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A LAND USE CHANGE MONITORING SYSTEM BASED ON LANDSAT

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A procedure for economically determining statistics on acreages of change in the use of land between two dates has been developed to support a Department of Housing and Urban Development program on neighborhood change modelling. The application of image processing techniques to LANDSAT imagery in four stages (registration, differencing, classification, and tabulation) provides one of the basic data sets needed to model future land use in one of six "typical" urban areas.

After appropriate LANDSAT imagery for two desired dates is obtained, date-to-date registration of the study area is performed. Once the two images are adequately registered, the procedures of determining the geographic areas of change are initiated. The ratio of two raw bands for the early date is computed and then subtracted from the same ratio for the late date. This difference is allowed to conform to a gaussian distribution, and those pixels whose values lie beyond two standard deviations from the mean are designated as areas of change.

The first step in the creation of a late date classification map is to extract and classify only those areas that show change. Then the early date classified data for unchanged areas is digitally summed with the late date classified data in changed areas.

Using polygon overlay routines individually for both the early and late date classifications and then combining the results, a tabulation revealing general land use changes (e.g., the number of acres of residential in the early date versus the number in the late date) can be generated. To determine the manner of the change (e.g., the number of acres changed from rural to urban), the land use classes are first aggregated into rural/urban dicotomies and then a routine which permits comparison of individual pixel values is executed. Finally, a tabulation can display the manner of the land use change aggregated by the administrative district desired (e.g., census tracts).