SELECTION D’ARTICLES SIGNALES
entre le 1ER MAI et le 30 JUIN 2013

3 JUILLET 2013
Bulletin 69
Le sommaire reprend nos thématiques et chaque thématique peut contenir plusieurs références.

Les documents sont en français sauf indication contraire.
A l'intérieur de chaque thème, les références sont classées par date de parution, puis par ordre alphabétique de premier auteur.

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**Acquisition d'image**

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<th>Correlation analysis of camera self-calibration in close range photogrammetry</th>
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<td>Auteur(s)</td>
<td>TANG (RONGFU) et FRITSCH (DIETER)</td>
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<td>Source</td>
<td>PHOTOGRAMMETRIC RECORD, vol 28, n° 141, [01/03/2013], pp 86 - 95</td>
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<td>Langue</td>
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<tr>
<td>Mots clés</td>
<td>AUTOETALONNAGE, CORRELATION, DEFORMATION D'IMAGE, ETALONNAGE DE CHAMBRE METRIQUE, PHOTOGRAMMETRIE METROLOGIQUE</td>
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<tr>
<td>Résumé d’auteur</td>
<td>While the Brown self-calibration model has been widely used in close range photogrammetry for over 40 years, the negative effects of the well-known high correlations between parameters are not clear. This paper presents a novel view and study of these correlations, which are shown to be inherent in the Brown model due to its polynomial nature; they occur exactly as with additional parameters in aerial photogrammetry. Although it has high correlations with the decentring distortion parameters, the principal point can be located precisely (up to a few pixels) in self-calibration with an appropriate image configuration. An alternative model of the in-plane distortion is proposed, which helps to reduce the correlation with principal distance.</td>
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<th>Titre</th>
<th>Automatic camera calibration in close range photogrammetry</th>
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<td>Auteur(s)</td>
<td>FRASER (CLIVE S.)</td>
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<td>Source</td>
<td>PHOTOGRAMMETRIC ENGINEERING &amp; REMOTE SENSING, vol 79, n° 4, [01/04/2013], pp 381 - 388</td>
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<tr>
<td>Mots clés</td>
<td>ABERRATION CHROMATIQUE, AUTOETALONNAGE, CHAMBRE DE PRISE DE VUES NUMERIQUE, CHAMBRE METRIQUE, ESPACE OBJET, ETALONNAGE DE CHAMBRE METRIQUE, LONGUEUR FOCALE, ORIENTATION INTERNE, PHOTOGRAMMETRIE METROLOGIQUE</td>
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<td>N° notice</td>
<td>A2013-207</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Automatic camera calibration using self-calibration with the aid of coded targets is now very much the norm in close-range photogrammetry. This is irrespective of whether the cameras to be calibrated are high-end metric, or the digital SLRs and consumer-grade models that are increasingly being employed for image-based 3D measurement. Automation has greatly simplified the calibration task, but there are real prospects that important camera calibration issues may be overlooked in what has become an almost black-box operation. This paper discusses the impact of a number of such issues, some of which relate to the functional model adopted for self-calibration, and others to practical aspects which need to be taken into account when pursuing optimal calibration accuracy and integrity. Issues discussed include interior orientation stability, calibration reliability, focal plane distortion, image point distribution, variation in lens distortion with image scale, color imagery and chromatic aberration, and whether 3D object space control is warranted. By appreciating and accounting for these issues, users of automatic camera calibration will enhance the prospect of achieving an optimal recovery of scene-independent camera calibration parameters.</td>
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<th>Titre</th>
<th>Evaluation of different methods to retrieve the hemispherical downwelling irradiance in the thermal infrared region for field measurements</th>
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<td>Auteur(s)</td>
<td>GARCIA-SANTOS (VICENTE), VALOR (ENRIC) et al.</td>
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<tr>
<td>Source</td>
<td>IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2155 - 2165</td>
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<td>Langue</td>
<td>Anglais</td>
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<tr>
<td>Mots clés</td>
<td>ANALYSE COMPARATIVE, DONNEES DE TERRAIN, ECLAIREMENT ENERGETIQUE, EFFET ATMOSPHERIQUE, EMISSIVITE, NEBULOSITE, NUAGE, RADIOMETRE, RAYONNEMENT INFRAROUGE THERMIQUE, REFLECTANCE SPECTRALE, REFLEXION DIFFUSE, TEMPERATURE DE SURFACE</td>
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<td>Résumé d’auteur</td>
<td>The thermal infrared hemispherical downwelling irradiance (HDI) emitted by the atmosphere and surrounding elements contributes through reflection to the signal measured over an observed surface by remote sensing. This irradiance must be estimated in order to obtain accurate values of land-surface temperature (LST). There are some fast methods to measure the HDI with a single measurement pointing to the sky at a specified viewing direction, but these methods require completely cloud-free or cloudy...</td>
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skies, and they do not account for the radiative contribution of surrounding elements. Another method is the use of a diffuse reflectance panel (usually, a rough gold-coated surface) with near-Lambertian behavior. This method considers the radiative contribution of surrounding elements and can be used under any sky condition. A third possibility is the use of atmospheric profiles and a radiative transfer code (RTC) in order to simulate the atmospheric signal and to calculate the HDI by integration. This study compares the HDI estimations with these approaches, using measurements made on four different days with a completely clear sky and two days with a partially cloudy sky. The measurements were made with a four-channel CIMEL Electronique radiometer working in the 8–14-µm spectral range. The HDI was also estimated by means of National Centers for Environmental Prediction atmospheric profiles introduced in the MODTRAN RTC. Additionally, the measurements were made at two different places with very different environments to quantify the effect of the contributing surroundings. Results showed that, for a clear-sky day with a minimal contribution of the surroundings, all methods differed from each other between 5% and 11%, depending on the spectral range, and any of them could be used to estimate HDI in these conditions. However, in the case of making surface measurements in an area with significant surrounding elements (buildings, trees, etc.), HDI values retrieved from the panel present an increase of +3 W . m⁻² . µm⁻¹ compared with the other methods; this increase, if ignored, implies to make an error in LST ranging from +0.5°C to +1.5°C, depending on the spectral range and on surface emissivity and temperature. Comparison under heterogeneous skies with changing cloud coverage showed also large differences between the use of panel and the other methods, reaching a maximum difference of +4.6 W . m⁻² . µm⁻¹, which implies to make an error on LST of +2.2°C. In these cases, the use of the diffuse reflectance panel is proposed, since it is the unique way to capture the contribution of the surroundings and also to adequately measure HDI for sky changing conditions.

**Title**

Mobile Mapping für die Planung einer neuen Tramlinie in Zürich

**Author(s)**

WOLF (ROMAN)

**Source**

GÉOMATIQUE SUISSE, vol 111, n° 4, [01/04/2013], pp 152 - 155

**Language**

Allemand

**Mots clés géog.**

ZURICH

**Mots clés**

SYSTEME DE NUMERISATION MOBILE, TRAMWAY

**N° notice**

A2013-242

**Résumé d’auteur**

Il est prévu d’élargir le réseau des tramways dans Zürich par une ligne via Hardbrücke et Rosengartenstrasse. Pour une étude de faisabilité, il est nécessaire de disposer de données de base tridimensionnelles qui sont saisies à l’aide d’un Mobile Mapping System. Dans ce contexte, les conditions de lever d’une artère très fréquentée en centre-ville présentent un défi tout particulier.

**Title**

Fast construction of global pyramids for very large satellite images

**Author(s)**

Xiang (LONGGANG), Chen (JING), Gong (JIANYA) et Zeng (ZHEN)

**Source**

TRANSACTIONS IN GIS, vol 17, n° 2, [01/04/2013], pp 282 - 297

**Language**

Anglais

**Mots clés**

DONNEES MULTIECHELLES, GLOBE VIRTUEL, IMAGE SATELLITE, MISE A L’ECHELLE

**N° notice**

A2013-175

**Résumé d’auteur**

Satellite imagery plays a critical role in recent popular Virtual Globe systems since it delivers spatially-related information in a direct and intuitive way. A satellite image may be very large in size due to large coverage, high resolution, or both, and therefore the construction of global pyramids, a core data structure of Virtual Globe, will be time-consuming if designed improperly. This article, based on the idea of divide-and-conquer, proposes an efficient algorithm, termed CGP, for the Construction of Global Pyramids, which builds global pyramids with only a single sequential scan of input imagery. By analyzing the space complexity of CGP, the memory-minimum pyramid level is derived, at which the memory requirement of CGP is minimized to a practical level, even for very large satellite images. This article also discusses a parallel implementation of CGP, which parallels the two main actions in CGP, thus further improving the pyramid construction performance. Both theoretical analysis and experimental results show that our approach outperforms other methods and, more importantly, this advantage increases considerably as the size of input imagery increases.
## Analyse spatiale

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<th>Projet VOTERR, une aide à la décision multicritère appliquée au développement d’une région = The VOTERR Project. A multicriteria decision aid approach for regional development</th>
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<tr>
<td>Auteur(s)</td>
<td>EHINGER (MATHIEU), BOLLINGER (DOMINIQUE), PRELAZ-DROUX (ROLAND), REPETTI (ALEXANDRE) et LEU (CHRISTINE)</td>
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<tr>
<td>Source</td>
<td>REVUE INTERNATIONALE DE GÉOMATIQUE, vol 23, n° 1, [01/03/2013], pp 71 - 94</td>
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<td>Mots clés géog.</td>
<td>VAUD</td>
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<td>Mots clés</td>
<td>AMENAGEMENT DU TERRITOIRE, ANALYSE MULTICRITERE, APPROCHE PARTICIPATIVE, OUTIL D'AIDE À LA DECISION, UTILISATION DU SOL</td>
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<td>N° notice</td>
<td>A2013-197</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Les communes vaudoises sont légalement contraintes à limiter leur surface de zones à bâtir. Par une approche de comparaison multicritère négociée, l’étude VOTERR décrite dans cet article vise à unifier celles constituant le Vallon du Nozon autour d’un projet leur permettant d’optimiser la répartition et la réorganisation des surfaces de zones à bâtir.</td>
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<th>Titre</th>
<th>Une évaluation spatiale des risques agro-environnementaux par une modélisation multicritère combinée avec la méthode PIXAL = Agro-environmental risk evaluation by a spatialised multi-criteria modelling combined with the PIXAL method</th>
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<td>Auteur(s)</td>
<td>MACARY (FRANCIS), LECCIA (ODILE), ALMEIDA DIAS (JUSCELINO), MORIN (SOIZIC) et SANCHEZ-PEREZ (JOSE-MIGUEL)</td>
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<td>Source</td>
<td>REVUE INTERNATIONALE DE GÉOMATIQUE, vol 23, n° 1, [01/03/2013], pp 39 - 70</td>
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<td>Mots clés géog.</td>
<td>GASCOGNE</td>
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<td>Mots clés</td>
<td>ANALYSE MULTICRITERE, BASSIN HYDROGRAPHIQUE, EAU DE SURFACE, ELECTRE TRI, NITRATE, OUTIL D'AIDE À LA DECISION, QUALITE DES EAUX, RISQUE ENVIRONNEMENTAL, SYSTEME D'INFORMATION GEOGRAPHIQUE</td>
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<td>N° notice</td>
<td>A2013-196</td>
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<tr>
<td>Résumé d’auteur</td>
<td>The degradation of water quality due to agricultural inputs is now a major problem in all regions where fertilizers and pesticides have been widely used for best yields. In order to improve the situation in the field, public agricultural and environmental services need to assess the agro-environmental risks at different spatial levels in order to apply the appropriate measures. We researched the assessment of these risks by studying current practices at different spatial scales. This was carried out in the Coteaux de Gasconne area of southwest France, using first, ELECTRE TRI-C multi-criteria spatial modelling combined with ArcGIS®, on a small experimental watershed (3 km²); then AZOTOPIXAL method, which includes both remote sensing and GIS on a 1,150 km² watershed. We identified a functional relationship between these two decision aiding methods, and then attempted to validate the results by taking measurements of nitrogen concentration in surface water.</td>
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<th>Titre</th>
<th>Couplage de l'AMCD avec les SIG en appui au processus décisionnel d'analyse des projets de fermes éoliennes, L'approche DEMIT = Coupling MCDA and GIS in a decision making process for wind farm projects analysis, TIMED approach</th>
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<tr>
<td>Auteur(s)</td>
<td>VAZQUEZ (MARIA DE), WAAUB (JEAN-PHILIPPE) et ILLINCA (ADRIAN)</td>
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<td>Source</td>
<td>REVUE INTERNATIONALE DE GÉOMATIQUE, vol 23, n° 1, [01/03/2013], pp 95 - 123</td>
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<td>QUEBEC</td>
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<td>Mots clés</td>
<td>AMENAGEMENT DU TERRITOIRE, ANALYSE MULTICRITERE, ENERGIE EOLIENNE, EOLIENNE, OUTIL D'AIDE À LA DECISION, SITE, SYSTEME D'INFORMATION GEOGRAPHIQUE</td>
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<td>Résumé d’auteur</td>
<td>The large-scale (more than 25MW) development of wind energy seems to be a very promising option given climate change and the need to diversify sources of energy. However, in Quebec, Canada, this fast growing field is raising the concern and apprehension of the population for various reasons, the first one being the protection of Quebec's rural landscape, an important tourism resource. Transparency and participation in the decision-making process are the two major requests of local stakeholders regarding the installation of wind farms. Hence, two methods are essential to address these demands: Multi-Criteria Decision Analysis (MCDA) and Geographic Information Systems (GIS). Several scholars working in different fields, including the wind sector, have used the MCDA-GIS coupling. Therefore, we developed an approach that uses both methods specifically in the context of large-scale wind energy projects. We emphasize</td>
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how such an approach can be used in the analysis of different scenarios and consider the opinions and attitudes of all stakeholders in order to choose the “best” one based on a participative, transparent decision making process.

**Applications de géodésie spatiale**

**Titre**

Galileo altimetry using AltBOC and RTK techniques

**Auteur(s)**

DAMPF (JURGEN) et al.

**Source**

INSIDE GNSS, vol 8, n° 1, [01/01/2013], pp 54 - 63

**Langue**

Anglais

**Mots clés géo.**

HAUTEUR (COORDONNÉE), REFLECTOMETRIE PAR GNSS, RESOLUTION D'AMBIGUITE, SIGNAL GALILEO

**N° notice**

A2013-166

**Résumé d'auteur**

Reflectometry systems analyze reflected GNSS signals to investigate properties of the reflecting surface and to derive various parameters from that surface. The emergence of additional GNSS systems has increased the availability of multiple signals on multiple frequencies, which provides the opportunity for developing new techniques for applying reflectometry. This article describes an E1/E5a/E5b ground-based altimetry application that has been tested with Galileo signals. The innovative aspect of this system resolves carrier phase ambiguities as in RTK positioning to achieve millimeter accurate surface height measurements, including the use of Galileo AltBOC code measurements for instantaneous decimeter accurate height values. New applications enabled by this technique may include monitoring of large buildings, landslides, or precision passive radar.

**Titre**

Study on the new methods of ship object detection based on GNSS reflection

**Auteur(s)**

LU (YONG), YANG (DONGKAI), LI (WEIQIANG) et al.

