problems without knowing how these specific techniques might be generalised. Yet the whole motivation for their work was to produce tools to handle a wide range of problems; the only suggested general tool was theorem-proving. Theorem-proving started with techniques established in mathematics and brought the computer in later as a processing device. Now, there is a change of emphasis, the phrase 'representation of knowledge' occurs right through the contributions. It means the entry of knowledge into the computer and its storage and retrieval once there. The significant point is that it is based on a strong sense of the capabilites and characteristics of the computer itself, and this must surely be the starting point for real progress. It is not surprising that the nature of knowledge in programming is examined by several authors. Another emerging trend is a more explicit examination of the process of transferring knowledge between humans and machines; it is just beginning to be recognised that information input and output for a worthwhile problem to be solved on a machine may be a formidable task, perhaps more difficult than the solution process.

This last remark brings out one unsatisfactory feature of these contributions. It has long been recognised by designers of applications data bases in such fields as patent searching and libraries that knowledge transfer between machines and humans can be costly and difficult, yet the authors here seem to be rather unwilling to look outside the work of professional researchers in machine intelligence. There are many other places where the authors seem to be refusing to look at work done by those in specific fields of applications, yet in areas such as satellite image processing complex and subtle techniques have evolved from which these authors can surely learn much. There is only one paper where ideas have been tested in a practical environment, that by Rutovitv on chromosome analysis.

The compact summaries of various points of view presented give this volume a permanent value much above that of typical conference records, and it can be recommended for personal as well as library purchase.

J. J. FLORENTIN (London)

Pattern Recognition, edited by Bruce G. Batchelor, 1978; 485 pages. (*Plenum Press*, $47.40)

This book which is a collection of papers by a number of distinguished workers in the field has the subtitle 'Ideas in Practice'. The contributions give an interesting insight into how far the goal of producing machines which will perform the well known but little understood human facility of recognition of patterns. Very broadly, it is divided into two parts: firstly a collection of ideas, theories and techniques and secondly some down-to-earth applications.

There is a strong emphasis on optical recognition techniques and in an opening chapter, J. R. Ullman presents a detailed survey with a copious bibliography. The theoretical underpinning is presented in chapters by Batchelor and Bell. It becomes clear that pattern recognition has many practical applications, some realisable now and others in the future. These applications include the drilling of printed circuit boards, industrial sensory devices, image analysis of micromolecular structures and applications to cytology. In the acoustic field, chapters are dedicated to vehicle sound recognition and speech recognition.

The book makes fascinating reading and the editor deserves special praise for his introductory comments to each chapter which forge links between the basic ideas and practical implementations.

R. L. GRIMSDALE (Brighton)

Numerical Analysis, by R. F. Churchhouse, 1978; 69 pages. (*Christopher Davies*, £1·50)

This book is based upon a course of eighteen lectures on numerical analysis which was given to first-year students taking Computing at University College, Cardiff. The book is modest in its scope. An introductory chapter is followed by chapters on rounding and errors. Chapter four is devoted to interpolation and includes a discussion of both the methods of Lagrange and Newton. The use of finite differences to detect errors forms the basis for chapter five, whilst chapter six is concerned with numerical integration dealing with the trapezium, midpoint and Simpson rules. The longest, and last, chapter describes iterative methods, including the Newton-Raphson method, for solving nonlinear equations. It is unlikely, because of the limited range of material presented, that the book will appeal to a wider audience than that for which it is specifically prepared.

N. RILEY (Norwich)