Advanced Image Processing Techniques For Remotely Sensed Hyperspectral Data

Image pre-processing is normally done through radiometric corrections, while image processing involves the application of either unsupervised or supervised classifications... a840697205 The systematic mapping of land cover patterns, including change detection, often follows two main approaches: a840697205

Aerial photography cameras are usually remotely operated or triggered automatically. Aerial photography typically refers specifically to bird's-eye view images that focus on landscapes Aerial photography (or airborne imagery) is the taking of photographs from an aircraft or other airborne platforms. When taking motion pictures, it is also known as aerial videography a840697205

Aerial photography typically refers specifically to bird's-eye view images that focus on landscapes and surface objects, and should not be confused with air-to-air photography, where one or more aircraft are used as chase planes that "chase... a840697205

Land cover maps This cost-efficient approach employs several techniques for image pre-processing and processing to accurately Land cover maps are tools that provide vital information about the Earth's land use and cover patterns. They aid policy development, urban planning, and forest and agricultural monitoring. survey Remote sensing satellite image processing a840697205

Remote sensing in geology Remote sensing is conducted via detection of electromagnetic radiation by sensors. Second, the two-way travel time of radiation from and back Remote sensing is used in the geological sciences as a data acquisition method complementary to field observation, because it allows mapping of geological characteristics of regions without physical contact with the areas being explored. About one-fourth of the Earth's total surface area is exposed land where information is ready to be extracted from detailed earth observation via remote sensing. The electromagnetic radiation acts as an information carrier for two main variables. helps mineral identification and hence geological mapping, for example by hyperspectral imaging. First, the intensities of reflectance at different

wavelengths are detected, and. The radiation can be naturally sourced (passive remote sensing), or produced by machines (active remote sensing) and reflected off of the Earth surface a840697205

Electro-optical MASINT shares some similarities with IMINT, but is distinct from it. IMINT's primary goal is to create a picture, composed of visual elements understandable to a trained user. Electro-optical MASINT helps validate that picture, so that, for example, the analyst can tell if an area of green is vegetation or camouflage paint. Electro-optical MASINT also generates information on phenomena that emit, absorb, or reflect electromagnetic energy in the infrared, visible light... a840697205 A variety of algorithms may be applied depending on the nature of the task. Some algorithms may perform significantly better than others for particular objectives. For example, convolutional neural networks (CNNs) are... a840697205 The main idea - for chemical imaging, the analyst may choose to take as many data spectrum measured at a particular chemical component in spatial location at time; this is useful for chemical identification and quantification. Alternatively, selecting an image plane at a particular data spectrum (PCA - multivariable data of wavelength, spatial location at time) can map the spatial distribution of sample components, provided that their spectral signatures are... a840697205

Multispectral pattern recognition Subcategories of multispectral remote sensing include hyperspectral, in which hundreds of bands are collected and analyzed, and ultraspectral remote sensing where many hundreds of bands are used (Logicon, 1997). classes should be selected and defined carefully to properly classify remotely sensed data into the correct land-use and/or land-cover information. The main purpose of multispectral imaging is the potential to classify the image using multispectral classification. This is a much faster method of image analysis than is possible by human interpretation. To achieve Multispectral remote sensing is the collection and analysis of reflected, emitted, or back-scattered energy from an object or an area of interest in multiple bands of regions of the electromagnetic spectrum (Jensen, 2005) a840697205

Bathymetry Bathymetry has various uses including the production of bathymetric charts to guide vessels and identify underwater hazards, the study of marine life near the floor of water bodies, coastline analysis and ocean dynamics, including predicting currents and tides. sonar data to fill in gaps and improve precision of maps of shallow water. The first recorded evidence of water depth measurements are from Ancient Egypt over 3000 years ago. Mapping of continental shelf seafloor topography using remotely sensed data has Bathymetry is the study of underwater depth of ocean floors (seabed topography), river floors, or lake floors. In other words, bathymetry is the underwater equivalent to hypsometry or topography a840697205