**Source**

MARINE GEODESY, vol 36, n° 1, [01/01/2013], pp 22 - 30

**Langue**

Anglais

**Mots clés géo.**

CAPTEUR AERIEN, DETECTION D'OBJET, NAVIRE, REFLECTOMETRIE PAR GNSS

**N° notice**

A2013-244

**Résumé d'auteur**

This paper presents a study on the new methods of ship object detection based on GPS-R correlation power spectra. Both the principle and the algorithms for recognition are given in detail. The architecture of Doppler Delay Mapping Receiver (DDMR), signal-processing chain, and correlation power spectra discriminant of the reflected signals from the ship object are discussed. Real-time data collection campaigns were done near the sea at Sanya with the Doppler delay mapping receiver mounted on an airplane. Some preliminary experiment results show that the DDMR could work well and can be used in ship object detecting.

**Titre**

Comparison of grid averaged altimeter and buoy significant wave heights in the Northern Indian Ocean

**Auteur(s)**

SABIQUE (L.), BALAKRISHNAN NAIR (T.), SRINIVAS (K.) et al.
A quantitative comparison of the collocated inter-annual significant wave height (SWH) data collected between 2006 and 2009 from buoys and altimeters at nine buoy locations (total n = 2241) in the Northern Indian Ocean is attempted for assessing the validity of daily averaged gridded altimeter significant wave height (ASWH) provided by AVISO for operational use. ASWH is underestimated by 0.20 m, the root-mean-square error (RMSE) is less than 0.30 m, the Scatter Index is less than 20%, and the correlation coefficient is greater than 0.90. Further, at three locations, the examination of the above statistics showed that the bias and RMSE is high during the southwest monsoon season compared with the Northeast monsoon. Scatter Index showed only slight variation (14–18%) for different ranges of SWH. The response of the daily average gridded ASWH data during extreme conditions (cyclones) in the vicinity of the buoy locations is poor at all compared buoy locations. The gridded ASWH from different satellite missions provided by AVISO can be used for basin scale validation experiments of the wave model and for climatological studies in the Indian Ocean, except during cyclone conditions.

Devising stable geometrical reference frames for use in geodetic studies of vertical crustal motion

We present a method for constructing and assessing the stability of a geometrical reference frame for use in vertical crustal motion studies. Our approach exploits the fact that when we transform GPS velocity solutions from one reference frame (RF) to another one using a Helmert transformation, only the frame translation rate parameters produce significant changes in the vertical station velocities expressed in the final RF. Loosely speaking, one can select and impose a ‘vertical RF’ from an ensemble of candidate frames, without any reference to the ‘horizontal RF’ (which can be selected and imposed afterwards), by seeing how the frame translation rates vary as one moves across the ensemble of frames. We order this ensemble according to the number of stations, N, incorporated into the set VREF whose RMS vertical motion is minimized in order to realize each frame. The value of N controls the level of scatter in, and hence the degree of similarity between the vertical velocities of the stations composing VREF. We characterize a specific vertical RF as stable if all of the frames located in a large neighborhood of the ensemble which includes the specific frame are characterized by very small relative frame translation rates. In this case, the expression of vertical GPS station velocities in any of these frames would lead to very similar results. We present a case study using a very large global time series in which we find a large RF neighborhood in which vertical station velocities are globally stable at the ? 0.2 mm/year level, and a slightly smaller neighborhood in which vertical stability improves to ? 0.1 mm/year level in polar regions.

A continuous velocity field for Norway

In Norway, as in the rest of Fennoscandia, the process of Glacial Isostatic Adjustment causes ongoing crustal deformation. The vertical and horizontal movements of the Earth can be measured to a high degree of precision using GNSS. The Norwegian GNSS network has gradually been established since the early 1990s and today contains approximately 140 stations. The stations are established both for navigation purposes
and for studies of geophysical processes. Only a few of these stations have been analyzed previously. We present new velocity estimates for the Norwegian GNSS network using the processing package GAMIT. We examine the relation between time-series length and precision. With approximately 3.5 years of data, we are able to reproduce the secular vertical rate with a precision of 0.5 mm/year. To establish a continuous crustal velocity field in areas where we have no GNSS receivers or the observation period is too short to obtain reliable results, either interpolation or modeling is required. We experiment with both approaches in this analysis by using (i) a statistical interpolation method called Kriging and (ii) a GIA forward model. In addition, we examine how our vertical velocity field solution is affected by the inclusion of data from repeated leveling. Results from our geophysical model give better estimates on the edge of the network, but inside the network the statistical interpolation method performs better. In general, we find that if we have less than 3.5 years of data for a GNSS station, the interpolated value is better than the velocity estimate based on a single time-series.

High-rate precise point positioning (PPP) to measure seismic wave motions: an experimental comparison of GPS PPP with inertial measurement units

XU (PEILIANG), SHI (CHUANG), FANG (RONGXIN) et al.
JOURNAL OF GEODESY, vol 87, n° 4, [01/04/2013], pp 361 - 372

High-rate GPS has been widely used to construct displacement waveforms and to invert for source parameters of earthquakes. Almost all works on internal and external evaluation of high-rate GPS accuracy are based on GPS relative positioning. We build an experimental platform to externally evaluate the accuracy of 50-Hz PPP displacement waveforms. Since the shake table allows motion in any of six degrees of freedom, we install an inertial measurement unit (IMU) to measure the attitude of the platform and transform the IMU displacements into the GPS coordinate system. The experimental results have shown that high-rate PPP can produce absolute horizontal displacement waveforms at the accuracy of 2–4 mm and absolute vertical displacement waveforms at the sub-centimeter level of accuracy within a short period of time. The significance of the experiments indicates that high-rate PPP is capable of detecting absolute seismic displacement waveforms at the same high accuracy as GPS relative positioning techniques, but requires no fixed datum station. We have also found a small scaling error of IMU and a small time offset of misalignment between high-rate PPP and IMU displacement waveforms by comparing the amplitudes of and cross-correlating both the displacement waveforms.

Using thermal time and pixel purity for enhancing biophysical variable time series: An interproduct comparison

DUVEILLER (GREGORY), BARET (FREDERIC) et DEFOURNY (PIERRE)
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2119 - 2127

This paper presents a multiannual comparison at regional scale of currently available 1-km global leaf area index (LAI) products with crop-specific green area index (GAI) retrieved from 250-m spatial resolution imagery from the Moderate Resolution Imaging Spectroradiometer (MODIS). The crop-specific GAI product benefits from the following extra processing steps: 1) spatial filtering of time series based on pixel purity; 2) transforming the time scale to thermal time; and 3) fitting a canopy structural dynamic model to smooth out the signal. In order to perform a rigorous comparison, these steps

Applications de télédétection
were also applied to the 1-km LAI products, namely, MODIS LAI (MCD15) and LAI produced in the CYCLOPES (Carbon Cycle and Change in Land Observational Products from an Ensemble of Satellites) project. A simple indicator was also designed to quantify the increase in temporal smoothness that can thus be obtained. The results confirm that, for winter wheat, the 250-m GAI product provides a more realistic description of the time course of the biophysical variable in terms of reaching higher values, grasping the variability, and providing smoother time series. However, the use of thermal time and pixel purity also improves the temporal consistency and coherence of the 1-km products. Overall, the results of this study suggest that these techniques could be valuable in harmonizing remote sensing data coming from different sources with varying spatial and temporal resolution for enhanced vegetation monitoring.

**Assessing the impact of hydrocarbon leakages on vegetation using reflectance spectroscopy**

This paper assesses the capability of hyperspectral remote sensing to detect hydrocarbon leakages in pipelines using vegetation status as an indicator of contamination. A field experiment in real scale and in tropical weather was conducted in which Brachiaria brizantha H.S. pasture plants were grown over soils contaminated with small volumes of liquid hydrocarbons (HCs). The contaminations involved volumes of hydrocarbons that ranged between 2 L and 12.7 L of gasoline and diesel per m3 of soil, which were applied to the crop parcels over the course of 30 days. The leaf and canopy reflectance spectra of contaminated and control plants were acquired within 350–2500 nm wavelengths. The leaf and canopy reflectance spectra were mathematically transformed by means of first derivative (FD) and continuum removal (CR) techniques. Using principal component analysis (PCA), the spectral measurements could be grouped into either two or three contamination groups. Wavelengths in the red edge were found to contain the largest
spectral differences between plants at distinct, evolving contamination stages. Wavelengths centred on water absorption bands were also important to differentiating contaminated from healthy plants. The red edge position of contaminated plants, calculated on the basis of FD spectra, shifted substantially to shorter wavelengths with increasing contamination, whereas non-contaminated plants displayed a red shift (in leaf spectra) or small blue shift (in canopy spectra). At leaf scale, contaminated plants were differentiated from healthy plants between 550–750 nm, 1380–1550 nm, 1850–2000 nm and 2006–2196 nm. At canopy scale, differences were substantial between 470–518 nm, 550–750 nm, 910–1081 nm, 1116–1284 nm, 1736–1786 nm, 2006–2196 nm and 2222–2378 nm. The results of this study suggests that remote sensing of B. brizantha H.S. at both leaf and canopy scales can be used as an indicator of gasoline and diesel contaminations for the detection of small leakages in pipelines.
In this paper, we present a hybrid shadow-analysis approach that integrates the model- and property-based methods for detecting collapsed buildings after an earthquake using high-resolution satellite imagery. The framework of the proposed approach has four main steps. (1) The three-dimensional (3D) building model is established according to its footprint and height data stored in a geographical information system. (2) The theoretical shadow area of the building at the time that the post-seismic image was acquired is calculated. And the polygon of the ground shadow area of the building, which is called the theoretical ground shadow polygon, is extracted. (3) The theoretical ground shadow polygon is overlaid with the casting shadow area of the building, which is called the actual shadow area in the post-seismic satellite image, and the mean value of the digital number values of the post-seismic image pixels within the polygon of the theoretical shadow area is calculated. (4) The calculated mean value is compared with predefined thresholds, which are determined by the training pixels collected from the different types of shadows. On this basis, the shadows of totally collapsed, partially collapsed and uncollapsed buildings can be distinguished. A comprehensive experiment for Dujiangyan city, one of the urban areas most severely damaged in the May 2008 Wenchuan Earthquake, was conducted, and the experimental results showed the superiority of the proposed approach to the other existing ones.

**Applications photogrammétriques**

**Titre**
Impact of scale and quality of Digital Terrain Models on predictability of seabed terrain types

**Auteur(s)**
ERIKSTAD (LARS), BAKKESTUEN (VEGAR), BEKKBY (TRINE) et HALVORSEN (RUNE)

**Source**
MARINE GEODESY, vol 36, n° 1, [01/01/2013], pp 2 - 21

**Langue**
Anglais

**Mots clés géog.**
NORVEGE

**Mots clés**
FOND MARIN, HABITAT ANIMAL, MODELE NUMERIQUE BATHYMETRIQUE, PENTE, RELIEF SOUS-MARIN

**N° notice**
A2013-243

**Résumé d’auteur**
The local and regional distribution of seabed terrain types depends on factors such as slope and terrain ruggedness. Digital bathymetrical models (DBM) are therefore essential for mapping and predictive modeling of marine habitats. DBMs vary considerably with respect to scale and quality, and this variation is likely to influence the predictive ability of marine habitat models built with use of DBM-derived environmental predictor variables. We studied the interpretability of seabed terrain types from four different DBMs in two ways: by visual inspection of hillshade representation of the DBMs and by subjecting sets of variables derived from each of the four DBMs to maximum entropy (MaxEnt) predictive modeling of six seabed terrain types. Our results show that DBMs based on multibeam echo sounder data, resampled at resolutions up to 50 m, enable identification of concentrations of seabed terrain types characterized by moraine-ridge assemblies and plough-mark fields. Variables derived from models interpolated from contours of existing marine maps and bathymetric databases have strong limitations and merely enable separation of terrain dominated by rugged bedrock seabed from soft sediment flats. Interpolated DBMs are currently the only type of bathymetrical data that cover all Norwegian coastal waters. Their poor quality is an important obstacle to predictive modeling and classification of seabed habitats.

**Titre**
From LiDAR data to forest representation on multi-scale

**Auteur(s)**
SCHWARZBACH (FREIDERIKE), OKSASNEN (JUHA) et al.

**Source**
CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 33 - 42

**Langue**
Anglais

**Mots clés**
ARBRE (FLORE), CARTE DE LA VEGETATION, CONCEPTION CARTOGRAPHIQUE, DONNEES LIDAR, FIGURE PONCTUEL, GENERALISATION CARTOGRAPHIQUE, ORTHOIMAGE COULEUR, REDACTION CARTOGRAPHIQUE, REPRESENTATION MULTIPLE

**N° notice**
A2013-187

Articles signalés entre le 1er mai et le 30 juin 2013 par le Centre de Documentation de l’IGN – p. 11
The paper describes processing methods for portraying forest areas on maps utilizing point symbols. The forest map design is based on the use of individual tree data, which is detected from airborne laser scanning data and colour-infrared orthophotos. Several generalisation and symbolisation approaches have been tested in order to use the tree data set for cartographic purposes. Our generalisation method differentiates between trees in dense forests and tree structures in open areas, such as isolated trees, tree groups, tree rows and sparsely scattered trees. The tree symbols are integrated visually with the other map content. The results show that the production of attractive and useful maps requires an advanced generalisation method due to the massive amount of tree objects extracted from the laser scanning data as well as a generalisation level and a symbol type for the trees that are carefully chosen according to the map scale. Furthermore, sophisticated visualisation methods are needed for composing the maps. The created maps are part of a project that aims at supporting outdoor activities using multi-scale maps as part of a multi-publishing service.

**Virtual worlds for photogrammetric image-based simulation and learning**

**Auteur(s)**
PIATTI (EDUARDO J.) et LERMA (JOSE L.)

**Source**
PHOTOGRAMMETRIC RECORD, vol 28, n° 141, [01/03/2013], pp 27 - 42

**Résumé d’auteur**
Simulation is a common activity in many fields and pursuits, not only for teaching but also for learning, training, monitoring, research and entertainment, among others. This paper presents the criteria used to develop virtual scenarios for photogrammetric simulation based on both synthetic objects and synthetic images. The workflow used to generate three-dimensional (3D) virtual worlds is presented together with the subsequent reconstruction of the metric perspective images (synthetic scenes) emulating any type of frame camera in any kind of terrestrial or aerial set-up, the latter with an aeroplane, helicopter or unmanned aerial vehicle (UAV). A simulator can be used to create 3D virtual worlds in order to improve an understanding of mission planning, generate synthetic image sequences with suitable overlaps, as well as optimising image data acquisition before undertaking expensive photogrammetric surveys in the field.

