Hence for $N = 4$ one possible solution is $p_1 = 1$ and $p_2 = \dfrac{112}{11}$.

4. Derivation of the leading error terms

I use S_8 to denote $\displaystyle\sum_i \frac{\partial^8 f}{\partial x_i^8}$,

$S_{6,2}$ to denote $\displaystyle\sum_{i \neq j} \left(\frac{\partial^8 f}{\partial x_i^6 \partial x_j^2} + \frac{\partial^8 f}{\partial x_i^2 \partial x_j^6} \right)$ and so on,

where the partial derivatives are evaluated at the origin. Then the error associated with an approximation (1.3), which satisfies equations (1.4)–(1.10), is of the form

$$h^8(\alpha_8 S_8 + \alpha_{6,2} S_{6,2} + \alpha_{4,4} S_{4,4} + \alpha_{4,2,2} S_{4,2,2}$$
$$+ \alpha_{2,2,2,2} S_{2,2,2,2}) + O(h^{10}) \quad (4.1)$$

the coefficients being derived as in Phillips (1967).

Approximate values of all the parameters associated with each solution of (1.4)–(1.10) referred to here, for $N = 2, 3, 4, 5$ and 6, are listed in **Table 1**.

References

MILLER, J. C. P. (1960). Numerical Quadrature over a Rectangular Domain in Two or More Dimensions, Part 2, *Math. of Comp.*, Vol. 14, pp. 130–138.

PHILLIPS, G. M. (1967). Numerical integration in two and three dimensions, *Computer Journal*, Vol. 10, p. 202.

Book Review

Experiments in Induction, by EARL B. HUNT, JANET MARIN, and PHILLIP J. STONE, 1966; 247 pages. (New York and London: *Academic Press*, 76s.)

One of the more important facets of intelligent behaviour is the process of induction, however unclear we may be as to what we mean by that term. If anyone were in any doubt that computers could be programmed to perform inductive feats, at least in a small way, then this book and the experimental results it contains should convince them. Hunt and his co-authors have written what is essentially a research report describing investigations carried out at a variety of times and places. At the heart of the research is a series of computer programs each of which is a *concept learning system* (CLS), and these link together the experiments described.

The book opens with chapters which state the general context of the enquiry, and outline the methods and test situations to be employed. A "concept" is a rule for correctly sorting objects into two or more classes. Each object is defined as a list of attribute values. A CLS is required to inspect a sequence of such objects, being given the correct classification in each case, and must develop the appropriate "concept" as a decision tree of tests on the attribute values.

The longest section of the book is devoted to reporting fully the performance of nine CLS programs, varying in the heuristics that they use and in the "memory" capacity available to them, when they were set to discover each of a range of classification rules. These results are followed by a description of experiments comparing program and human performance in similar test situations.

A chapter is devoted to applications, primarily to content analysis of English text. For this purpose a sentence is converted into a set of pairs, each pair consisting of a semantic tag (attribute) and a syntactic position (attribute value). These pairs form the basis of the input to the CLS. In their final chapter the authors review the relationship of their CLS programs to similar work, notably Sebesteyen's approach to automatic pattern recognition, and Feigenbaum's EPAM. They also point out that their approach to classification is, in an important sense, complementary to conventional methods of multivariate statistical analysis.

My impression is that the work described is solid and important. It does not, however, provide any surprises or new insights, perhaps because the experimental environments used are so simple and artificial. Psychologists, and computer scientists involved in artificial intelligence research, will find the book interesting and instructive.

It is pleasant to report that the authors have troubled to publish the programs they have used, happily using Iverson's notation rather than the original IPL-V. An exception is the final program of the series which is published in the KDF–9 dialect of ALGOL 60. Reading this program is not helped by a too-brief explanation of it, nor by the transposition of the program text on pages 232 and 233. A little more care and effort here would have been worthwhile.

Apart from the blunder just mentioned, the book is well presented, with helpful figures, references and indexes.

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