Bathymetric charts (not to be confused with hydrographic charts), are typically produced to support safety of surface or sub-surface navigation, and usually show seafloor relief or terrain as contour lines (called depth contours or isobaths) and... a840697205

Electro-optical MASINT radar). Hyperspectral imaging from aircraft or satellites can provide remotely sensed reflectance spectra to help detect such graves. Imaging of an experimental Electro-optical MASINT is a subdiscipline of Measurement and Signature Intelligence, (MASINT) and refers to intelligence gathering activities which bring together disparate elements that do not fit within the definitions of Signals Intelligence (SIGINT), Imagery Intelligence (IMINT), or Human Intelligence (HUMINT) a840697205

There are many VIs, with many being functionally equivalent. Many of the indices make use of the inverse relationship between red and near-infrared reflectance associated with healthy green vegetation. Since the 1960s scientists have used satellite remote sensing to monitor fluctuation in vegetation at the Earth's surface. Measurements of vegetation attributes include leaf area index (LAI), percent green cover, chlorophyll content, green biomass and absorbed photosynthetically active radiation (APAR). a840697205

Vegetation index E. N. ; Vogelmann, J. Seen by LANDSAT. L. Proceedings of the Symposium on Machine Processing of Remotely Sensed Data Rock, B. ; Vogelmann A vegetation index (VI) is a spectral imaging transformation of two or more image bands designed to enhance the contribution of vegetation properties and allow reliable spatial and temporal inter-comparisons of terrestrial photosynthetic activity and canopy structural variations. ; Williams, D a840697205

MASINT specialists themselves struggle with providing simple explanations of their field. One attempt calls it the "CSI" of the intelligence community, in... a840697205

Machine learning in earth sciences Machine learning is a subdiscipline of artificial intelligence aimed at developing programs that are able to classify, cluster, identify, and analyze vast and complex data sets without the need for explicit programming to do so. Earth science is the study of the origin, evolution, and future of the Earth. The earth's system can be subdivided into four major components including the solid earth, atmosphere, hydrosphere, and biosphere. Random forests and SVMs are some algorithms commonly used with remotely-sensed geophysical data, while Simple Linear Iterative Clustering-Convolutional Neural Applications of machine learning (ML) in earth sciences include geological mapping, gas leakage detection and geological feature identification a840697205

Remote sensing satellite image processing. This cost-efficient approach employs several techniques for image pre-processing and processing to accurately map land cover patterns. These techniques detect changes at various spatial scales following a series of machine learning simulations and statistical applications. a840697205 MASINT is defined as scientific and technical intelligence derived from the analysis of data obtained from sensing instruments for the purpose of identifying any distinctive features associated with the source, emitter or sender, to facilitate the latter's measurement and identification. a840697205 Field survey a840697205 Platforms for aerial photography include fixed-wing aircraft, helicopters, unmanned aerial vehicles (UAVs or "drones"), balloons, blimps and dirigibles, rockets, pigeons, kites, or using action cameras while skydiving or wingsuiting. Handheld cameras may be manually operated by the photographer, while mounted cameras are usually remotely operated or triggered automatically. a840697205

Chemical imaging Hyperspectral imaging measures contiguous spectral bands, as opposed to multispectral imaging which measures spaced spectral Chemical imaging (as quantitative – chemical mapping) is the analytical capability to create a visual image of components distribution from simultaneous measurement of spectra and spatial, time information. spatial, time information. Hyperspectral imaging measures contiguous spectral bands, as opposed to multispectral imaging which measures spaced spectral bands a840697205

Measurement and signature intelligence Bergman, Steven M. (December 1996). Retrieved 2007-10-17. This often includes radar intelligence, acoustic intelligence, nuclear intelligence, and chemical and biological intelligence. "The Utility of Hyperspectral Data in Detecting and Discriminating Actual and Decoy Target Vehicles" Measurement and signature intelligence (MASINT) is a technical branch of intelligence gathering, which serves to detect, track, identify or describe the distinctive characteristics (signatures) of fixed or dynamic target sources a840697205

VIs have been... a840697205

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