**Pedestrian network extraction from fused aerial imagery (orthoimages) and laser imagery (lidar)**

**Auteur(s)**
KASEMSUPPAKORN (PIYAWAN) et KARIMI (HASSAN A.)

**Source**
PHOTOGRAMMETRIC ENGINEERING & REMOTE SENSING, vol 79, n° 4, [01/04/2013], pp 369 - 379

**Résumé d’auteur**
A pedestrian network is a topological map that contains the geometric relationship between pedestrian path segments (e.g., sidewalk, crosswalk, footpath), which is needed in a variety of applications, such as pedestrian navigation services. However, current pedestrian networks are not widely available. In an effort to provide an automatic means for creating pedestrian networks, this paper presents a methodology for extracting pedestrian network from aerial and laser images. The methodology consists of data preparation and four steps: object filtering, pedestrian path region extraction, pedestrian network construction, and raster to vector conversion. An experiment, using ten images, was conducted to evaluate the performance of the methodology. Evaluation results indicate that the methodology can extract sidewalk, crosswalk, footpath, and building entrances; it collects pedestrian networks with 61 percent geometrical completeness, 67.35 percent geometrical correctness, 71 percent topological completeness and 51.38 percent topological correctness.

**Low altitude aerial photography applications for digital surface models creation in archaeology**

**Auteur(s)**
MARTINEZ-DEL-POZO (JOSE-ANGEL), CERILLO-CUENCA (ENRIQUE) et SALAS-TOVAR (ERNESTO)

**Source**
TRANSACTIONS IN GIS, vol 17, n° 2, [01/04/2013], pp 227 - 246

**Langue**
Anglais
Résumé d’auteur

Low Altitude Aerial Photography (LAAP) is based on the use of small flying platforms to take photographs from very low altitudes. The acquisition of series of Digital Surface Models (DSMs) and orthoimages through photogrammetric and orthorectification processes is one of the main applications. The use of this technique in archaeological sites provides very precise and valuable data, but knowing the reliability of the method is a key to ensuring that the results are valid, since the repeatability of the method is fundamental to multitemporal studies. The present work shows an analysis of the similarity of DSMs obtained from different stereoscopic pairs from the same area. The reliability of the models has been assessed by calculating the Standard Deviation (STD) of the altitude values from the models, to obtain maps displaying the differences among them. Finally, the STD values’ spatial distribution has been studied to assess if spatial autocorrelation exists by means of the Moran's Index and Anselin's Local Moran's Index. Results showed good similarity among the models and revealed clearly those areas where the model must be edited.

Applications SIG

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<tr>
<th>Titre</th>
<th>Implementation of the 1:10 000 scale for visualisation of environmental changes</th>
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<tr>
<td>Auteur(s)</td>
<td>LAWNICZAK (RADZYM) et KUBIAK (JAROSLAW)</td>
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<td>Source</td>
<td>CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 82 - 90</td>
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<td>Langue</td>
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<tr>
<td>Mots clés géog.</td>
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<td>Mots clés</td>
<td>1:10.000, ANALYSE DE DONNEES, CARTE THEMATIQUE, CHANGEMENT, ENVIRONNEMENT, IMPLEMENTATION (INFORMATIQUE), REPRESENTATION DES DETAILS TOPOGRAPHIQUES, SYSTEME D'INFORMATION GEOGRAPHIQUE, VISUALISATION CARTOGRAPHIQUE</td>
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<td>N° notice</td>
<td>A2013-191</td>
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Résumé d’auteur

This paper is an elaboration of the theses proposed in 'Cartographic presentation of forms and degradation of the natural environment: sozological map on a scale of 1:50 000' (Lawniczak and Kubiak, 2009), where a sozological map of Poland was presented. The said map contained comprehensive cartographic information on the forms of environmental protection and degradation, made to a scale of 1:50 000. The thematic scope of the map has already been modified twice: in 1997 and in 2005, with the ensuing changes presented in corresponding manuals: Sozological Map on a Scale of 1:50 000, in an Analogue and Digital Form (Chief National Geodesist, 1997) and Technical Guidelines GIS-4. Sozological Map of Poland, Scale of 1:50 000, in an Analogue and Digital Form (2005). Many years’ worth of experience gained since the launch of this cartographic system points out to the need for broadening the presented content and improving the map’s scale. Thus, attempts have been made at rescaling the map to 1:10 000. Increasing the degree of detail is particularly necessary for presenting areas of intensive human activity. In this paper, the authors propose technical and graphical solutions for the 1:10 000 scale

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<th>Titre</th>
<th>A GIS-based site identification for the seasonal storage of solar heating: Promises and pitfalls</th>
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<td>Auteur(s)</td>
<td>DOLNEY (TIMOTHY J.) et FLAREND (RICHARD)</td>
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<tr>
<td>Source</td>
<td>TRANSACTIONS IN GIS, vol 17, n° 2, [01/04/2013], pp 247 - 266</td>
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<tr>
<td>Mots clés géog.</td>
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<td>Mots clés</td>
<td>CHALEUR, ENSOLEILLEMENT, SITE, STOCKAGE, SYSTEME D'INFORMATION GEOGRAPHIQUE</td>
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<td>N° notice</td>
<td>A2013-173</td>
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Résumé d’auteur

This research presents the use of GIS to identify potential locations of the Seasonal Storage of Solar Heating (S3H) within the state of Pennsylvania. The S3H utilizes a large pit to store thermal energy collected during the warm months for later use in the cold months. To maximize its overall efficiency, S3H must be built where several locational parameters occur in unison: abandoned mine lands (AMLs), institutions, soil type, and land use. These parameters were mapped using GIS with potential locations identified
through the application of neighborhood statistics. Potential locations were verified through the use of aerial photographs, hillshades, and site visitations. The verification process revealed spatial inaccuracies associated with the AML dataset. As a result, the horizontal positional accuracy of AMLs was tested according to the Geospatial Positioning Accuracy Standards – National Standard for Spatial Data Accuracy (NSSDA). Results indicate larger than expected positional offset for a dataset that is crucial to funding the reclamation of AMLs.

Bases de données localisées

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<th>Titre</th>
<th>Les résolutions des bases de données &quot;occupation du sol&quot; et la mesure du changement</th>
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<td>Auteur(s)</td>
<td>BOUSQUET (AURELIE), COUDERCHET (LAURENT), GASSIAT (ANNE) et HAUTDIDIER (BAPTISTE)</td>
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<tr>
<td>Source</td>
<td>ESPACE GEOGRAPHIQUE, (L'), vol 42, n° 1, [01/03/2013], pp 61 - 76</td>
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<tr>
<td>Mots clés géog.</td>
<td>ARCACHON (BASSIN D')</td>
</tr>
<tr>
<td>Mots clés</td>
<td>BASE DE DONNEES D'OCCUPATION DU SOL, BASE DE DONNEES THEMATIQUES, CORINE LAND COVER, DONNEES MULTITEMPORELLES, INVENTAIRE PERMANENT DU LITTORAL, LIMITE DE RESOLUTION GEOMETRIQUE, LITTORAL, OCCUPATION DU SOL, QUALITE DES DONNEES, UTILISATION DU SOL</td>
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<td>N° notice</td>
<td>A2013-209</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Les bases de données d'occupation et d'usage du sol, produites par les services publics, sont communément utilisées pour étudier les thématiques aussi différentes que la déprise agricole, l'étalonnage urbain ou les trames écologiques. Bien que les fournisseurs avertissent sur les limites de leurs produits, les utilisateurs se posent peu de questions sur la performance des résolutions spatiale, temporelle ou thématique de ces bases. En comparant trois bases de données (CorineLand Cover, LittoMOS et IPLI) sur un espace littoral (bassin d'Arcachon, France), nous montrons l'importance de la prise en compte de ces résolutions pour valider l'état et les changements d'occupation et d'usage du sol.</td>
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<tr>
<th>Titre</th>
<th>Multi-level representation of terrain features on a contour map</th>
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<td>Auteur(s)</td>
<td>GUILBERT (ERIC)</td>
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<tr>
<td>Source</td>
<td>GEOINFORMATICA, vol 17, n° 2, [01/04/2013], pp 301 - 324</td>
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<td>Langue</td>
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<tr>
<td>Mots clés</td>
<td>ADJACENCE RELATIVE, ARBRE (MATHÉMATIQUES), CONTOUR, DESCRIPTION MULTINIVEAU, GENERALISATION AUTOMATIQUE DE DONNEES, INCLUSION, REPRESENTATION MULTIPLE</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Contour lines are important for quantitatively displaying relief and identifying morphometric features on a map. Contour trees are often used to represent spatial relationships between contours and assist the user in analysing the terrain. However, automatic analysis from the contour tree is still limited as features identified on a map by sets of contours are not only characterised by local relationships between contours but also by relationships with other features at different levels of representation. In this paper, a new method based on adjacency and inclusion relationships between regions defined by sets of contours is presented. The method extracts terrain features and stores them in a feature tree providing a description of the landscape at multiple levels of detail. The method is applied to terrain analysis and generalisation of a contour map by selecting the most relevant features according to the purpose of the map. Experimental results are presented and discussed.</td>
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<th>Titre</th>
<th>STHist-C: a highly accurate cluster-based histogram for two and three dimensional geographic data points</th>
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<tr>
<td>Auteur(s)</td>
<td>MAI (HAI THANH), KIM (JAEHO) et al.</td>
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<tr>
<td>Source</td>
<td>GEOINFORMATICA, vol 17, n° 2, [01/04/2013], pp 325 - 352</td>
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<td>Langue</td>
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<tr>
<td>Mots clés</td>
<td>BASE DE DONNEES LOCALISEES, DONNEES LOCALISEES 2D, DONNEES LOCALISEES 3D, HISTOGRAMME, REGROUPEMENT DE DONNEES, SYSTÈME D'INFORMATION GEOGRAPHIQUE, TRAITEMENT DE DONNEES LOCALISEES</td>
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<td>N° notice</td>
<td>A2013-162</td>
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</table>
Histograms have been widely used for estimating selectivity in query optimization. In this paper, we propose a new histogram construction method for geographic data objects that are used in many real-world applications. The proposed method is based on analyses and utilization of clusters of objects that exist in a given data set, to build histograms with significantly enhanced accuracy. Our philosophy in allocating the histogram buckets is to allocate them to the subspaces that properly capture object clusters. Therefore, we first propose a procedure to find the centers of object clusters. Then, we propose an algorithm to construct the histogram buckets from these centers. The buckets are initialized from the clusters’ centers, then expanded to cover the clusters. Best expansion plans are chosen based on a notion of skewness gain. Results from extensive experiments using real-life data sets demonstrate that the proposed method can really improve the accuracy of the histograms further, when compared with the current state of the art histogram construction method for geographic data objects.

**_cartographie**

<table>
<thead>
<tr>
<th>Titre</th>
<th>New insights into the concept of orienteering maps</th>
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<td>Auteur(s)</td>
<td>MUNOZ-NIETO (ANGEL), RODRIGUEZ-GONZALVEZ (PABLO) et al.</td>
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<tr>
<td>Source</td>
<td>CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 91 - 97</td>
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<td>Langue</td>
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<td>Mots clés</td>
<td>CARTE THEMATIQUE, CONCEPTION CARTOGRAPHIQUE, COURSE D’ORIENTATION, REDACTION CARTOGRAPHIQUE</td>
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<td>Résumé d’auteur</td>
<td>Orienteering is both a mental and physical activity. A compass and maps are the basic tools of orienteering, and orienteering requires specialized maps that have been adapted and standardized to guarantee fair competition. Map-making for orienteering has become a highly specialized cartographic task. This paper aims to answer three main questions: What is an orienteering map (o-map)? How should we categorize o-maps? What are its essential components? The answers to these questions provide insight into the concept and nature of o-maps. By analysing the functions of this type of maps and by searching for similarities and differences between o-maps, topographic maps, and nautical charts, we attempt to comprehensively characterize and conceptualize o-maps to contribute to their improvement.</td>
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**_cartographie étrangère_**

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<th>Titre</th>
<th>An approach to transform Chinese historical books into scenario-based historical maps</th>
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<td>Auteur(s)</td>
<td>HE (LI), CHEN (MIN) et LU (GUONIAN)</td>
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<td>Source</td>
<td>CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 49 - 65</td>
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<td>CARTE INTERACTIVE, CARTOGRAPHIE HISTORIQUE, CONCEPTION CARTOGRAPHIQUE, DONNEES SPATIOTEMPORELLES, HISTOIRE, LITTERATURE, MONOGRAPHIE</td>
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<td>Résumé d’auteur</td>
<td>Spatio-temporal information (e.g. time, location, person and event) recorded in detail in vast Chinese historical books can provide evidence about the movement of entities (e.g. people, family, army and weapons) and their underlying spatial behaviours. Furthermore, this information largely reflects the process of social development, which makes it valuable to both professional research and public awareness. However, this information cannot be easily expressed and visually utilized because it is often hidden in the text of historical books. Aiming to better realize the potential value of such abundant information derived from historical books and bridging the gap between historical research and geographic space, a feasible and appropriate approach is explored in this article, to guide the transforming process from historical books to historical maps. The hope is that providing the scenarios of historical events will benefit related historical and social research. First, the integral framework of the approach was introduced, and the detail of building the specific spatio-temporal framework for information matching was discussed. Based on the spatio-temporal framework, the specification for the representation of</td>
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historical books was designed. By extracting the spatio-temporal data from historical books, organizing them according to the specification and matching them with the spatio-temporal framework, the scenarios of historical events in the book (e.g. wars, migration, diseases, natural disasters, mass movement, etc.) can be visually transformed into historical maps. As the most critical writing of the Chinese Twenty-Four Histories, the Records of the Grand Historian (also known as Shiji) was employed as an example to test the proposed approach.

