Chapter 16

Vegetation Index: Ideas, Methods, Influences, and Trends

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ABSTRACT

This is the survey for finding vegetation, deforestation of earth images from various related papers from different authors. This survey deals with remote sensing and normalized difference vegetation index with various techniques. We survey almost 100 theoretical and empirical contributions in the current decade related to image processing, NDVI generation by using various new techniques. We also discuss significant challenges involved in the adaptation of existing image processing techniques to generation NDVI systems that can be useful in the real world. The resolution of remote sensing images increases every day, raising the level of detail and the heterogeneity of the scenes. Most of the existing geographic information systems classification tools have used the same methods for years. With these new high resolution images, basic classification methods do not provide satisfactory results.

SATELLITE IMAGE PROCESSING AND AIR POLLUTION DETECTION

Prochdxka and Kolinovd of their paper was devoted to the analysis of mathematical methods allowing for detection of concentration of aerosol particles observed at ground measuring stations and by satellites (Prochdxka & Kolinovd, 2004). Their whole paper is focused on satellite images and their processing. Owing to simultaneous observations at different frequencies.

This is devoted to the design and verification of algorithms of image denoising including wavelet use and their correlation. They use image segmentation, feature extraction, classification, and detection of the most important sources of pollution, prediction and control of pollution sources for this analysis. This paper discusses problems of image analysis and image processing applied to satellite images allowing to obtain information on air pollution due to solid particles. The extracted information of solid particles in the air obtained via surface measurements.

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Correlation methods assume in many cases proper signal preprocessing to remove specific signal components and to reduce substantial signal errors. For this research, first they used data acquisition. In data acquisition, many techniques were used like ground observations, remote satellite sensing. Second thing is image processing. For image processing, they handle some techniques like image denoising, image correlation. Then parts of the figure were evaluated to compare results of this correspondence for i) different time instants of ground observations, ii) different sizes of regions used for satellite channels correlation. For correlation, they used two images stored in two matrices assumes evaluation of the correlation coefficient for the corresponding sub image regions which can be obtained using the relation

\[
r = \frac{\sum \sum (A(m,n) - \bar{A})(B(m,n) - \bar{B})}{\sqrt{\sum \sum (A(m,n) - \bar{A})^2 \sum \sum (B(m,n) - \bar{B})^2}}
\]

Then the best correspondence has been found.

Results presented in this paper justify correspondence between satellite and ground observations in the case of appropriate weather conditions as correlation of the surface and satellite measurements gives very satisfactory results for some regions in which the (Figure 1) concentration of aerosol particles in the air is measured. Then more detailed statements on how such information can be used for evaluation of air pollution will be made after greater volumes of data are processed.

Studies of their given data motivate subsequent research of general mathematical problems and they form a basis for further research in this area. Mathematical background used for these studies will include further methods of i) time series processing including two dimensional interpolation using non-linear methods and wavelet functions, ii) image preprocessing, filtering, image enhancement and channels correlation. It was assumed that general methods of image processing will contribute both to environmental sensing and to the area of signal analysis.

*Figure 1. Correlation of aerosol particles evaluated in satellite images*
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