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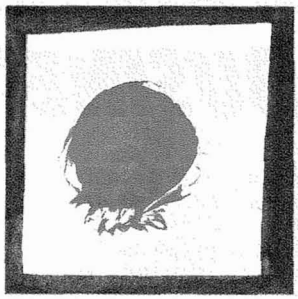

Neural networks proposed for diverse applications
A decision-technology concept improves budgeting
Curriculum revision gets high priority in education
Better interchange of integrated documents needed

Neural networks are slow to learn. . .cybernetics can boost competitiveness. . .the future engineer's education must encompass more topics in a more cohesive manner. . .the ability to transfer documents integrating test and graphics among different software packages needs developing. These comments on some of the more specialized branches of electrical engineering come from reports given to us by spokesmen from the IEEE Council on Neural Networks, the IEEE Systems, Man, and Cybernetics Society, the IEEE Education Society, and the IEEE Professional Communication Society.

Artificial neural networks remain the most exciting topic in the field of computational sciences, maintained Robert J. Marks II, president of the IEEE Council on Neural Networks. Meanwhile, however, they "are still seeking an application identity," he said. "Currently, the bulk of interest is being focused on artificial neural networks as classification and regression machines trained by example. Such networks have been proposed and preliminarily applied in fields as diverse as electric power load forecasting, medical diagnosis, mortgage brokering, explosives detection, speech recognition, remote sensing, and racehorse handicapping." The short-term success of the networks will be determined by their performance relative to other cutting-edge techniques and to more conventional approaches, he said, adding that in recent studies "in most cases, the artificial neural network has performed quite well."

But although the "modular and parallel structure and, in some cases, the highly fault-tolerant characteristics of artificial neural network architectures remain quite attractive," Marks cited some problems. "The most widely used artificial neural networks, for example, don't scale well. They typically yield a diminishing performance return as the size of the net grows," he observed. "Possible solutions include modularization or a more general algorithmic breakthrough." As for their current use as classification and regression machines, he pointed up significant training problems. "Current popular training procedures, for example, remain painfully slow and many require floating-point precision, prohibiting analog implementation," he said.

Better budgeting with TAPS

Madan G. Singh, vice president for publications, IEEE Society on Systems, Man, and Cybernetics, told us that a number of recent decision technology concepts and products are being used to enhance companies' competitiveness.

One example Singh told us about is Targeting and Allocation of Promotional Spend (TAPS). It brings together ideas from systems engineering, computer science, cognitive science, marketing, and mathematics, to produce a practical computer-based aid to budget allocation. Singh gave us this further explanation:

"TAPS follows a three-stage process. In stage 1, the judgments of a group of managers in response to a series of 'what if' expenditure scenarios generated by TAPS are captured. In stage 2, the expert knowledge base is used with mathematical optimization routines within TAPS to build up individual campaign models and a model of the total budget allocation across all campaigns. Stage 3 is one of exploration, which can provide answers to such questions as: how can sales be increased from the same budget? How, if the budget is increased or decreased, can it be allocated across different products and media types, to maximum effect? How are tradeoffs made between sales and image?"

Ronald K. Jurgen Senior Editor

Curriculum revision

Chalmers F. Sechrist Jr., vice president (1990) of the IEEE Education Society, told us that, at the present time, most attention is focused on restructuring the curriculum of the first two years of college. He predicted a major restructuring, updating, and modernizing of the undergraduate engineering core at a number of institutions during the 1990s because engineers of the 21st century will be expected to solve a broader and more complex set of problems and to accept more leadership positions in industry and government.

Other trends he foresaw include:

- Integration of mathematics, chemistry, physics, and some engineering courses in order to improve the connections between present courses and those taken previously.
- Integration of more computing, design, and oral and written communications into the curriculum.
- More emphasis on global awareness, improving the quality of life, international experiences, business, management skills, and the importance of engineering education.
- More exposure to nontechnical subjects such as ethics, safety, economics, and the impact of technology on society.
- Implementation of new instructional and learning methods using technology-based approaches.
- More emphasis on interactive methods in which students work together in interdisciplinary teams to learn cooperatively and to solve complex engineering design problems.

Integrated-document interchange needed

A major impediment to universal adoption of Wysiwyg (what-you-see-is-what-you-get) publishing and word-processing systems is the poor interchangeability of integrated documents among different platforms, said David L. McKown, member of the administrative committee and chair of the Ad Hoc Committee on New Communication Technology, IEEE Professional Communication Society. He explained why this is so:

"While several vendors now sell software that integrates text and graphics, and several of those offer that software on many hardware operating-system platforms, the ability to transfer integrated documents intact from one software package to another generally does not exist. This means that, although a user of WordPerfect on an MS-DOS platform can share integrated documents with a user of WordPerfect on a VAX, that same user cannot share integrated documents with a Microsoft Word user on any platform. The path to interchange involves separately converting the text and graphics into file formats that can be read by the other system, importing them separately, and then reintegrating the document."

Still, before this can become a useful reality, McKown said, improvements in data storage capacity and speed and processing power will be necessary. ◆

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