Cartographie thématique

<table>
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<th>Titre</th>
<th>Quelles frontières en mer de Chine méridionale ?</th>
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<tr>
<td>Auteur(s)</td>
<td>MARIN (C.)</td>
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<tr>
<td>Source</td>
<td>CARTO, LE MONDE EN CARTES, n° 17, [01/05/2013], pp 54 - 55</td>
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<td>Mots clés géog.</td>
<td>CHINE (MER DE)</td>
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<td>Mots clés</td>
<td>CONFLIT, EAUX TERRITORIALES, FRONTIERE MARITIME, HYDROCARBURE, PECHE</td>
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<td>Résumé d’auteur</td>
<td>Devenu un des couloirs de navigation les plus empruntés au monde et abritant d'abondantes ressources halieutiques, ainsi que d'importantes réserves d'hydrocarbures, la mer de Chine méridionale est revendiquée pour partie ou totalité par les états riverains. Ce conflit territorial et maritime largement couvert par les médias ne peut être compréhensible qu'à l'aide d'une cartographie explicite. Les représentations montrant des lignes de revendications entrecroisées sont nombreuses, sans toutefois nous éclairer réellement.</td>
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Géodésie spatiale

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<th>Titre</th>
<th>Assessing GNSS data message performance: a new approach</th>
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<tr>
<td>Auteur(s)</td>
<td>ANGHI LERI (MARCO) et al.</td>
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<td>Source</td>
<td>INSIDE GNSS, vol 8, n° 2, [01/03/2013], pp 61 - 71</td>
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<td>Langue</td>
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<tr>
<td>Mots clés</td>
<td>ANALYSE COMPARATIVE, POSITIONNEMENT PAR GALILEO, POSITIONNEMENT PAR GPS</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Performance analysis of GNSS signal properties and components is well defined in the technical literature. Terms such as code tracking noise, multipath error envelopes, and S-curve bias, to name a few, are commonly accepted and widely used by scientists. However, the performance of GNSS data messages has yet to be fully assessed and compared. This article proposes well-defined &quot;figures of merit&quot; that can be used to better evaluate current and future GNSS system performance and presents sample analyses to demonstrate the authors' methodology.</td>
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<th>Titre</th>
<th>Galileo on its own: First position fix</th>
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<td>Source</td>
<td>INSIDE GNSS, vol 8, n° 2, [01/03/2013], pp 50 - 71</td>
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<td>POSITIONNEMENT PAR GALILEO</td>
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<td>Résumé d’auteur</td>
<td>In a milestone for Europe’s GNSS program, the European Space Agency reports the first successful 3D position determination using only Galileo satellites.</td>
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<th>Titre</th>
<th>Fast error analysis of continuous GNSS observations with missing data</th>
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<td>Auteur(s)</td>
<td>BOS (M.S.), FERNANDES (R.), WILLIAMS (S.) et BASTOS (L.)</td>
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<tr>
<td>Source</td>
<td>JOURNAL OF GEODESY, vol 87, n° 4, [01/04/2013], pp 351 - 360</td>
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<td>Mots clés</td>
<td>BRUIT, CLASSIFICATION PAR MAXIMUM DE VRAISEMBLANCE, DONNEES GNSS, MATRICE DE COVARIANCE, SERIE TEMPORELLE, TRAITEMENT DE DONNEES GNSS</td>
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<tr>
<td>Résumé d’auteur</td>
<td>One of the most widely used method for the time-series analysis of continuous Global Navigation Satellite System (GNSS) observations is Maximum Likelihood Estimation (MLE) which in most implementations requires O(n3) operations for n observations.</td>
</tr>
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</table>
Previous research by the authors has shown that this amount of operations can be reduced to O(n^2) for observations without missing data. In the current research we present a reformulation of the equations that preserves this low amount of operations, even in the common situation of having some missing data. Our reformulation assumes that the noise is stationary to ensure a Toeplitz covariance matrix. However, most GNSS time-series exhibit power-law noise which is weakly non-stationary. To overcome this problem, we present a Toeplitz covariance matrix that provides an approximation for power-law noise that is accurate for most GNSS time-series. Numerical results are given for a set of synthetic data and a set of International GNSS Service (IGS) stations, demonstrating a reduction in computation time of a factor of 10–100 compared to the standard MLE method, depending on the length of the time-series and the amount of missing data.
knowledge base was evaluated against a set of spatiotemporal test queries. The
evaluation showed that this knowledge base supports a wide range of queries on the
evolution of the administrative units of Switzerland between 1960 and 2010.

<table>
<thead>
<tr>
<th>Title</th>
<th>Parallel indexing technique for spatio-temporal data</th>
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<tr>
<td>Auteur(s)</td>
<td>HE (ZHENWEN), KRAAK (MENNO-JAN) et HUISMAN (OTTO)</td>
</tr>
<tr>
<td>Source</td>
<td>ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING, VOL 78, N° 0, [01/04/2013], pp 116 - 128</td>
</tr>
<tr>
<td>Langue</td>
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<tr>
<td>Mots clés</td>
<td>ARBRE-R, DONNEES HETEROGENES, DONNEES SPATIOTEMPORELLES, INDEXATION SPATIALE, REQUETE SPATIO-TEMPORELLE, SYSTEME D'INFORMATION GEOGRAPHIQUE, TRAITEMENT PARALLELE</td>
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<td>N° notice</td>
<td>A2013-182</td>
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<td>Résumé d'auteur</td>
<td>The requirements for efficient access and management of massive multi-dimensional spatio-temporal data in geographical information system and its applications are well recognized and researched. The most popular spatio-temporal access method is the R-Tree and its variants. However, it is difficult to use them for parallel access to multi-dimensional spatio-temporal data because R-Trees, and variants thereof, are in hierarchical structures which have severe overlapping problems in high dimensional space. We extended a two-dimensional interval space representation of intervals to a multi-dimensional parallel space, and present a set of formulae to transform spatio-temporal queries into parallel interval set operations. This transformation reduces problems of multi-dimensional object relationships to simpler two-dimensional spatial intersection problems. Experimental results show that the new parallel approach presented in this paper has superior range query performance than R*-trees for handling multi-dimensional spatio-temporal data and multi-dimensional interval data. When the number of CPU cores is larger than that of the space dimensions, the insertion performance of this new approach is also superior to R*-trees. The proposed approach provides a potential parallel indexing solution for fast data retrieval of massive four-dimensional or higher dimensional spatio-temporal data.</td>
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<tr>
<th>Title</th>
<th>A framework to model and manipulate constraints for over-constrained geographic applications</th>
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<tr>
<td>Auteur(s)</td>
<td>JAZIRI (WASSIM) et MAINGUENAUD (M.)</td>
</tr>
<tr>
<td>Source</td>
<td>GEOINFORMATICA, VOL 17, N° 2, [01/04/2013], pp 257 - 284</td>
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<tr>
<td>Langue</td>
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<tr>
<td>Mots clés géog.</td>
<td>FECAMP, PAYS DE CAUX, YVETOT</td>
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<td>Mots clés</td>
<td>CONTRAINE D'INTEGRITE, INONDATION, PROGRAMMATION PAR CONTRAINTEES, RISQUE NATUREL, SIMULATION NUMERIQUE, SYSTEME D'INFORMATION GEOGRAPHIQUE</td>
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<tr>
<td>N° notice</td>
<td>A2013-159</td>
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<tr>
<td>Résumé d'auteur</td>
<td>Geographic applications are often over-constrained because of the stakeholders' multiple requirements and the various spatial, alphanumeric and temporal constraints to be satisfied. In most cases, solving over-constrained problems is based on the relaxation of some constraints according to values of preferences. This article proposes the modelling and the management of constraints in order to provide a framework to integrate stakeholders in the expression and the relaxation of their constraints. Three families of constraints are defined: static vs. dynamic, intra-entity vs. inter-entities and intra-instance vs. inter-instances. Constraints are modelled from two points of view: system with the complexity in time of the different involved operators and user with stakeholders’ preferences. The methodology of constraints relaxation is based on primitive, complex and derived operations. These operations allow a modification of the constraints in order to provide a relevant solution to a simulation. The developed system was applied to reduce the streaming/floods risks in the territory of Pays de Caux (Seine Maritime, France).</td>
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<tr>
<th>Title</th>
<th>Spatio-temporal polygonal clustering with space and time as first-class citizens</th>
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<tr>
<td>Auteur(s)</td>
<td>JOSHI (DEEPTI), SAMAL (ASHOK) et SOH (LEEN-KIAT)</td>
</tr>
<tr>
<td>Source</td>
<td>GEOINFORMATICA, VOL 17, N° 2, [01/04/2013], pp 387 - 412</td>
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<tr>
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<td>Mots clés</td>
<td>ANALYSE DE GROUPEMENT, ANALYSE SPATIO-TEMPORELLE, DONNEES SPATIOTEMPORELLES, EXPLORATION DE DONNEES, SPATIO-TEMPORAL POLYGONAL CLUSTERING</td>
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<tr>
<td>N° notice</td>
<td>A2013-164</td>
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</table>
Detecting spatio-temporal clusters, i.e. clusters of objects similar to each other occurring together across space and time, has important real-world applications such as climate change, drought analysis, detection of outbreak of epidemics (e.g. bird flu), bioterrorist attacks (e.g. anthrax release), and detection of increased military activity. Research in spatio-temporal clustering has focused on grouping individual objects with similar trajectories, detecting moving clusters, or discovering convoys of objects. However, most of these solutions are based on using a piece-meal approach where snapshot clusters are formed at each time stamp and then the series of snapshot clusters are analyzed to discover moving clusters. This approach has two fundamental limitations. First, it is point-based and is not readily applicable to polygonal datasets. Second, its static analysis approach at each time slice is susceptible to inaccurate tracking of dynamic cluster especially when clusters change over both time and space. In this paper we present a spatio-temporal polygonal clustering algorithm known as the Spatio-Temporal Polygonal Clustering (STPC) algorithm. STPC clusters spatial polygons taking into account their spatial and topological properties, treating time as a first-class citizen, and integrating density-based clustering with moving cluster analysis. Our experiments on the drought analysis application, flu spread analysis and crime cluster detection show the validity and robustness of our algorithm in an important geospatial application.

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<tr>
<th>Titre</th>
<th>Les utilisateurs ont-ils trop de fournisseurs ?</th>
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<tr>
<td>Auteur(s)</td>
<td>BLOMAC (F. DE)</td>
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<td>Source</td>
<td>SIG LA LETTRE, n° 144, [01/02/2013], pp 2 - 4</td>
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<td>Mots clés</td>
<td>DONNEES MULTISOURCES, HETEROGENEITE, LOGICIEL DE CARTOGRAPHIE, SYSTEME D'INFORMATION GEOGRAPHIQUE</td>
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<td>N° notice</td>
<td>A2013-146</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Rares sont les collectivités, bureaux d'études, entreprises et organismes de toutes sortes qui n'utilisent qu'un seul SIG, qui sont clients d'un unique éditeur. Même si l'interopérabilité est devenue plus qu'un discours, ces situations d'hétérogénéité restent complexes à gérer et coûtent for cher.</td>
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<tr>
<th>Titre</th>
<th>Ephemeral conflation</th>
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<tr>
<td>Auteur(s)</td>
<td>GONZALEZ (CARLOS-HUMBERTO), LOPEZ-VASQUEZ (CARLOS) et BERNABE (MIGUEL-ANGEL)</td>
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<td>Source</td>
<td>CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 43 - 48</td>
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<td>Langue</td>
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<td>Mots clés</td>
<td>APPAREIL PORTABLE, CONFLATION, DONNEES LOCALISEES DES BENEVOLES, INFRASTRUCTURE DE DONNEES, QUALITE DES DONNEES, TELEPHONE INTELLIGENT</td>
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<td>N° notice</td>
<td>A2013-189</td>
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<tr>
<td>Résumé d’auteur</td>
<td>The great availability of geographic information, due to Spatial Data Infrastructure development, the existence of data collected by volunteers, etc., makes the problems of geometric interoperability of data very conspicuous. Traditionally, conflation is being carefully carried out and evaluated by experts. Yet there are practices that involve occasional users who will look up the information in mobile devices without the intention of keeping a copy. Evaluation will be carried out with different criteria, involving the Human Visual System and perhaps even the characteristics of the physical devices as well. In this paper, we coin the term 'Ephemeral Conflation' to characterize that context and the procedures to evaluate it.</td>
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<tr>
<th>Titre</th>
<th>Geo-social model: A conceptual framework for real-time geocollaboration</th>
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<td>Auteur(s)</td>
<td>CHANG (ZHENG (ERIC)) et LI (SONGNIAN)</td>
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<tr>
<td>Source</td>
<td>TRANSACTIONS IN GIS, vol 17, n° 2, [01/04/2013], pp 182 - 205</td>
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<td>Mots clés</td>
<td>CADRE DE CONCEPTION, DONNEES LOCALISEES 3D, DONNEES LOCALISEES DES BENEVOLES, ONTOLOGIE, ORGANISATION DU TRAVAIL, SYNCHRONISATION, SYSTEME MULTI-AGENTS, TEMPS REEL</td>
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<td>N° notice</td>
<td>A2013-170</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Synchronous geocollaboration helps geographically dispersed people to work together in a shared geospatial environment. Its real-time nature, multiple users' interaction and diversity of work context impose some special social, organizational and technological requirements, making the development of such real-time geocollaboration systems a challenging task. A conceptual framework is therefore needed to specify and describe what synchronous geocollaboration is, considering its social, spatial and technical aspects. The geo-social model presented in this article describes a conceptual framework for synchronous geocollaboration systems addressing the above aspects, identifies the core elements of the system and describes how these elements collaborate with each other. This model is presented using application-level ontology and is then applied to a multi-agent system based prototype in which multiple users can interact and negotiate in a shared 3D geospatial environment.</td>
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<tr>
<th>Titre</th>
<th>Exploring geovisualization symbology for landscape genetics</th>
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<tr>
<td>Auteur(s)</td>
<td>MAC AOIDH (EOIN), MARTINSHON (JANN TH.) et al.</td>
</tr>
<tr>
<td>Source</td>
<td>TRANSACTIONS IN GIS, vol 17, n° 2, [01/04/2013], pp 267 - 281</td>
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<td>Mots clés</td>
<td>GESTION DE LA VIE SAUVAGE, INTERFACE WEB, PAYSAGE, PEUPLEMENT VEGETAL, POPULATION ANIMALE, SYMBOLE GRAPHIQUE, VISUALISATION CARTOGRAPHIQUE</td>
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<td>N° notice</td>
<td>A2013-174</td>
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<tr>
<td>Résumé d’auteur</td>
<td>Landscape genetics, which considers genetic population structure in the context of spatially referenced parameters in the surrounding landscape, has been shown to be extremely useful for wildlife management. Unfortunately its widespread uptake beyond...</td>
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</table>
the research community is hampered due to a lack of effective communication of usable information in a suitable format for application by stakeholders such as wildlife regulators or managers. To improve the communication of suitable information, geovisualization of results should be facilitated in a comprehensible format for stakeholders without GIS or genetic expertise. While specialist applications exist, alternative accessible solutions do not provide adequate support for the visualization of multi-attribute spatially referenced genetic population structure information. As a solution, we document our exploration for an appropriate symbology to communicate landscape genetic information through an accessible, web-based interface. A full problem description, review of available technologies, development rationale, and discussion of the symbology exploration are provided.

**Driving the industry**

**Auteur(s)** BARATA (SERGIO)  
**Source** GEO:CONNEXION, vol 12, n° 6, [01/06/2013], pp 40 - 42  
**Langue** Anglais  
**Mots clés** AIDE À LA DECISION, INFORMATIQUE EN NUAGE, NAVIGATION TERRESTRE, POSITIONNEMENT, ROUTAGE, SYSTEME D'INFORMATION GEOGRAPHIQUE  
**N° notice** A2013-230  
**Résumé d’éditeur** Cloud has recently seen rapid uptake in location intelligence. Sergio Barata looks at how it can help businesses save money with their fleet.

**Sweet and simple**

**Auteur(s)** BROWN (CHRIS)  
**Source** GEO:CONNEXION, vol 12, n° 6, [01/06/2013], pp 32 - 34  
**Langue** Anglais  
**Mots clés** DONNEES LOCALISEES NUMERIQUES, INFORMATIQUE EN NUAGE, SYSTEME D'INFORMATION GEOGRAPHIQUE, WEB MAPPING  
**N° notice** A2013-228  
**Résumé d’éditeur** Chris Brown looks forward to a time when companies no longer host their GIS data internally but in the cloud and explains what he's doing to make that happen.

