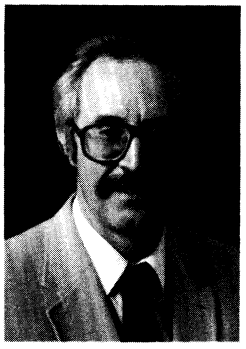
EDITORIAL



Edward R. Dougherty
Editor

When I attended the SPIE symposium in Orlando last April, I happened to watch a public television documentary on the direction of universities in the next century. Speaker after speaker came on to demand "change" and "responsiveness." The way of the past is all wrong, especially emphasis on scholarship and science. The "needs" of society must be addressed. Research must be made more "relevant." There is too much emphasis on research and publication—and this research is not relevant to the needs of society. Not one speaker questioned the implications or the content of the criticism that was being heaped upon those who had built the greatest university system the world has ever known. Not one raised the problematic nature of relevance. And who were these "experts" on the nature of knowledge? I saw no Maxwell or Einstein among them.

What about the scientific faculties of our universities? Is it not their very reason-to-be to focus on long-term research aimed at appreciating the fundamental aspects of science and to educate students who wish to partake in this endeavor? I often think of my thesis advisor at Rutgers University. I spent four years working under her and during that time she stretched me to the breaking point. Indeed, there were moments when I could not bear my own inability to understand what she demanded me to understand. Each week I would have to go to her office and describe my work of the past six days. Since I achieved no solid results for the first two years, I did not look forward to these visits. But near the end of the second year she began to encourage me by telling me that I was coming to some primitive understanding and that this groping was the way to knowledge at the "frontier." She was, of course, correct. Anyone who has endured the maddening struggle at the frontier knows this. Whatever success I have had at research and whatever insight I have passed on to my students is due to my apprenticeship, to the privilege of working with a truly gifted mathematician who insisted that I perform to my very limits, to the point where reading my own thesis was never an easy task.

And what of our current students? Do we push them to the frontier? Do we insist that they push forward that frontier at one of its most challenging points? Are we not satisfied until they have reached the limits of their own endurance? Do we let the scientific frontier (and only the scientific frontier) dictate their directions? Are we ourselves (as was my mentor) immersed in the struggle to push forward the frontier, so that our students too must become immersed to even appreciate what we are saying? Do we weaken our demands in the face of complaints about the burdens and strain of the work? Do we stretch our students to the breaking point and at the same time continue to stretch ourselves so that as teachers we maintain the mental acuity gained under our own apprenticeships?

To be good, one must perspire. Every athletic coach understands this. An athlete must endure grueling practice and exercise to prepare his mind and body for the contest, for the point in the race when the pain says to quit but victory requires him to go on. Imagine the absurdity of adapting training methods to relieve the sweat and the exhaustion, and to make the athlete's training experience more enjoyable. I coach junior-high-level basketball and expect my players to full-court press the entire game and to fast break on every rebound. This requires them to go through rigorous mental and physical training. They put in the time coming to practice and they deserve to be brought to the peak of their ability. Do the students in our universities deserve the same? It would be dereliction of duty to send my players on the court to lose when through greater endurance and commitment they could be victorious. Does a professor fulfill his duty if he does not push a student to do the finest work possible within the bounds of the student's ability?

None of these questions were raised on that program I watched on public television. There was much talk of "relevance," but criteria on which relevance would be judged were not examined. I would hate to have my children study in the kind of gimmick-ridden learning environment championed by the producers of the program. And what of the scientific needs of society? From what appeared in the program, only the most cursory thought was given to these needs. I suspect that some might even think that society has no scientific needs, as if we know all we need to know.

And on this last point I thought of our own discipline—imaging. How little we know! Only someone with the most superficial understanding would hazard a comprehensive definition. A panel of knowledgeable and experienced imaging scientists were asked at an SPIE Electronic Imaging Working Group meeting when, as an industrial person, would the questioner be able to compute confidence bounds to characterize the performance of imaging algorithms. The panel struggled with an obviously important question but they really had no answers. As moderator I interjected my view that it would be a long wait, since even in the case of binary images we are far from the mathematical and statistical understanding required. As for the program on public television, it appears to me that the speakers and producers hope to insure that we never have an answer to the question and that the technological achievements requiring such an answer are never developed.

EDITORIAL SCHEDULE

January 1996

Digital Document Imaging

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This special section will cover image processing topics that are relevant to creation, acquisition, storage, transmission, recognition, analysis, and rendering of digital documents. Specific topics of interest are OCR, compression, document structure analysis, digital magnification, resolution conversion, enhancement, restoration, halftoning, and color management.

April 1996

Multimedia Systems

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In recent years there has been a tremendous increase in the applications of multimedia systems. This special section will be devoted to the imaging aspects of multimedia systems. Papers are solicited in all areas of multimedia imaging, in particular the following: image and video compression, image and video databases, multimedia data security, image and video transmission over data networks, media capture, the use of imaging on the Internet, and multimedia imaging in education and health care delivery.

Manuscripts due Nov. 17. 1995.

July 1996

Nonlinear Image Processing

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In the past decade, there has been significant progress in nonlinear image processing techniques. Not only have new methods been developed, but deep connections have also been found between the various nonlinear image processing methods that have grown from different origins. Our understanding of nonlinear image processing techniques has evolved to the level where rigorous design procedures based on mathematical modeling of the target application have become possible. The aim of this special section is to present a comprehensive overview of the recent advances in both the theory and applications of nonlinear image processing.

Manuscripts due December 1, 1995.

October 1996

Real-Time Imaging

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This special section will cover the application of real-time imaging in the following technologies: robotics, virtual reality, multimedia, medical imaging, industrial inspection, high-definition television, advanced simulators, computer-integrated manufacturing, and intelligent vehicles.

Manuscripts due January 1, 1996.

January 1997

Random Models in Imaging

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This special section will present recent advances in random models in imaging. Papers are invited for submission in the following areas: theory and applications of random models to image processing (coding, filtering, pattern recognition, and segmentation), image analysis (including model-based measurements), and simulations of random fields.

Manuscripts due April 1, 1996.

April 1997

Image Coding

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This special section aims at presenting new image coding techniques for various applications, bit rate, quality, and complexity. Novelty of the approach and superiority of the performances will be determinant.

Manuscripts due May 1, 1996.