A Parallel Processing Algorithm for Signal Detection

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The bootstrap error-adjusted single sample technique (BEST) is shown to perform better than the Mahalanobis distance metric in discriminant analysis of spectra in this paper. The BEST algorithm is designed for high-speed parallel-processing computers like the HP Superdome, but it is also shown to operate efficiently on single processors, especially when implemented with hashing.

Using hypothetical multivariate data from a known distribution, the bias and RSD of the BEST and Mahalanobis metrics were compared as a function of the number of dimensions in hyperspace (frequencies monitored) and the number of training samples in the calibration spectral data set.

Using actual microwave spectra, signals from a test generator were analyzed successfully down to the limit of the A/D resolution.

The BEST metric (which is O(n)) is calculated more rapidly and more precisely than the Mahalanobis metric (which is O(n3)) when full microwave spectra are employed.