**Cloud is opening doors**

**Auteur(s)** DICK (JESSI)  
**Source** GEO:CONNEXION, vol 12, n° 6, [01/06/2013], pp 26 - 27  
**Langue** Anglais  
**Mots clés** DONNEES LOCALISEES NUMERIQUES, DONNEES MASSIVES, IMAGE SATELLITE, INFORMATIQUE EN NUAGE, STOCKAGE DE DONNEES  
**N° notice** A2013-227  
**Résumé d’éditeur** Cloud and big data offer the next stage in the geospatial data revolution.

**The universal map**

**Auteur(s)** TOON (MATT)  
**Source** GEO:CONNEXION, vol 12, n° 6, [01/06/2013], pp 36 - 38  
**Langue** Anglais  
**Mots clés** AIDE À LA DECISION, APPROCHE PARTICIPATIVE, GOOGLE MAPS, INFORMATIQUE EN NUAGE, SYSTEME D'INFORMATION GEOGRAPHIQUE  
**N° notice** A2013-229  
**Résumé d’auteur** Google's Matt Toon explains how the company has developed its cloud-based Maps service with both consumers and professionals in mind.

**Infrastructure de données**

**Géocollaborer n'est pas jouer**

**Auteur(s)** BLOMAC (F. DE)  
**Source** SIG LA LETTRE, n° 147, [01/05/2013], pp 8 - 11  
**Mots clés** DONNEES LOCALISEES, INFRASTRUCTURE REGIONALE DE DONNEES LOCALISEES, MISE À JOUR DE BASE DE DONNEES, MUTUALISATION, PARTAGE DE DONNEES LOCALISEES  
**N° notice** A2013-203  
**Résumé d’auteur** Mutualiser, harmoniser, partager, collaborer, coproduire ... impossible désormais d’échapper à ce vaste mouvement qui ne laisse aucun acteur de l'information

**Open Data INSPIRE : deux démarches différentes ?**

Auteur(s) BLOMAC (F. DE)

Source SIG LA LETTRE, n° 147, [01/05/2013], pp 8 - 8

Mots clés DONNEES OUVERTES, INFRASTRUCTURE EUROPEENNE DES DONNEES LOCALISEES, INSPIRE

N° notice A2013-202

Résumé d'auteur Il n'est sans doute plus l'heure d'opposer INSPIRE et Open Data, car les deux démarches se nourrissent désormais l'une de l'autre.

**INSPIRE, C'est bon pour le business !**

Auteur(s) BLOMAC (F. DE)

Source SIG LA LETTRE, n° 147, [01/05/2013], pp 6 - 7

Mots clés DIRECTIVE EUROPEENNE, INFRASTRUCTURE EUROPEENNE DES DONNEES LOCALISEES, INSPIRE

N° notice A2013-201

**Entre opportunité et contraintes**

Auteur(s) BLOMAC (F. DE)

Source SIG LA LETTRE, n° 147, [01/05/2013], pp 2 - 5

Mots clés DIRECTIVE EUROPEENNE, INFRASTRUCTURE FRANCAISE DES DONNEES LOCALISEES, INSPIRE, METADONNEES

N° notice A2013-200

**Lasergrammétérie**

Auteur(s) LICHTI (DEREK D.) et CHOW (JACKY C. K.)

Source PHOTOGRAMMETRIC RECORD, vol 28, n° 141, [01/03/2013], pp 74 - 85

Langue Anglais

Mots clés AUTOETALONNAGE, COMPENSATION PAR MOINDRES CARRES, CONTRAINE GEOMETRIQUE, PLAN (GÉOMÉTRIE), TELEMETRIE LASER TERRESTRE

N° notice A2013-152

**Growth-competition-based stem diameter and volume modeling for tree-level forest inventory using airborne LiDAR data**

Geometric features, planes in particular, have recently replaced signalised points as the object space primitives of choice for a number of fundamental terrestrial laser scanner data processing tasks such as registration, self-calibration and deformation monitoring. The inner constraints for planes are developed in this paper owing to their importance as the optimal means of datum definition. Pertinent least squares adjustment results from several terrestrial laser scanner datasets are presented to demonstrate the impact of planar inner constraints on registration and self-calibration. When solution quality is measured in terms of parameter precision and correlation, it is demonstrated that the planes should be constrained for both laser scanner registration and self-calibration with a basic additional parameter set.
An individual tree within a forest stand will have its height and diameter growth restricted by the influence of neighboring trees. This is because trees in close proximity compete for resources and space to enable growth. In this paper, the position of trees, tree height (LH), tree crown radius (LCR), and growth competition index (LCI) were extracted from a light-detection-and-ranging (LiDAR)-based rasterized canopy height model using the multilevel morphological active-contour algorithm. The diameter and volume of individual trees are tested and validated to be an exponential function of those LiDAR-derived tree parameters. The best LiDAR-based diameter estimation model and volume estimation model were tested as significant with an \( R^2 \) value of 0.84 and 0.9 and evaluated with an estimation bias of 8.7 cm and 0.9 m\(^3\), respectively. Results also showed that LH and LCR are positively related to the LiDAR-derived diameter at breast height (DBH) and the LiDAR-derived volume of individual trees in a forest stand, whereas LCI is negatively related. The proposed algorithm of individual tree volume estimation was further applied to predict the volume of three sample plots in mountainous forest stands. It was found that the LVM could be used to predict an acceptable volume estimate of old-aged forest stands. The estimation bias, i.e., percentage RMSE (RMSE\%), is averaged at around 4% using the LiDAR metrics lnLH, LCI, and LCR, whereas the RMSE\% increases to 50% if only lnLH is applied. Results suggest that LCI is an important regulation factor in the estimation of forest volume stocks using LiDAR remote sensing.
Terrestrial laser scanning systems are steadily increasing in many fields of engineering, geoscience and architecture namely for fast data acquisition, 3-D modeling and mapping. Similarly to other precision instruments, these systems provide measurements with implicit systematic errors. Systematic errors are physically corrected by manufacturers before delivery and sporadically afterwards. The approach presented herein tackles the raw observables acquired by a laser scanner with additional parameters, a set of geometric calibration parameters that model the systematic error of the instrument to achieve the most accurate point cloud outputs, improving eventual workflow owing to less filtering, better registration and best 3D modeling. This paper presents a fully automatic strategy to calibrate geometrically terrestrial laser scanning datasets. The strategy is tested with multiple scans taken by a FARO FOCUS 3D, a phase-based terrestrial laser scanner. A calibration with local parameters for datasets is undertaken to improve the raw observables and a weighted mathematical index is proposed to select the most significant set of additional parameters. The improvements achieved are exposed, highlighting the necessity of correcting the terrestrial laser scanner before handling multiple data sets.

**Towards 3D lidar point cloud registration improvement using optimal neighborhood knowledge**

**Automatic 3D point cloud registration is a main issue in computer vision and remote sensing. One of the most commonly adopted solution is the well-known Iterative Closest Point (ICP) algorithm. This standard approach performs a fine registration of two overlapping point clouds by iteratively estimating the transformation parameters, assuming good a priori alignment is provided. A large body of literature has proposed many variations in order to improve each step of the process (namely selecting, matching, rejecting, weighting and minimizing). The aim of this paper is to demonstrate how the knowledge of the shape that best fits the local geometry of each 3D point neighborhood can improve the speed and the accuracy of each of these steps. First, we present the geometrical features that form the basis of this work. These low-level attributes indeed describe the neighborhood shape around each 3D point. They allow to retrieve the optimal size to analyze the neighborhoods at various scales as well as the privileged local dimension (linear, planar, or volumetric). Several variations of each step of the ICP process are then proposed and analyzed by introducing these features. Such variants are compared on real datasets with the original algorithm in order to retrieve the most efficient algorithm for the whole process. Therefore, the method is successfully applied to various 3D lidar point clouds from airborne, terrestrial, and mobile mapping systems. Improvement for two ICP steps has been noted, and we conclude that our features may not be relevant for very dissimilar object samplings.**

**A generative statistical approach to automatic 3D building roof reconstruction from laser scanning data**

**Automatic 3D point cloud registration is a main issue in computer vision and remote sensing. One of the most commonly adopted solution is the well-known Iterative Closest Point (ICP) algorithm. This standard approach performs a fine registration of two overlapping point clouds by iteratively estimating the transformation parameters, assuming good a priori alignment is provided. A large body of literature has proposed many variations in order to improve each step of the process (namely selecting, matching, rejecting, weighting and minimizing). The aim of this paper is to demonstrate how the knowledge of the shape that best fits the local geometry of each 3D point neighborhood can improve the speed and the accuracy of each of these steps. First, we present the geometrical features that form the basis of this work. These low-level attributes indeed describe the neighborhood shape around each 3D point. They allow to retrieve the optimal size to analyze the neighborhoods at various scales as well as the privileged local dimension (linear, planar, or volumetric). Several variations of each step of the ICP process are then proposed and analyzed by introducing these features. Such variants are compared on real datasets with the original algorithm in order to retrieve the most efficient algorithm for the whole process. Therefore, the method is successfully applied to various 3D lidar point clouds from airborne, terrestrial, and mobile mapping systems. Improvement for two ICP steps has been noted, and we conclude that our features may not be relevant for very dissimilar object samplings.**
This paper presents a generative statistical approach to automatic 3D building roof reconstruction from airborne laser scanning point clouds. In previous works, bottom-up methods, e.g., points clustering, plane detection, and contour extraction, are widely used. Due to the data artefacts caused by tree clutter, reflection from windows, water features, etc., the bottom-up reconstruction in urban areas may suffer from a number of incomplete or irregular roof parts. Manually given geometric constraints are usually needed to ensure plausible results. In this work we propose an automatic process with emphasis on top-down approaches. The input point cloud is firstly pre-segmented into subzones containing a limited number of buildings to reduce the computational complexity for large urban scenes. For the building extraction and reconstruction in the subzones we propose a pure top-down statistical scheme, in which the bottom-up efforts or additional data like building footprints are no more required. Based on a predefined primitive library we conduct a generative modeling to reconstruct roof models that fit the data. Primitives are assembled into an entire roof with given rules of combination and merging. Overlaps of primitives are allowed in the assembly. The selection of roof primitives, as well as the sampling of their parameters, is driven by a variant of Markov Chain Monte Carlo technique with specified jump mechanism. Experiments are performed on data-sets of different building types (from simple houses, high-rise buildings to combined building groups) and resolutions. The results show robustness despite the data artefacts mentioned above and plausibility in reconstruction.

A laser scanning-based method for fast estimation of seismic-induced building deformations

Monitoring damaged buildings in an area where an earthquake has occurred requires the use of techniques which provide rapid and safe measurements even in emergency conditions. In particular, remote sensing techniques like terrestrial laser scanning (TLS) can satisfy these requirements, since they produce very dense point clouds in little time and also allow an accurate geometric modeling of observed buildings. Nevertheless, strong constraints on TLS data acquisition geometry, such as acquisition distance and incidence angles, typically characterize an area in seismic emergency conditions. In order to correctly interpret the data, it is necessary to estimate errors affecting TLS measurements in these critical conditions. A reliable estimation can be achieved by means of experiments and numerical simulations aimed at quantifying a realistic noise level, with emphasis on reduction of artifacts due to data acquisition, registration and modeling. This paper proposes a data analysis strategy in which TLS-based morphological maps computed as point-to-primitive differences are created. The method can be easily used for accurate surveying in emergency conditions. In order to demonstrate the proposed method in very diverse situations, it was applied to rapidly detect deformation traces in the San Giacomo Roncole Campanile (Modena), the Asinelli tower (Bologna) and the Cantalovo Church (Verona), three buildings damaged by the Mw 5.9 Emilia Romagna 2012 earthquake (Italy).

A semi-automated extraction and delineation of 3D roads of street scene from mobile laser scanning point clouds

Accurate 3D road information is important for applications such as road maintenance and virtual 3D modeling. Mobile laser scanning (MLS) is an efficient technique for capturing...
dense point clouds that can be used to construct detailed road models for large areas. This paper presents a method for extracting and delineating roads from large-scale MLS point clouds. The proposed method partitions MLS point clouds into a set of consecutive “scanning lines”, which each consists of a road cross section. A moving window operator is used to filter out non-ground points line by line, and curb points are detected based on curb patterns. The detected curb points are tracked and refined so that they are both globally consistent and locally similar. To evaluate the validity of the proposed method, experiments were conducted using two types of street-scene point clouds captured by Optech’s Lynx Mobile Mapper System. The completeness, correctness, and quality of the extracted roads are over 94.42%, 91.13%, and 91.3%, respectively, which proves the proposed method is a promising solution for extracting 3D roads from MLS point clouds.

Navigation et positionnement

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<th>Titre</th>
<th>LTE, positioning, and the implications for GNSS over-the-air testing</th>
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<tr>
<td>Auteur(s)</td>
<td>BORSATI (RONALD) et FOEGELLE (MICHAEL)</td>
</tr>
<tr>
<td>Source</td>
<td>INSIDE GNSS, vol 7, n° 6, [01/11/2012], pp 41 - 48</td>
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<td>Mots clés</td>
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</table>

Résumé d’auteur

Evolving wireless communications technology, the incorporation of GNSS positioning into mobile devices, and increasingly crowded radio frequency spectrum are driving the creation of new specifications and standards for user equipment. Testing procedures and practices are changing in parallel with these developments and receiving additional impetus by real-world experiences such as the recent LightSquared/GPS controversy. Two engineers with extensive backgrounds in standards-setting and testing describe how these circumstances are shaping the evaluation methods for positioning capabilities in mobile devices that incorporate “fourth-generation” or 4G communications technology - including a growing reliance on over-the-air testing.

<table>
<thead>
<tr>
<th>Titre</th>
<th>Navipedia, the GNSS Wiki: A reference for Global Navigation Satellite Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auteur(s)</td>
<td>FERREIRA (TERESA) et al.</td>
</tr>
<tr>
<td>Source</td>
<td>INSIDE GNSS, vol 7, n° 6, [01/11/2012], pp 59 - 64</td>
</tr>
<tr>
<td>Langue</td>
<td>Anglais</td>
</tr>
<tr>
<td>Mots clés</td>
<td>GLOBAL NAVIGATION SATELLITE SYSTEM, SITE WIKI</td>
</tr>
<tr>
<td>N° notice</td>
<td>A2012-671</td>
</tr>
</tbody>
</table>

Résumé d’auteur

Satellite navigation is progressing at such a rapid pace that it is difficult to keep track of the latest evolutions, satellite launches, technologies or even systems and signals. With Navipedia, the European Space Agency has introduced a common online entry point for GNSS know-how. As with all media-wiki products, any registered user can comment, propose modification to an existing article, suggest a new topic or submit a draft article. However, Navipedia has something many other wikis don’t: a robust content management and control process managed by an editorial team of knowledgeable GNSS professionals to ensure that the website always remains updated and reliable.

