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A LAND USE CHANGE MONITORING SYSTEM BASED ON LANDSAT

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A procedure for economically deter-
mining 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 appli-
cation of image processing techniques to
LANDSAT imagery in four stages (registra-
tion, 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 ade-
quately 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 con-
form 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 ex-
tract and classify only those areas that
show change. Then the early date classi-
fied data for unchanged areas is digitally
summed with the late date classified data
in changed areas.

Using polygon overlay routines indiv-
idually 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 admin-
istrative district desired (e.g., census
tracts).