V. Kreinovich, A. Lakeyev, J. Rohn and R. Kahl, *Computational complexity and feasibility of data processing and interval computations*. Dordrecht / Boston / London: Kluwer Academic Publishers, 1998. xii + 459 p. prijs fl. 375,– (hc) (Applied Optimization, Volume 10) ISBN 0-7923-4865-6.

The central issue in this monograph is the following basic problem: given a function $f(x_1, \ldots, x_n)$ of n real variables, and n intervals $\mathbf{x}_i$, compute the range $\mathbf{y} = f(\mathbf{x}_1, \ldots, \mathbf{x}_n) = \{f(x_1, \ldots, x_n) \mid x_1 \in \mathbf{x}_1, \ldots, x_n \in \mathbf{x}_n\}$. And is this basic problem of interval computations feasible (i.e., computable in polynomial time) or intractable (i.e., NP-hard)?

After two introductory chapters, Gaganov's result is treated in Chapter 3: the basic problem is computationally intractable even for polynomials $f(x_1, \ldots, x_n)$ with rational coefficients. In subsequent chapters special instances of the basic problem are considered: polynomials with a fixed number of variables (feasible; Chapter 4), polynomials of fixed degree d (intractable, except when $d = 1$; Chapter 5), with bounded coefficients (intractable, even when restricted to coefficients from $\{0, 1, 2, 3\}$ ($d = 2$) or from $\{0, 1\}$ ($d = 3$); Chapter 6), a sequence of fixed quadratic polynomials $f_n(x_1, \ldots, x_n)$ with arbitrary intervals (intractable; Chapter 7), arbitrary polynomials with fixed intervals (intractable; Chapter 8), polynomials over a set $\mathcal{O}$ of operations (intractable if $\star \in \mathcal{O}$ and $\mathcal{O} \cap \{+, -\} \neq \varnothing$, feasible otherwise; Chapter 9), and fractional linear functions. i.e., functions of the type $f(x_1, \ldots, x_n) = (a_0 + a_1x_1 + \ldots a_nx_n)/(b_0 + b_1x_1 + \ldots b_nx_n)$ (feasible; Chapter 10). Chapters 11–14 are devoted to solving a system of linear equations $\sum a_{ij} \cdot f_j = b_i$ where the coefficients a_{ij} and b_i are linear functions of the variables that are defined with interval uncertainty. Again the general case is intractable but some special instances (sparse matrices with restricted coefficients) are feasible. The remaining chapters deal with: the rôle of heuristics (Chapter 15), narrow intervals (16), applications to optimization, solving systems of equations, approximation (17–20), checking of properties (21–22), and problems with non-interval uncertainty (23-26). Finally, there are 7 Appendices and a long list of references.

Primarily this book is intended for specialists in numerical computations ("numerical optimization"), but it might also be of interest to people working in applied mathematics who are dealing with the computational complexity of numerical methods. The style of writing and layout is capable of improvement: the reader gets the impression that the starting point of this book was a stack of transparencies for the overhead projector which have been provided with additional comments and proofs of the theorems; these proofs are always collected at the end of a chapter. This impression is reinforced by the authors' overuse of boldface and italic fonts. Other shortcomings are: (i) the table of contents only mentions chapter titles but no (sub)section titles, (ii) there are no exercises, and (iii) the structure of this book is unbalanced: of the 26 chapters, three chapters only consists of two pages, whereas the three longest chapters possess a length 16 times this minimal length. Apart from the numerous results, at the positive side there is the extensive bibliography, but at the very negative one we have the price: it is ridiculously high, especially since the authors probably produced the LaTeX-source files.

In short, the subject deserves a better organized/written/printed monograph, the authors deserve a better publisher, and the prospective readers . . . ? Due to its extreme high price, they are forced to borrow this book from their library.

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