<table>
<thead>
<tr>
<th>Titre</th>
<th>Non-Gaussian noises: What about Gaussian vs. non-Gaussian noise in inertial/GNSS integration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auteur(s)</td>
<td>PETOVELLO (MARK)</td>
</tr>
<tr>
<td>Source</td>
<td>INSIDE GNSS, vol 7, n° 6, [01/11/2012], pp  -</td>
</tr>
<tr>
<td>Langue</td>
<td>Anglais</td>
</tr>
<tr>
<td>Mots clés</td>
<td>BRUIT, FILTRAGE DU BRUIT, GPS-INS</td>
</tr>
<tr>
<td>N° notice</td>
<td>A2012-672</td>
</tr>
</tbody>
</table>

Résumé d’auteur

The design of optimal inertial/GNSS integrated navigation systems begins with the calculation or the estimation of the lower bound of the system before its development. This article has looked at various ways of obtaining an approximation to the CRLB. It is hoped that online approximation of these lower bounds may soon be applied to modern non-linear filtering approaches.

<table>
<thead>
<tr>
<th>Titre</th>
<th>Performance of real-time precise point positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auteur(s)</td>
<td>CHEN (JUNPING), LI (HAOJUN), WU (BIN) et al.</td>
</tr>
<tr>
<td>Source</td>
<td>MARE DE GEOGRAPHY, vol 36, n° 1, [01/01/2013], pp 98 - 108</td>
</tr>
</tbody>
</table>

Articles signalés entre le 1er mai et le 30 juin 2013 par le Centre de Documentation de l’IGN – p. 26
The IGS Real-time Pilot Project (IGS-RTPP) provides real-time precise orbits and clocks, which support real-time positioning for single stations over large areas using the Precise Point Positioning (PPP) technique. This paper investigates the impact of real-time orbits, network configuration, and analysis strategies on real-time PPP implementation and demonstrates the real-time PPP performance. One month of data from the IGS network is analyzed in a real-time simulation mode. Results reveal the following: (1) In clock estimation, differential approaches are much more efficient than the zero-differenced approach. (2) The precision of IGS Ultra rapid (IGU) orbits could meet the IGS-RTPP requirement for precise clock estimation and PPP positioning. (3) Considering efficiency and precision, a network with 50 stations is recommended for the IGS-RTPP. It is demonstrated that the real-time satellite clock precision is 0.1 ns supporting hourly static PPP with a mean precision of 2–3 cm in the North component and 3–4 cm in the other components. Kinematic PPP assessed with onboard GPS data collected from a buoy provided mean coordinate precision of 2.2, 4.2, 6.1 cm in the North, East and Up directions, compared to the RTK solutions.

Ensuring the authenticity of position and time services is becoming a major requirement in many GNSS applications, demonstrating the need of tools to support the design, testing, and validation of protection mechanisms at the user and system levels. This work describes the architecture of the GNSS Authentication and User Protection System Simulator (GAUPSS), an innovative testbed that uses software to control hardware equipment and capable of creating realistic scenarios for GNSS threats. The testbed is designed to expose weaknesses of detection mechanisms in user equipment, test the effectiveness of new receiver-based mitigation techniques, and support analysis of system-level schemes to guarantee the authenticity of received signals. Preliminary results from a validation campaign are presented in this work.

Ces dernières années, on a constaté la tendance, que de plus en plus d'entreprises de construction équipent une partie de leurs machines avec des systèmes de pilotage par mesure. Ces outils offrent aux entreprises la possibilité, en particulier pour des projets complexes et avec des délais restreints, d'accomplir leurs mandats de manière encore plus efficiente et plus rapide. En cas d'utilisation intelligente de capteurs de mesure et de pilotage, une quantité remarquable de matériel et de mouvements de terre peut être économisée. De plus, cela réduit aussi les heures de présence humaine, puisque par exemple le machiniste peut seul exécuter l'essentiel des mouvements de terre. Productivité et rentabilité peuvent être augmentées, ce qui permet aux entreprises de faire face encore davantage aux actuelles exigences du marché. Malgré d'innovatrices solutions de mesure et la partielle simplicité d'utilisation des capteurs, un engagement sérieux de ces technologies nécessite évidemment, comme par le passé, les connaissances fondées en mensuration des spécialistes de la branche.

Finding optimal travel routes with uncertain cost data

Articles signalés entre le 1er mai et le 30 juin 2013 par le Centre de Documentation de l'IGN – p. 27
Geospatial data analysis techniques are widely used to find optimal routes from specified starting points to specified destinations. Optimality is defined in terms of minimizing some impedance value over the length of the route – the value to be minimized might be distance, travel time, financial cost, or any other metric. Conventional analysis procedures assume that impedance values of all possible travel routes are known a priori, and when this assumption holds, efficient solution strategies exist that allow truly optimal solutions to be found for even very large problems. When impedance values are not known with certainty a priori, exact solution strategies do not exist and heuristics must be employed. This study evaluated how the quality of the solutions generated by one such heuristic were impacted by the nature of the uncertainty in the cost database, the nature of the costs themselves, and the parameters used in the heuristic algorithm. It was found that all of these factors influenced the qualities of the solutions produced by the heuristic, but encouragingly, an easily controlled parameter of the heuristic algorithm itself played the most important role in controlling solution quality.

**MUSTER, a collaborative GNSS receiver architecture for weak signal processing**

**Auteur(s)** SOLOVIEV (ANDREY), DICKMAN (JEFFREY) et CAMPBELL (JACOB)

**Source** INSIDE GNSS, vol 8, n° 3, [01/05/2013], pp 56 - 68

**Langue** Anglais

**Mots clés** CANYON URBAIN, POSITIONNEMENT EN INTERIEUR, RECEPTEUR GNSS, TRAITEMENT DU SIGNAL

Many research efforts have proposed ways to enhance single-receiver GNSS navigation performance. However, methods that combine data from multiple receivers remain relatively unexplored. In this article, the authors introduce a receiver design and operational methodology that take advantage of the largely yet untapped potential for collaborative approaches to achieve more robust positioning capability, particularly in weak signal environments.

**Nivellement**

**Titre** Nivellement général de la France : L'entretien des triplets

**Auteur(s)** COULOMB (ALAIN)

**Source** GÉOMÈTRE, n° 2102, [01/04/2013], pp 46 - 48

**Mots clés géog.** INSTUTUT GEOGRAPHIQUE NATIONAL IGN


Comment l'exigence réglementaire en matière de rattachement altimétrique peut-elle être aujourd'hui satisfaite ? Et dans quelques années ?

**Orthophotographie**

**Titre** R-Pod, essais en forêt dense ivoirienne avec un drone

**Auteur(s)** DELLEY (N.) et CHATELAIN (C.)

**Source** Géomatique Suisse, vol 111, n° 2, [01/02/2013], pp 62 - 65

**Mots clés géog.** COTE D'IVOIRE

**Mots clés** CARTE DE LA VEGETATION, DRONE, FORET TROPICALE, IMAGE AERIENNE, ORTHOIMAGE, ORTHOPHOTOPLAN NUMERIQUE

Dans un précédent article; «R-Pod: un drone photogrammétrique au service du territoire», le concept de photogrammétrie à la demande de la HEIG-VD était présenté en tant que système ayant atteint une maturité certaine. Cet instrument de cartographie...
ouvre de nouvelles portes à la géomatique. Ainsi, l'équipe R-Pod fut contactée par les Conservatoire et Jardin botaniques (CJB) de la ville de Genève pour cartographier des zones de forêt dense en Côte d'Ivoire.

**Photogrammétrie**

<table>
<thead>
<tr>
<th>Titre</th>
<th>Accuracy assessment of commercial self-calibrating bundle adjustment routines applied to archival aerial photography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auteur(s)</td>
<td>AGUILAR (MANUEL A.), AGUILAR (FERNANDO J.) et FERNADEZ (ISMAEL)</td>
</tr>
<tr>
<td>Source</td>
<td>PHOTOGRAMMETRIC RECORD, vol 28, n° 141, [01/03/2013], pp 96 - 114</td>
</tr>
<tr>
<td>Langue</td>
<td>Anglais</td>
</tr>
<tr>
<td>Mots clés</td>
<td>ARCHIVES, AUTOETALONNAGE, COMPENSATION PAR FAISCEAUX, ERREUR SYSTEMATIQUE, ESTIMATION DE PRECISION, IMAGE AERIENNE, LEICA PHOTOGRAMMETRY SUITE</td>
</tr>
</tbody>
</table>

**Résumé d’auteur**

The use of archival or historical photography for photogrammetric purposes often involves a lack of data concerning the aerial cameras employed, difficulties in identifying control points on the photos and inappropriate conservation of the photography. When camera calibration parameters are unknown, they should be estimated by means of a self-calibrating bundle adjustment. Several calibration models available in the Leica Photogrammetry Suite software have been tested on two archival datasets, captured in 1956 and 1977, covering the same working area. The accuracy of the dataset triangulation was found to depend significantly on the self-calibration method and the number of ground control points used; when the latter ranged from six to nine per stereopair, self-calibrating bundle adjustment techniques were found to slightly, but not always significantly, improve the photogrammetric capability of archival aerial photography. Thus, the adoption of self-calibration cannot guarantee the improvement of results when working on poorly conserved imagery. Results from such datasets are very dependent on numerous local variables which cannot be extrapolated to other areas for the same camera since each dataset is unique and may present systematic errors of a different nature.

**Photogrammétrie spatiale**

<table>
<thead>
<tr>
<th>Titre</th>
<th>Exterior orientation of CBERS-2B imagery using multi-feature control and orbital data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auteur(s)</td>
<td>MARCATO (J.) et TOMMASELLI (A.M.G.)</td>
</tr>
<tr>
<td>Source</td>
<td>ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING, vol 79, n° 0, [01/05/2013], pp 219 - 225</td>
</tr>
<tr>
<td>Langue</td>
<td>Anglais</td>
</tr>
<tr>
<td>Mots clés</td>
<td>CANEVAS PHOTOGRAMMETRIQUE, COLINEARITE, COMPENSATION PAR BLOC, COMPENSATION PAR FAISCEAUX, COPLANARITE, IMAGE CBERS, ORIENTATION EXTERNE, POINT D’APPUI</td>
</tr>
</tbody>
</table>

**Résumé d’auteur**

The XXIInd International Congress of Photogrammetry and Remote Sensing was held at the Melbourne Convention and Exhibition Centre, Victoria, Australia, from 25th August to 1st September 2012. Reports are given on the Congress as a whole, including the General Assembly, Plenary and Special sessions, some Technical Commission activities and the Congress Exhibition. Papers from the Congress are published in Volume XXXIX of the International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences and Volume I of the new ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences.
The major contribution of this paper relates to the practical advantages of combining Ground Control Points (GCPs), Ground Control Lines (GCLs) and orbital data to estimate the exterior orientation parameters of images collected by CBERS-2B (China–Brazil Earth Resources Satellite) HRC (High-resolution Camera) and CCD (High-resolution CCD Camera) sensors. Although the CBERS-2B is no longer operational, its images are still being used in Brazil, and the next generations of the CBERS satellite will have sensors with similar technical features, which motivates the study presented in this paper. The mathematical models that relate the object and image spaces are based on collinearity (for points) and coplanarity (for lines) conditions. These models were created in an in-house developed software package called TMS (Triangulation with Multiple Sensors) with multi-feature control (GCPs and GCLs). Experiments on a block of four CBERS-2B HRC images and on one CBERS-2B CCD image were performed using both models. It was observed that the combination of GCPs and GCLs provided better bundle block adjustment results than conventional bundle adjustment using only GCPs. The results also demonstrate the advantages of using primarily orbital data when the number of control entities is reduced.

### Rédaction cartographique

**Titre**

Effective graphic features for multivariate symbol mapping

**Auteur(s)**

CHOENGS-ARD (VASAN), TRIPATHI (NITIN K.) et JANECEK (PAUL)

**Source**

CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 66 - 81

**Langue**

Anglais

**Mots clés**

DONNEES SPATIOTEMPORELLES, DONNEES STATISTIQUES, PROTOTYPE, SEMIOLOGIE GRAPHIQUE, SIGNE CONVENTIONNEL, SYMBOLE GRAPHIQUE, VISION

**N° notice**

A2013-190

**Résumé d’auteur**

Various patterns of cartographic multivariate symbols (MSs) have been developed to work efficiently with objective symbol mapping. One such MS pattern is composed of a graph that uses spatial data to represent statistical data. A preliminary study revealed major problems with users’ perceptions and understanding of the symbol. These problems present obstacles to the presentation objectives. We are therefore interested in studying the human factors that contribute to the visual perception of graph symbols. We predict that the graph symbols currently in use are too complex for viewers to fully understand what they are intended to represent. This research aims to study the mechanisms and behaviours of human visual perception that are necessary to understand cartography MSs and to determine a more effective prototype symbol that presents and conveys information to viewers more efficiently. The prototype design is based on a basic cartographic symbol and includes the characteristics and properties of the original patterns of graph symbols via a study of their pros and cons. Graphic structures and properties were modified to create a more effective symbol.

**Titre**

Visual abstraction and stylisation of maps

**Auteur(s)**

ISENBERG (TOBIAS)

**Source**

CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 8 - 18

**Langue**

Anglais

**Mots clés**

CONCEPTION CARTOGRAPHIQUE, COULEUR (RÉDACTION CARTOGRAPHIQUE), ESTHETIQUE CARTOGRAPHIQUE, ESTOMPAGE, GENERALISATION CARTOGRAPHIQUE AUTOMATISEE, LISSAGE DE DONNEES, STYLE CARTOGRAPHIQUE

**N° notice**

A2013-185

**Résumé d’auteur**

We explore visual map abstraction for the generation of stylized renderings of 2D map data. We employ techniques that are centred around the concept of shape simplification and graph layout and that allow iterative abstraction of 2D maps. We use data from publicly available sources and show how we can iteratively generate aesthetic renditions of these maps. These renditions do not have the goal to allow for navigation tasks, but instead show the map data in a distorted manner. The techniques used to create these images apply simplification, abstraction/generalisation, and displacement operations to the map elements in varying orders and add stylistic shading to produce aesthetic renditions for print or electronic displays. The degree of abstraction/generalisation can be individually chosen and determines the characteristics of the distorted map: whether components retain their shape, degenerate, or are processed in a manner that the abstraction becomes the focus of the image rather than the underlying map data. The
Renditions can be further personalized by choosing shading and colours for this shading. Together, the presented techniques allow for playful and creative exploration of aesthetic renditions of 2D map data.

**Titre**
Identification of optimal colours for maps from the web

**Auteur(s)**
STEINRUCKEN (JORG) et PLUMER (L.)

**Source**
CARTOGRAPHIC JOURNAL, vol 50, n° 1, [01/02/2013], pp 19 - 32

**Langue**
Anglais

**Mots clés**
CARTE SUR MESURE, COHERENCE DES COULEURS, COMMUNICATION CARTOGRAPHIQUE, VISUALISATION CARTOGRAPHIQUE, WEB MAP SERVICE, WEB MAPPING

**Résumé d’auteur**
Maps which are created on demand by combining geospatial data from different Web Map Services integrate conflicting portrayals and do not satisfy the requirements of effective cartographic communication. A significant improvement is achieved by selecting clearly distinguishable colours which are determined by solving an optimisation problem. Cartographic guidelines and user characteristics (e.g. colour vision impairment) can be incorporated into the optimisation model as constraints which guide the selection of colours.

