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CANONICAL ANALYSIS FOR CROP TYPE DISCRIMINATION

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ABSTRACT

The accuracy and computer processing efficiency of canonical analysis (a linear transformation technique) as a tool for crop type classification of Landsat data were investigated in the Clarke, Oregon, area. Canonical analysis was used to transform a 12-band, 3-date multitemporal Landsat multispectral scanner (MSS) digital data set into a 6-channel canonical data set. The canonical data channels were classified using transformed statistics, and the resulting classification was then compared to a 12-band Landsat classification of agricultural crops that had been produced in an earlier study.

The data analysis methods followed five basic steps: (1) preparation of the ground derived reference data, (2) registration of the Landsat data for three calendar dates, (3) supervised training set selection and generation of training statistics, (4) canonical transformation of multitemporal Landsat data, and (5) minimum-distance-to-mean classification of the transformed data.

The comparison of the classification based on canonical analysis to the 12-band multitemporal classification showed no significant difference in terms of overall crop identification accuracy. The canonical classification resulted in an accuracy of 75.8 percent and the 12-band classification showed an accuracy of 75.9 percent. While the accuracies were nearly identical, the computer processing unit (CPU) time showing efficiency was 14,781 CPU seconds for the 12-band classification and the CPU time for the canonical classification was only 4,240 seconds. This notable difference was due primarily to the reduction of original channels needed for classification in the canonical transformation process (dimensionality reduction) and the differences in the complexity of the classifiers used.

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