

XXXII. ADVANCED COMPUTATION SYSTEMS*

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RESEARCH OBJECTIVES

Our basic objective is to design and develop better auditory and visual interfaces between men and machines, as well as to mechanize the processes of "pattern recognition" that are now handled exclusively by human senses and perceptual processes.

Progress in this field during the past decade has been slow, and it is our contention that this may well have been due to emphasis on the application of standard processing techniques without utilization of knowledge about the behavior of living systems. Perception and recognition result from the measurements and processing of living systems whose general objective is to survive in a hostile environment. In such an environment, the eye as a camera or the ear as a recorder, in making an accurate set of measurements of amplitude, frequency, and time, may well be both second-order and misleading concepts.

In our view, an initial step in understanding what the living system is measuring and processing is to put bounds upon the demonstrable capabilities of the senses of living systems. Pertinent information is available in such diverse and scattered fields as art, music, history, physiology, pathology, and psychology, and the approach is to collect and appraise it. We have already applied this approach in a limited area of visual processing, and it has yielded valuable and applicable insight. These results have been utilized in the development of a limited-capability handwriting recognition system that can handle a very large font without significant size or orientation constraints. The remaining constraints of language style and segmentation are now being removed.

The general approach is also being applied to problems of medical diagnosis and data interpretation such as are encountered in electrocardiographic, phonocardiographic, and x-ray interpretation.

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