**Statistiques**

**Titre**
On the formulation of the alternative hypothesis for geodetic outlier detection

**Auteur(s)**
LEHMANN (RUDIGER)

**Source**
JOURNAL OF GEODESY, vol 87, n° 4, [01/04/2013], pp 373 - 386

**Langue**
Anglais

**Mots clés**
COMPENSATION DE COORDONNEES, ERREUR GEOMETRIQUE, MEAN SHIFT MODEL, METHODE DE MONTE-CARLO, VALEUR ABERRANTE, VARIABLE ALEATOIRE, VARIANCE

**Résumé d’auteur**
The concept of outlier detection by statistical hypothesis testing in geodesy is briefly reviewed. The performance of such tests can only be measured or optimized with respect to a proper alternative hypothesis. Firstly, we discuss the important question whether gross errors should be treated as non-random quantities or as random variables. In the first case, the alternative hypothesis must be based on the common mean shift model, while in the second case, the variance inflation model is appropriate. Secondly, we review possible formulations of alternative hypotheses (inherent, deterministic, slippage, mixture) and discuss their implications. As measures of optimality of an outlier detection, we propose the premium and protection, which are briefly reviewed. Finally, we work out a practical example: the fit of a straight line. It demonstrates the impact of the choice of an alternative hypothesis for outlier detection.

**Systèmes d'information géographique**

**Titre**
De l'art de jongler entre plusieurs éditeurs

**Auteur(s)**
BLOMAC (F. DE)

**Source**
SIG LA LETTRE, n° 144, [01/02/2013], pp 6 - 8

**Mots clés**
HETEROGENEITE, SYSTEME D'INFORMATION GEOGRAPHIQUE

**Résumé d’auteur**
Si le site SIG génétiquement pur n'existe pas, comment gérer la multiplicité des fournisseurs ? Faut-il tenter de réduire le nombre de ses fournisseurs ou vivre avec ? Et si oui, sur quelles bases techniques s'appuyer ? Retour sur quelques conseils émanant de professionnels.

**Titre**
Web-based PPGIS and multicriteria decision analysis, A case study = Analyse multicritère et PPGIS en ligne, Une étude de cas

**Auteur(s)**
MALCZEWSKI (JACEK), BOROUSHAKI (SOHEIL) et MENG (YUNLIANG)

**Source**
REVUE INTERNATIONALE DE GÉOMATIQUE, vol 23, n° 1, [01/03/2013], pp 125 - 144

**Mots clés géog.**
ALBERTA
Mots clés
ANALYSE MULTICRITERE, APPROCHE PARTICIPATIVE, OUTIL D’AIDE À LA DECISION, PARKING, SIG PARTICIPATIF, SITE

N° notice
A2013-199

Résumé d’auteur
This paper presents an approach for integrating Web-based public participation GIS (PPGIS) and multicriteria decision analysis (MCDA). The approach consists of two main elements supporting the deliberative and analytic components of decision-making process. The integrated system, called ParticipatoryGIS, is used and evaluated in the context of a parkade site selection procedure in the Town of Canmore, Alberta.

Titre
Intégration de la méthode d’aide à la décision ELECTRE TRI dans un système d'information géographique open source = Integration of the method of decision support ELECTRE TRI in a geographical information system

Auteur(s)
SOBRIE (OLIVIER), PIRLOT (MARC) et JOERIN (FLORENT)

Source
REVUE INTERNATIONALE DE GÉOMATIQUE, vol 23, n° 1, [01/03/2013], pp 13 - 38

Mots clés
ANALYSE MULTICRITERE, ELECTRE TRI, IMPLEMENTATION (INFORMATIQUE), INTERFACE GRAPHIQUE, LOGICIEL LIBRE, OUTIL D'AIDE À LA DECISION, QGIS, SYSTEME D'INFORMATION GÉOGRAPHIQUE

N° notice
A2013-195

Résumé d’auteur
L’utilisation d’outils d’analyse multicritère (AMC) dans les Systèmes d'Information Géographique (SIG) est à ce jour encore assez peu répandue et limitée. Plusieurs causes ont été identifiées dans différents articles traitant du sujet. Citons notamment le manque d’intégration de ces méthodes dans les SIG et l’utilisation de méthodes à critère unique de synthèse. À toutes ces causes, une supplémentaire peut être ajoutée : bon nombre de travaux SIG-AMC n’ont pas bénéficié d’une politique de maintenance ou sont restés au stade de prototype. Afin de surmonter ces limitations, une intégration d’ELECTRE TRI dans un SIG open source, Quantum GIS, est proposée. Cet article décrit la stratégie adoptée pour intégrer la méthode d’AMC dans le SIG et l’implémentation. La méthode est par ailleurs complétée d’un outil d’apprentissage des préférences. Pour terminer, une application de l’outil sur un problème d’aménagement du territoire est présentée.

Titre
Mise en place d’un SIG pour inventorier les dégâts sur les murs en pierres sèches des vignobles de Martigny et Martigny-Combe

Auteur(s)
SZAKACS (NICOLAS)

Source
GÉOMATIQUE SUISSE, vol 111, n° 4, [01/04/2013], pp 144 - 146

Mots clés géog.
VALAIS

Mots clés
MUR, SYSTEME D’INFORMATION GEOGRAPHIQUE, VITICULTURE

N° notice
A2013-241

Résumé d’auteur
Les murs en pierres sèches du Valais représentent un authentique patrimoine du Vieux-Pays. la sauvegarde des vignobles en terrasses constitue un défi important pour le canton. De manière générale, les murs en pierres sèches subissent l’évolution du temps et se dégradent. La culture de la vigne en terrasse amène des valeurs paysagères importantes et le projet de rénovation des murs en pierres sèches est un outil essentiel pour le maintien de son intérêt agricole. Le vignoble en terrasse permet également la production de vin de qualité supérieure. Ce sont ces éléments qui ont poussé le canton du Valais à lancer les projets d’amélioration et de sauvegarde du vignoble.

Traitement d'image

Titre
Object-based fusion of multitemporal multangle ENVISAT ASAR and HJ-1B multispectral data for urban land-cover mapping

Auteur(s)
BAN (YIFANG) et JACOB (ALEXENDER)

Source
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 1998 - 2006

Langue
Anglais

Mots clés géog.
PEKIN

Mots clés
CARTE D'OCCUPATION DU SOL, CONFLATION, FUSION DE DONNEES MULTISOURCE, IMAGE ENVISAT-ASAR, IMAGE HJ-1B, IMAGE MULTIBANDE, IMAGE MULTITEMPORELLE, IMAGE RADAR MOIREE, SEGMENTATION D'IMAGE, ZONE URBAINE

N° notice
A2013-213
The objectives of this research are to develop robust methods for segmentation of multitemporal synthetic aperture radar (SAR) and optical data and to investigate the fusion of multitemporal ENVISAT advanced synthetic aperture radar (ASAR) and Chinese HJ-1B multispectral data for detailed urban land-cover mapping. Eight-date multangle ENVISAT ASAR images and one-date HJ-1B charge-coupled device image acquired over Beijing in 2009 are selected for this research. The edge-aware region growing and merging (EARGM) algorithm is developed for segmentation of SAR and optical data. Edge detection using a Sobel filter is applied on SAR and optical data individually, and a majority voting approach is used to integrate all edge images. The edges are then used in a segmentation process to ensure that segments do not grow over edges. The segmentation is influenced by minimum and maximum segment sizes as well as the two homogeneity criteria, namely, a measure of color and a measure of texture. The classification is performed using support vector machines. The results show that our EARGM algorithm produces better segmentation than eCognition, particularly for built-up classes and linear features. The best classification result (80%) is achieved using the fusion of eight-date ENVISAT ASAR and HJ-1B data. This represents 5%, 11%, and 14% improvements over eCognition, HJ-1B, and ASAR classifications, respectively. The second best classification is achieved using fusion of four-date ENVISAT ASAR and HJ-1B data (78%). The result indicates that fewer multitemporal SAR images can achieve similar classification accuracy if multitemporal multangle dual-look-direction SAR data are carefully selected.
**Traitement d'image optique**

**Titre**
Topological gradient connection analysis for feature detection

**Auteur(s)**
LO (CHAO-YUAN) et CHEN (LIENG-CHIEN)

**Source**
PHOTOGRAMMETRIC RECORD, vol 28, n° 141, [01/03/2013], pp 7 - 26

**Langue**
Anglais

**Mots clés**
ANALYSE COMPARATIVE, CONNEXITE, DETECTION DE CONTOUR, EXTRACTION DE TRAITS CARACTERISTIQUES, FILTRE DE CANNY, GRADIENT, LIGNE CARACTERISTIQUE, LISSAGE DE COURBE, NIVEAU DE GRIS, RELATION TOPOLOGIQUE

**N° notice**
A2013-149

**Résumé d'auteur**
Edges and corners are two major image features in the modelling of man-made objects; an edge provides strong geometric orientation and corners possess good localisation. Feature detection is the basis of image processing for numerous applications such as image registration and object modelling. Completeness and localisation are the two major considerations for these applications; however, illumination, reflectance and shadows may interfere with image grey values to produce various gradients along an edge. Thus, threshold selection is an important step in obtaining suitable features in target-dependent methods as improper selection might cause information loss and broken edges. Instead of threshold selection, this study therefore proposes a feature extraction method using topological gradient connection (TGC) analysis involving three steps: grey value refinement, gradient computation and topological connection analysis. The first step uses a Gaussian filter to smooth the grey value image. The second step computes directional gradients to identify ridge pixels and collect feature candidates. The third step analyses adjacent candidates based on the criterion of topological connection. This three-step tracing procedure combines these connected candidates into a single object. The proposed scheme employs different images derived from various sensors and compares them with the Canny operator (using manually selected thresholds) and manually plotted corners for detection ability assessment. Experimental results indicate that the automatic results are more complete for subtle feature lines than the Canny edges. In addition, the proposed method provides higher flexibility in selecting suitable feature layers for different applications.

**Titre**
A comparison of dense matching algorithms for scaled surface reconstruction using stereo camera rigs

**Auteur(s)**
AHMADABADIAN (ALI HOSSEININAVEH), ROBSON (STUART) et BOEHM (JAN)
Photogrammetric methods for dense 3D surface reconstruction are increasingly available to both professional and amateur users who have requirements that span a wide variety of applications. One of the key concerns in choosing an appropriate method is to understand the achievable accuracy and how choices made within the workflow can alter that outcome. In this paper we consider accuracy in two components: the ability to generate a correctly scaled 3D model; and the ability to automatically deliver a high quality data set that provides good agreement to a reference surface. The determination of scale information is particularly important, since a network of images usually only provides angle measurements and thus leads to unscaled geometry. A solution is the introduction of known distances in object space, such as base lines between camera stations or distances between control points. In order to avoid using known object distances, the method presented in this paper exploits a calibrated stereo camera utilizing the calibrated base line information from the camera pair as an observational based geometric constraint. The method provides distance information throughout the object volume by orbiting the object. In order to test the performance of this approach, four topical surface matching methods have been investigated to determine their ability to produce accurate, dense point clouds. The methods include two versions of Semi-Global Matching as well as MicMac and Patch-based Multi-View Stereo (PMVS). These methods are implemented on a set of stereo images captured from four carefully selected objects by using (1) an off-the-shelf low cost 3D camera and (2) a pair of Nikon D700 DSLR cameras rigidly mounted in close proximity to each other. Inter-comparisons demonstrate the subtle differences between each of these permutations. The point clouds are also compared to a dataset obtained with a Nikon MMD laser scanner. Finally, the established process of achieving accurate point clouds from images and known object space distances are compared with the presented strategies. Results from the matching demonstrate that if a good imaging network is provided, using a stereo camera and bundle adjustment with geometric constraints can effectively resolve the scale. Among the strategies for dense 3D reconstruction, using the presented method for solving the scale problem and PMVS on the images captured with two DSLR cameras resulted in a dense point cloud as accurate as the Nikon laser scanner dataset.

Multitemporal cross-calibration of the Terra MODIS and Landsat 7 ETM+ reflective solar bands

In recent years, there has been a significant increase in the use of remotely sensed data to address global issues. With the open data policy, the data from the Moderate Resolution Imaging Spectroradiometer (MODIS) and Enhanced Thematic Mapper Plus (ETM+) sensors have become a critical component of numerous applications. These two sensors have been operational for more than a decade, providing a rich archive of multispectral imagery for analysis of multitemporal remote sensing data. This paper focuses on evaluating the radiometric calibration agreement between MODIS and ETM+ using the near-simultaneous and cloud-free image pairs over an African pseudo-invariant calibration site, Libya 4. To account for the combined uncertainties in the top-of-atmosphere (TOA) reflectance due to surface and atmospheric bidirectional reflectance distribution function (BRDF), a semiempirical BRDF model was adopted to normalize the TOA reflectance to the same illumination and viewing geometry. In addition, the spectra from the Earth Observing-1 (EO-1) Hyperion were used to compute spectral corrections.
between the corresponding MODIS and ETM+ spectral bands. As EO-1 Hyperion scenes were not available for all MODIS and ETM+ data pairs, MODerate resolution atmospheric TRANsmission (MODTRAN) 5.0 simulations were also used to adjust for differences due to the presence or lack of absorption features in some of the bands. A MODIS split-window algorithm provides the atmospheric water vapor column abundance during the overpasses for the MODTRAN simulations. Additionally, the column atmospheric water vapor content during the overpass was retrieved using the MODIS precipitable water vapor product. After performing these adjustments, the radiometric cross-calibration of the two sensors was consistent to within 7%. Some drifts in the response of the bands are evident, with MODIS band 3 being the largest of about 6% over 10 years, a change that will be corrected in Collection 6 MODIS processing.

**Titre**  
Line segment confidence region-based string matching method for map conflation  

**Auteur(s)**  
HUH (YONG), YANG (SUNGCHUL), GA (CHILLO) et al.  

**Source**  
ISPRS Journal of Photogrammetry and Remote Sensing, vol 78, n° 0, [01/04/2013], pp 69 - 84  

**Langue**  
Anglais  

**Mots clés**  
APPARIEMENT DE DONNEES LOCALISEES, CARTE TOPOGRAPHIQUE, CONFLATION, POINTS HOMOLOGUES, RECONSTRUCTION AUTOMATIQUE, SEGMENT DE DROITE  

**N° notice**  
A2013-180  

**Résumé d’auteur**  
In this paper, a method to detect corresponding point pairs between polygon object pairs with a string matching method based on a confidence region model of a line segment is proposed. The optimal point edit sequence to convert the contour of a target object into that of a reference object was found by the string matching method which minimizes its total error cost, and the corresponding point pairs were derived from the edit sequence. Because a significant amount of apparent positional discrepancies between corresponding objects are caused by spatial uncertainty and their confidence region models of line segments are therefore used in the above matching process, the proposed method obtained a high F-measure for finding matching pairs. We applied this method for built-up area polygon objects in a cadastral map and a topographical map. Regardless of their different mapping and representation rules and spatial uncertainties, the proposed method with a confidence level at 0.95 showed a matching result with an F-measure of 0.894.

