

Reprinted from

**Symposium on
Machine Processing of
Remotely Sensed Data**

June 21 - 23, 1977

The Laboratory for Applications of
Remote Sensing

Purdue University
West Lafayette
Indiana

IEEE Catalog No.
77CH1218-7 MPRSD

Copyright © 1977 IEEE
The Institute of Electrical and Electronics Engineers, Inc.

Copyright © 2004 IEEE. This material is provided with permission of the IEEE. Such permission of the IEEE does not in any way imply IEEE endorsement of any of the products or services of the Purdue Research Foundation/University. Internal or personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution must be obtained from the IEEE by writing to pubs-permissions@ieee.org.

By choosing to view this document, you agree to all provisions of the copyright laws protecting it.

MAXL4X - A LARGE AREA LANDSAT CLASSIFIER

RONNIE W. PEARSON

Lyndon B. Johnson Space Center
Earth Resources Laboratory
1010 Gause Boulevard
Slidell, Louisiana 70458

Program MAXL4X is a maximum likelihood classifier that classifies exclusively four-channel data. MAXL4X is a hybrid type of classifier in that it employs a table look-up technique in the region(s) of frequently occurring vectors. Though MAXL4X can classify any data set digitized at 128 levels or less, it was designed specifically for classifying large areas of LANDSAT data.

Presently, MAXL4X resides on a Varian mini-computer but is being adapted to the U-1108. Tests on the Varian mini-computer (32K core, 16-bit words) show that MAXL4X runs usually take less than half the time required by ELLTAB. MAXL4X is expected to run four times as fast as ELLTAB on the Univac 1108, although time is slightly data-dependent. According to Jones*, this equates to more than a fifty times speedup of LARSYSAA when classifying twenty or more classes.

The MAXL4X table is constructed on the basis of the following information: frequency of occurrence in band 7, means in band 6 for each occurring radiometric value in band 7, means in band 5 for each occurring radiometric value in band 6, and means in band 4 for each occurring radiometric value in band 5. The remaining ingredient required to build a relatively small table that includes a high percentage of occurring vectors is high correlation of successive bands. The presence of such correlation is hardly worth elaborating on for those who are familiar with the black and white images from LANDSAT.

The decision rule used to compute the classification of vectors not found in the table was extracted from MAXL4, a maximum likelihood classifier optimized for four-channel data that was developed by the same author. The author is currently developing a three module software package that completely processes a LANDSAT frame for under \$400 mini-computer cost. MAXL4X is the classifier used in this software package.

*Jones, Clay, "Implementation of an Advanced Table Look-up Classifier for Large Area Land-Use Classification," Proceedings of the Ninth International Symposium on

Remote Sensing of the Environment.
University of Michigan. Ann Arbor,
Michigan. April 1975. pp. 813-824.