NASA TECH BRIEF

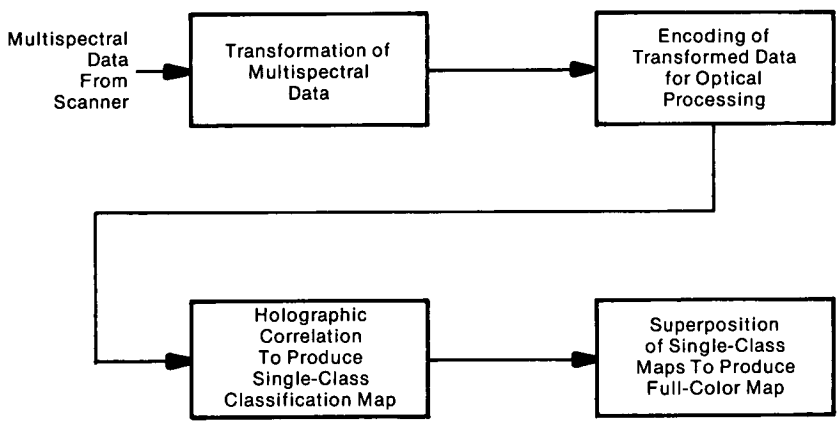
Lyndon B. Johnson Space Center

Data Processing Large Quantities of Multispectral Information

Current multispectral scanners generate large quantities of digital multichannel data, which is more than the processing equipment can handle. The scanners are used on aircraft and satellities to study the spectral reflectivity of the Earth's surface. The results of these studies generally indicate the agricultural and mining potentials of various geographical locations. Similar scanners are used in medicine.

Processing capacities are increased with a newly developed method. The method as outlined in the illustration is a combination of digital and optical techniques. Basically, the multispectral data obtained from a scanned area is coded into a binary matrix format. Next, it is encoded onto a photographic film and is holographically correlated with preprogramed spectral signatures. Each signature corresponds to a certain spectrum selected for study. For each signature a single-class classification map is generated. Each map shows an areal distribution of one type of spectrum reflected from the area being studied. A number of these maps are then optically superimposed to produce a color-coded, multiclass classification map showing a combined spectral image of the area.

In this process, data from the scanner are transformed into 8-bit integers and are recorded on magnetic tape. Each integer corresponds to one resolution element of the area recorded on all data channels simultaneously. The integers are transformed into a binary matrix having the elements +1 and -1. These elements are arranged in specific arrays corresponding to the integers.



Processing Steps for Multispectral Data

(continued overleaf)

The matrix is then encoded on photographic film by selective exposures provided by a computer-controlled cathode-ray tube. The dotlike exposures correspond to the +1 values of the matrix; the -1 areas remain unexposed. Next, the film is holographically correlated with a spectral signature to generate the single-class classification map. When a number of these maps are generated, they are optically superimposed to produce a full-color, multiclass classification map.

Note:

Requests for further information may be directed to:

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Reference: TSP75-10080

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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