**Titre**  
Rational function model in processing historical aerial photographs  

**Auteur(s)**  
MA (RUIJIN)  

**Source**  
Photogrammetric Engineering & Remote Sensing, vol 79, n° 4, [01/04/2013], pp 337 - 345  

**Langue**  
Anglais  

**Mots clés**  
MODELE PAR FONCTIONS RATIONNELLES, MODELISATION DE PRISE DE VUE, ORTHORECTIFICATION, PHOTOGRAPHIE AERIENNE, PHOTOGRAPHIE ARGENTIQUE, PHOTOGRAPHIE NUMERISEE, POINT D’APPUI  

**N° notice**  
A2013-204  

**Résumé d’auteur**  
A large amount of aerial photographs were acquired early 1900s for various purposes. These aerial photographs provide valuable baseline data for a variety of environmental studies. To be used for analysis together with other data, these photographs need to be referenced to a ground coordinate system. Often large topographical variations in photo ground coverage demand these photographs be orthorectified using photogrammetric methods for acceptable mapping accuracy. However, camera models for these historical photographs are usually unavailable. Additionally, land-cover change over the years makes it a great challenge to collect accurate control points for calculating camera models. This study investigated the rational function model to orthorectify historical aerial photographs. The analysis results suggest that while the linear, the 2nd order, and the 3rd order BFMs are all able to closely approximate the rigorous frame camera model, the linear RFM is optimal in representing imaging geometries of historical photographs.

**Titre**  
STARS: A new method for multitemporal remote sensing  

**Auteur(s)**  
MELLO (MARCIO PUPIN) et VIEIRA (CARLOS A.O.)  

**Source**  
IEEE Transactions on Geoscience and Remote Sensing, vol 51, n° 4, [01/04/2013], pp 1897 - 1913  

**Langue**  
Anglais  

**Mots clés géog.**  
BRESIL
There is great potential for the development of remote sensing methods that integrate and exploit both multispectral and multitemporal information. This paper presents a new image processing method: Spectral–Temporal Analysis by Response Surface (STARS), which synthesizes the full information content of a multitemporal–multispectral remote sensing image data set to represent the spectral variation over time of features on the Earth's surface. Depending on the application, STARS can be effectively implemented using a range of different models [e.g., polynomial trend surface (PTS) and collocation surface (CS)], exploiting data from different sensors, with varying spectral wavebands and acquiring data at irregular time intervals. A case study was used to test STARS, evaluating its potential to characterize sugarcane harvest practices in Brazil, specifically with and without preharvest straw burning. Although the CS model presented sharper and more defined spectral–temporal surfaces, abrupt changes related to the sugarcane harvest event were also well characterized with the PTS model when a suitable degree was set. Orthonormal coefficients were tested for both the PTS and CS models and performed more accurately than regular coefficients when used as input for three evaluated classifiers: instance based, decision tree, and neural network. Results show that STARS holds considerable potential for representing the spectral changes over time of features on the Earth's surface, thus becoming an effective image processing method, which is useful not only for classification purposes but also for other applications such as understanding land-cover change. The STARS algorithm can be found at www.dsr.inpe.br/~mello.
strategy is applied on RAG to produce multi-scale segmentation results. During the
region merging process, a Step-Wise Scale Parameter (SWSP) strategy is proposed to
produce boundary-constrained multi-scale segmentation results. Moreover, in order to
improve the accuracy of object boundaries, the property of edge strength is introduced as
a merging criterion. A set of high spatial resolution remote sensing images is used in the
experiment, e.g., QuickBird, WorldView, and aerial image, to evaluate the effectiveness
of the proposed method. The segmentation results of BCMS are compared with those of
the commercial image analysis software eCognition. The experiment shows that BCMS
can produce nested multi-scale segmentations with accurate and smooth boundaries,
which proves the robustness of the proposed method.

Titre
Multiple-spectral-band CRFs for denoising junk bands of hyperspectral imagery
Auteur(s)
ZHONG (PING) et WANG (RUNSHENG)
Source
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2260 - 2275
Langue
Anglais
Mots clés
CHAMP ALEATOIRE DE MARKOV, FILTRAGE DU BRUIT, IMAGE HYPERSONTRALE, SPECTROSCOPIE
N° notice
A2013-224
Résumé d’auteur
Denoising of hyperspectral imagery in the domain of imaging spectroscopy by conditional
random fields (CRFs) is addressed in this work. For denoising of hyperspectral imagery,
the strong dependencies across spatial and spectral neighbors have been proved to be
very useful. Many available hyperspectral image denoising algorithms adopt
multidimensional tools to deal with the problems and thus naturally focus on the use of
the spectral dependencies. However, few of them were specifically designed to use the
spatial dependencies. In this paper, we propose a multiple-spectral-band CRF (MSB-
CRF) to simultaneously model and use the spatial and spectral dependencies in a unified
probabilistic framework. Furthermore, under the proposed MSB-CRF framework, we
develop two hyperspectral image denoising algorithms, which, thanks to the incorporated
spatial and spectral dependencies, can significantly remove the noise, while maintaining
the important image details. The experiments are conducted in both simulated and real
noisy conditions to test the proposed denoising algorithms, which are shown to
outperform the popular denoising methods described in the previous literatures.

Titre
Commercial tree species discrimination using airborne AISA Eagle hyperspectral
imaging and partial least squares discriminant analysis (PLS-DA) in KwaZulu–
Natal, South Africa
Auteur(s)
PEERBHAY (KABIR YUNUS), MUTANGA (ONISIMO) et ISMAIL (RIYAD)
Source
ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING, vol 79, n° 0, [01/05/2013], pp 19 - 28
Langue
Anglais
Mots clés géog.
AFRIQUE DU SUD
Mots clés
ANALYSE DISCRIMINANTE, ARBRE (FLORE), CLASSIFICATION DIRIGEE, ESPECE
VEGETALE, FORET, IMAGE AISA+, IMAGE HYPERSONTRALE, METHODE DES MOINDRES
CARRES
N° notice
A2013-231
Résumé d’auteur
Discriminating commercial tree species using hyperspectral remote sensing techniques is
critical in monitoring the spatial distributions and compositions of commercial forests.
However, issues related to data dimensionality and multicollinearity limit the successful
application of the technology. The aim of this study was to examine the utility of the
partial least squares discriminant analysis (PLS-DA) technique in accurately classifying
six exotic commercial forest species (Eucalyptus grandis, Eucalyptus nitens, Eucalyptus
smithii, Pinus patula, Pinus elliottii and Acacia mearnsii) using airborne AISA Eagle
hyperspectral imagery (393–900 nm). Additionally, the variable importance in the
projection (VIP) method was used to identify subsets of bands that could successfully
discriminate the forest species. Results indicated that the PLS-DA model that used all the
AISA Eagle bands (n = 230) produced an overall accuracy of 80.61% and a kappa value
of 0.77, with user’s and producer’s accuracies ranging from 50% to 100%. In comparison,
incorporating the optimal subset of VIP selected wavebands (n = 78) in the PLS-DA
model resulted in an improved overall accuracy of 88.78% and a kappa value of 0.87,
with user’s and producer’s accuracies ranging from 70% to 100%. Bands located
predominantly within the visible region of the electromagnetic spectrum (393–723 nm)
showed the most capability in terms of discriminating between the six commercial forest
species. Overall, the research has demonstrated the potential of using PLS-DA for reducing the dimensionality of hyperspectral datasets as well as determining the optimal subset of bands to produce the highest classification accuracies.

### Traitement d'image radar

**Titre**
From previous C-Band to new X-band SAR systems: Assessment of the DInSAR mapping improvement for deformation time-series retrieval in urban areas

**Auteur(s)**
BONANO (MANUELA), MANUNTA (MICHELE) et al.

**Source**
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 1973 - 1984

**Langue**
Anglais

**Mots clés géog.**
NAPLES

**Mots clés**
ANALYSE COMPARATIVE, BANDE C, BANDE X, DEFORMATION D'EDIFICE, IMAGE COSMOSKYMED, IMAGE ENVISAT, IMAGE RADAR MOIREE, IMAGE RADARSAT, INTERFEROMETRIE DIFFERENTIELLE, INTERFEROMETRIE PAR RADAR A ANTENNE SYNTHETIQUE, SERIE TEMPORELLE, ZONE URBaine

**N° notice**
A2013-212

**Résumé d’auteur**
We investigate the capability improvement of the advanced differential interferometric synthetic aperture radar (DInSAR) techniques to map deformation phenomena affecting urban areas by exploiting multitemporal SAR data acquired by the new X-band sensors with respect to those of the previous C-band systems. In particular, we perform a comparative analysis of the deformation time-series retrieved by applying the full-resolution Small Baseline Subset DInSAR technique to selected sequences of SAR data acquired by the ENVISAT and RADARSAT-1 sensors (both operating at C-band) and by the X-band radar systems onboard the SAR sensors of the COSMO-SkyMed (CSK) constellation. This study, focused on the city of Napoli (Italy), allows us to quantify the dramatic increase of the DInSAR coherent pixel density achieved by exploiting the high-resolution X-band CSK SAR images (a few meters), resulting in an improvement factor of about 320% and 550%, with respect to the RADARSAT-1 and ENVISAT products, respectively. This improvement permits us to analyze nearly all the structures located within the investigated urbanized area and, in many cases, also portions of the same building. The improved coherent pixel spatial densities, combined with the reduced revisit times of the new X-band SAR missions, allow us to significantly increase the effectiveness of the advanced DInSAR methodologies, further extending the role of those Earth Observation data in the development of monitoring scenarios.
A hierarchical approach to change detection in very high resolution SAR images for surveillance applications

BOVOLO (FRANCESCA), MARTIN (CARLO) et BRUZZONE (LORENZO)

IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2042 - 2054

The availability of very high resolution (VHR) synthetic aperture radar (SAR) images, which can be acquired by satellites over the same geographical area with short repetition interval, makes the development of effective unsupervised change detection (CD) techniques very important. This paper proposes a hierarchical approach to CD in VHR SAR images for addressing surveillance applications, where VHR data are acquired with high temporal resolution (e.g., one image every few days). The proposed approach is based on two concepts: 1) exploitation of a multiscale technique for a preliminary detection of areas containing changes in backscattering at different scales (hot spots) and 2) explicit modeling of the semantic meaning of changes by using both the intrinsic SAR image properties (e.g., acquisition geometry and scattering mechanisms) and the available prior information. In order to illustrate the effectiveness of the proposed approach, a problem of freight traffic surveillance is addressed considering two data sets. Each of them is made up of a pair of multitemporal VHR SAR images acquired by the COSMO-SkyMed (Constellation of small Satellites for the Mediterranean basin Observation) constellation in spotlight mode. Each data set defines a complex CD problem due to both the presence of a variety of changes on the ground and the complexity of object backscattering. Experimental results point out the effectiveness of the proposed approach.

A change detection approach to flood mapping in urban areas using TerraSAR-X

GIUSTRARINI (LAURA), HOSTACHE (RENAUD), MATGEN (PATRICK) et al.

IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2417 - 2430

Very high resolution synthetic aperture radar (SAR) sensors represent an alternative to aerial photography for delineating floods in built-up environments where flood risk is highest. However, even with currently available SAR image resolutions of 3 m and higher, signal returns from man-made structures hamper the accurate mapping of flooded areas. Enhanced image processing algorithms and a better exploitation of image archives are required to facilitate the use of microwave remote-sensing data for monitoring flood dynamics in urban areas. In this paper, a hybrid methodology combining backscatter thresholding, region growing, and change detection (CD) is introduced as an approach enabling the automated, objective, and reliable flood extent extraction from very high resolution urban SAR images. The method is based on the calibration of a statistical distribution of “open water” backscatter values from images of floods. Images acquired during dry conditions enable the identification of areas that are not “visible” to the sensor (i.e., regions affected by “shadow”) and that systematically behave as specular reflectors (e.g., smooth tarmac, permanent water bodies). CD with respect to a reference image thereby reduces overdetection of inundated areas. A case study of the July 2007 Severn River flood (UK) observed by airborne photography and the very high resolution SAR sensor on board TerraSAR-X highlights advantages and limitations of the method. Even though the proposed fully automated SAR-based flood-mapping technique overcomes some limitations of previous methods, further technological and methodological improvements are necessary for SAR-based flood detection in urban areas to match the mapping capability of high-quality aerial photography.
Titre Soil moisture estimation under low vegetation cover using a multi-angular polarimetric decomposition
Auteur(s) JAGHUBER (THOMAS), HAJNSEK (IRENA), BRONSTERT (AXEL) et PAPATHANASSIOU (KONSTANTINOS PANAGIOTIS)
Source IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, vol 51, n° 4, [01/04/2013], pp 2201 - 2215
Langue Anglais
Mots clés BANDE L, COUVERT VEGETAL, DECOMPOSITION D'IMAGE, DIFFUSION DU RAYONNEMENT, HUMIDITE DU SOL, IMAGE E-SAR, IMAGE RADAR MOIREE, POLARIMETRIE RADAR, RETRODIFFUSION, SURFACE CULTIVEE
N° notice A2013-222
Résumé d’auteur The estimation of volumetric soil moisture under low agricultural vegetation from fully polarimetric synthetic aperture radar (SAR) data at L-band using a multi-angular polarimetric decomposition is investigated. Radar polarimetry provides the framework to decompose the backscattered signal into different canonical scattering mechanisms referring to scattering contributions from the underlying soil and the vegetation cover. Multi-angular observation diversity further increases the information space for soil moisture inversion enabling higher inversion rates and a stable inversion performance. The developed approach was applied on the multi-angular L-band data set acquired by German Aerospace Center's ESAR sensor as part of the OPAQUE campaign in 2008. The obtained results are compared against ground measurements collected by the OPAQUE team over a variety of vegetated agricultural fields. The validation of the estimated against ground measured soil moisture results in an root mean square error level of 6–8 vol.% including all test fields with a variety of crop types.

Titre On the degree of polarization for SAR sea oil slick observation
Auteur(s) NUNZIATA (FERDINANDO), GAMBARDELLA (ATTILIO) et MIGLIACCIO (MAURIZIO)
Source ISPRS JOURNAL OF PHOTOGRAMMETRY AND REMOTE SENSING, vol 78, n° 0, [01/04/2013], pp 41 - 49
Langue Anglais
Mots clés IMAGE RADAR, PETROLE, POLARIMETRIE RADAR, POLARISATION, POLLUTION DES MERS
N° notice A2013-178
Résumé d’auteur A polarimetric model to relate the degree of polarization, DoP, to the sea surface scattering with and without oil slicks, under low-to-moderate wind conditions, is proposed. DoP, measured directly from the Mueller scattering matrix, is shown to be a reliable measure of the departure from Bragg scattering; a phenomenon that, under low-to-moderate wind conditions, occurs when an oil slick is present. Following this theoretical rationale, a simple filter is developed to observe oil slicks in quad-polarimetric full-resolution Synthetic Aperture Radar (SAR) data. Experiments, undertaken on a meaningful set of quad-polarization Single Look Complex (SLC) C-band RADARSAT-2 SAR data, where both well-known oil slicks and a weak-damping look-alike are in place, demonstrate the soundness of the model and its effectiveness from an operational viewpoint.