

SPATIAL INFORMATION EXTRACTION WITH "PIXEL SWAPPING"

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ABSTRACT

One of the most successful applications of digital image processing is the multispectral image analysis of remotely sensed data where multispectral image data is analyzed mostly on a pixel-by-pixel basis. However, due to resolution enhancement of remote sensors such as TM and SPOT data, the observed data shows more spatial and spectral variability than coarse spatial resolution data. Thus, powerful spatial processing techniques are highly required.

Existing methods to extract spatial information, however, are mostly time-consuming and quite a few methods have been applied operationally. They treat only neighboring pixels in a specific window, the size of which is ordinarily determined by computational convenience and not by the semantical content of spatial features. Human interpretation of spatial features is reported to be different from that adopted for spatial processing on computers, and more vision-related and structure-oriented spatial information processing methods are required for higher resolution image analysis.

This paper will discuss a new digital image processing method which is very powerful to extract spatial features of objects in images. This method is basically based upon frame-wise processing rather than traditional pixel-wise processing.

This method is also easily implemented at PC-based systems as well as main frame computers using existing technologies and immature technology like neural network processing is not required.

This paper will describe an outline of an implementation at CCRS and demonstrate some capabilities of this method to extract spatial features from an image: morphological filtering, like discriminating point-like features, line-like features from region-like areas, detection of line edges, line intersections and vertices, and segmentation of texture fields are examples of the application of this method.

Required computational time is estimated based upon frame-by-frame operation time and complexity of target features.