Object Recognition Using Feature-and Color-Based Methods

The combination of methods works better than does either method alone.

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An improved adaptive method of processing image data in an artificial neural network has been developed to enable automated, real-time recognition of possibly moving objects under changing (including suddenly changing) conditions of illumination and perspective. The method involves a combination of two prior object-recognition methods—one based on adaptive detection of shape features and one based on adaptive color segmentation—to enable recognition in situations in which either prior method by itself may be inadequate.

The chosen prior feature-based method is known as adaptive principal-component analysis (APCA); the chosen prior color-based method is known as adaptive color segmentation (ACOSE). These methods are made to interact with each other in a closed-loop system.
In principle, the improved method could readily be implemented in integrated circuitry to make a compact, low-power, real-time object-recognition system. It has been proposed to demonstrate the feasibility of such a system by integrating a 256-by-256 active-pixel sensor with APCA, ACOSE, and neural processing circuitry on a single chip. It has been estimated that such a system on a chip would have a volume no larger than a few cubic centimeters, could operate at a rate as high as 1,000 frames per second, and would consume in the order of milliwatts of power.

This work was done by Tuan Duong, Vu Duong, and Allen Stubberud of Caltech for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

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