

TURNING A PAGE AND LEARNING SOMETHING USEFUL

By Norman Chonacky, Editor in Chief



AT THE BEGINNING OF EACH YEAR, I ENTER A CONTEMPLATIVE FRAME OF MIND AS EDITOR IN CHIEF AND ATTEMPT TO CONFESS MY RETROSPECTIVE REFLECTIONS ON—AND PROSPECTIVE INTENTIONS FOR—*CiSE*. OF THE PAST YEAR, I CAN REPORT THAT WE’VE INCREASED OUR READERSHIP,

which is in sharp contrast to the dominant trend for technical publications. Part of this increased interest has occurred in the astronomy and geophysics communities, which have traditionally been “marginal” areas for *CiSE*. Equally encouraging has been a recovery of interest in an important part of our core constituency, the physics education community.

These developments validate that *CiSE* is attending to its mission “to support the development of computing tools and methods, as well as their effective use in theoretical, computational, and experimental sciences, engineering, and education.” I especially welcome this particular combination of gains—expansion of our scope and strengthening of our core—because undergraduate physics provides a significant piece of fundamental preparation for the other sciences as well as engineering. The better that the physics and other science communities understand one another’s work in the computational domain, the more likely that physics will contribute meaningful training to students in these disciplines for which computation has become an essential driving force.

Brokering information among diverse communities through computational discourse is a necessary but not entirely sufficient performance criterion for *CiSE*, however. The chosen information must be useful, and its presentation must elicit understanding as well. Take the current issue as a case in point.

Its theme, combinatorics, has always been a bane to me as an experimental physicist trying to make my way through statistical mechanics. Questions like “how many distinct combinations of R elements can be made by taking them from sets of U distinguishable and V indistinguishable elements” used to drive me nuts. What I didn’t realize was that this enumerative combinatorial issue was related to structural combinatorial issues framed in graph theory.

In fact, at the time, I really didn’t understand how knowledge of mathematical graphs could help me even though I was, in effect, trying to use them.

Enter *CiSE* volume 10, number 2, and voila! The article “Passing Messages to Lonely Numbers” (which could arguably be alternatively entitled “Passing Combinatorics to Puzzled Experimentalists”) at last affords me an introduction to the subject that I can enjoy and understand (p. 32). The articles “A Unified Framework for Numerical and Combinatorial Computing” (p. 20) and “Graph Analysis with High-Performance Computing” (p. 14) provide readable introductions to tools and methods useful for those of you engaged in high-performance computing. Finally, “Sampling Binary Contingency Tables” (p. 26) sets the combinatorial problem in the beautifully simple and accessible context of Darwin’s finches.

The particular choice of useful, not just interesting, topics in this theme issue wasn’t accidental—nor was the accessibility of their presentations mere chance. The coeditors, Isabel Beichl and Francis Sullivan, are both long-standing members of the *CiSE* editorial board and have developed their design and management skills through years of attention to this publication’s quality. It’s my commitment during this, my last year as editor in chief, to work closely with future theme editors, an increasing number of whom aren’t editorial board members, to give them the perspective needed to make equally well-designed issues.

Finally, I want to comment on two of the nontheme articles in this issue. “Agile Computer Control of a Complex Experiment” (p. 55) is a feature article directed to experimental scientists and engineers and emphasizes how to effectively apply Python to laboratory control computation. In future issues, I’ll try to increase the number of articles related to experimental applications as well. “Are We There

A TRIBUTE TO GENE GOLUB



The scientific computing community recently lost its foremost member: Gene H. Golub died on 16 November 2007 from complications of leukemia. His scientific achievements transformed the field of matrix computations.

As the Fletcher Jones Professor of Computer Science at Stanford University, Gene was a pioneer in numerical analysis, particularly matrix computations. Through his prolific writing on the subject, he showed remarkable breadth, creativity, and productivity, contributing fundamental computational algorithms and broadening the applications of matrix methods.

Gene made matrix factorization practical by developing algorithms for both dense and sparse matrices. He championed the application and use of the singular value decomposition (SVD), a versatile tool in the analysis of matrix properties. The SVD provides the best low-rank approximation to a matrix, which is most useful in data compression; it also computes the principal components, which is much needed in statistics, and can filter noise, which is useful in signal processing and information retrieval. Finally, it's key to solving problems in which the matrix has errors. His fundamental contributions to the computation of the SVD and related eigenvalue problems enabled the explosion of fruitful and surprising applica-

tions within computer science and beyond—for example, matrix approximations and eigenvalue computations are essential in enabling the technology behind search engines such as Yahoo! and Google.

Gene made other seminal contributions, including iterative algorithms for large linear systems of equations. Among the 17 books he coauthored or edited, the most influential is *Matrix Computations*, written with Charles Van Loan. Within this book is a wealth of insight into how to compute with matrices efficiently and accurately.

Gene received many important honors and distinctions, including several honorary degrees, fellowship grade in the American Academy of Arts and Sciences, and membership in both the US National Academy of Engineering and the National Academy of Sciences.

An amazing scientist and an engaging warm-hearted human being with a great sense of humor, Gene was accessible to anyone and was a wonderful mentor to many young numerical analysts. He enjoyed traveling and interacting with the people he met and took great pleasure in the serendipitous interactions and new ideas that followed. At Stanford, he loved to introduce the audience to the speaker as a seminar was about to begin.

With Gene's passing, the sense of loss is great. He continues to be an inspiration to us all, and his strong presence will be greatly missed. For me he was a mentor, colleague, and friend. I miss my friend.

—Jack Dongarra
Knoxville, Tennessee

Yet?" (At Issue, p. 60), a departmental article by editorial board members Bill Feiereisen and George Thiruvathukal, brings an important piece of current discussion and internal board debate out into an open forum within which we

invite you, our readers, to react.

You have my best wishes for a productive and educational new year, and you can depend on *CiSE* to help make it so. Keep those cards and letters coming!

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