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# THE PERFORMANCE OF UNSUPERVISED CLUSTERING TECHNIQUES IN THE CLASSIFICATION OF ERTS DATA

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ABSTRACT

Three algorithms for unsupervised per-field classifications of ERTS data are discussed; a hierarchical technique, an iterative technique, and a chain technique. The feature set used comprised the gray-scale histograms for all four spectral bands, reduced to 32 classes per band, and evaluated for fields containing 50 by 50, 100 X 100, and 200 X 200 pixels, yielding respectively 2816, 704 and 176 fields to an ERTS frame. Although it yielded excellent results, it was possible to use the hierarchical technique only on the smallest of these data sets. An iterative technique proved rapid for small data set, but used excessive amounts of computer time to achieve convergence for large data sets. However, an acceptable but non-convergent solution could be achieved within reasonable computation times. The chain algorithm proved to be the most efficient in operation, handling large data sets very rapidly, but yielding the least acceptable classifications. The results indicate that depending upon the scale and purposes of the investigation, a particular classification algorithm is appropriate.

# REMOTE SENSING DATA PROCESSING IN SWEDEN

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ABSTRACT

Machine processing of remotely sensed data in Sweden is at present limited to one research group.

Current activities encompass development of maximum likelihood classification procedures on a general purpose IBM 360/75 and later also on a special purpose PDP 11/40 with Ramtek GX 100 B Graphical display unit for inveractive processing.

Our Algorithm is adapted from the interesting modification of this method used by Robert H. Dye of the Bendix Corporation.

In a sense this technique amounts to a "dynamic" determination of the optimum information yielding combination of a few wave length bands from a larger number of available spectral bands.

Testing and evaluation of the analysis programs is done in an application to land vegetation mapping and the particular problem used for these purposes is the identification of clearcut areas in forested regions.

One of the output units in our special purpose image processing system is a novel Swedish color ink jet plotter, capable of generation hardcopy imagery in three colors about 10 - 16 gray levels each on plain paper or transparencies. It is a drum plotter with a registration capacity of 3 X 1024 X 1536 points in about 120 seconds on an area of about 20 CM X 28 CM.

This project as well as other major remote sensing projects is sponsored in part by the remote sensing committee of the Swedish board of space activities. The research is mainly concentrated to three problem areas of particular interest VIZ land vegetation, sea ice, and oil pollution.