Preface

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This issue contains full, traditionally refereed papers with topics presented at the Validated Computing 2002 conference, held in Toronto, May 23 to May 25, 2002. See (Kearfott and Walster, 2002) for a review of that conference and see the web page
`http://www.cs.utep.edu/interval-comp/`
`interval.02/program.html`
for the conference program. The papers in this issue represent the first of the twenty submitted full-length works to be accepted; we anticipate an additional issue containing more of these works.

Keeping with the overall conference theme of honoring the contributions of Ramon Moore over the past half-century, Louis Rall, in "Evaluation of Functions, Gradients, and Jacobians," provides a lucid and concise overview of automatic differentiation, including use of the structure of the process in validation of the results. (Rall asserts that Ramon Moore, in addition to originating interval analysis in its present form, originated automatic differentiation.)

Robust geometric computations are one of the application areas that have benefitted most from interval computations. Along these lines, João Batista Oliviera and Luiz Henrique de Figueiredo present an algorithm for "Robust Approximation of Offsets, Bisectors, and Medial Axes of Plane Curves." The careful explanations, inclusion of background material, and insightful illustrations make this work noteworthy.

In "Numerical Experiences with a New Generalized Subinterval Selection Criterion for Interval Global Optimization, " Tibor Csendes studies a heuristic to increase the efficiency of interval branch and bound algorithms for global optimization. In contrast to his previous works on the subject, Csendes studies the effect of this heuristic in practical algorithms involving interval Newton methods and other acceleration devices, in addition to the heuristic's effect within the simple "Moore–Skelboe" algorithm. The numerical experiments are carefully reported.

With "Estimating and Validating the Cumulative Distribution of a Function of Random Variables: Toward the Development of Distribution Arithmetic," Weldon Lodwick and K. David Jamison contribute to the burgeoning field of applications of intervals and interval uncertainty to statistics. Also in the general area of statistical analysis verified with

interval computations, Daniel Berleant, Lizhi Xie and Jianzhong Zhang present a software package "Statool". Statool is downloadable, free for noncommercial use, from

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http://class.ee.iastate.edu/berleant/home/Research
          /Pdfs/versions/statool/distribution/index.htm
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The article explains underlying theory, construction and testing of Statool, and illustrates its use as well.

Finally, Ivo Nenov and Daniel Fylstra present a software package for global optimization and finding all solutions to nonlinear systems of algebraic equations, based on constraint propagation and interval branch and bound techniques. Due to use of the "GI form" originated by Nenov and Lyubo Kolev, as well as due to other innovative techniques, this software appears to be competitive in relative to other such interval branch and bound packages. The package is distributed with the Microsoft Excel Solver as a premium "add-on" package. The paper explains the underlying computations and structure of this package well.

References

Kearfott, R. B. and G. W. Walster: 2002, 'SIAM Conference on Optimization, Validated Computing 2002, and the Fields Institute Informal Working Group on Validated Optimization: A Personal View'. *Reliable Computing* **8**(5), 419–424.