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LANDUSE ANALYSIS USING BASIC+ INTERACTIVE IMAGE PROCESSING FOR TEACHING: A COMPARISON WITH LARSYS

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Landuse analyses continue to be the medium for communicating important spatial, spectral, and temporal remote sensing concepts. Unfortunately, hardware and software constraints often limit these activities to the examination of photographic formats of remotely sensed data. Such constraints cause manual interpretation techniques to be given inordinate attention compared to digital image processing. Even when the instructor is actively involved in image processing research, batch-mode processing may dominate. Again the student is confronted with hard-copy, this time in the form of computer printouts. A more effective remote sensing education is realized if students have the opportunity to experience interactive digital image processing.

To this end, BASIC+ digital image processing has been implemented at the University of California, Santa Barbara as an integral part of the Geography Department's remote sensing curriculum. Students interrogate Landsat images to extract digital number (DN) values, experiment with their own preprocessing algorithms and use Boolean logic classification. Analyses are performed on a 15 x 45km coastal study area encompassing a diversity of landuses and discrimination problems. This paper first summarizes the image processing system configuration including:

1) Data Acquisition
    -SUBIMG. (select subimage from scene)
2) Preprocessing
    -PREPRO. (arithmetic operations, eg. ratio)
    -SHIFT. (edge enhancement)
3) Class Specific Processing
    -PTRAIN. (train on proprocessed file)
    -TRAIN. (train on unpreprocessed file)
    -TEST.   (select test data)
4) Data Analysis
    -STATS. (parametric statistics)
    -HISTO. (histogram)
    -DIVER. (divergence)
5) Classification
    -PTHEME. (Boolean on preprocessed files)
    -THEME. (Boolean on unpreprocessed files)
6) Utility
    -FIXIT. (list DN values; file clean-up)
    -LOOKC. (grey map)

The paper concludes with the results of the student landuse classification experience in the 115B remote sensing class (the second of a three course sequence). Evaluations include:

1) Student reactions and perceptions
    a. Innovative preprocessing to optimize classification
    b. The 'real' utility of remote sensing
2) Comparison of student results with LARSYS classifications using both student and researcher training and test data.

Overall reactions by students and faculty indicate that the BASIC+ image processing system is effective for both educational and research purposes.