

SUMMARIES

Józef Beluch, Robert Krzyżek: **The use of palmtops in geodetic survey leading to numeric map creations** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Palmtop is a versatile electronic instrument applied to field works and used as a peripheral electronic device for surveying instruments: tachimeters, receivers of signals in GPS-RTK mode etc. Fundamentally its role is a recorder of archival data as benchmark co-ordinates or scanned and calibrated maps but also as a recorder of data information obtained at field works. It allows further numeric processing of mentioned above information and its visualisation. It is possible to use it for preliminary stage of numeric map creation. Recorded survey data (e.g. in *.mmp format for iPAQ H3850 palmtop) can be transmitted by proper software (for iPAQ H3850 palmtop is ActiveSync software) to any computer, where following software leads to realize a numeric map. The elaboration presents practical experience of the authors in palmtop applications.

Keywords: palmtops, numerical map, geodetic surveys

Jerzy Bernasik, Sławomir Mikrut: **Taking surface digital images of a strictly defined orientation** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Taking surface images of precisely known (at the level of a theodolithe accuracy) elements of external orientation makes a rarely taken chance in terrestrial photogrammetry. Usually control points are used to increase the accuracy of the processing images when the orientation is not enough precisely known. It is particularly difficult – apparently – in case of photographs taken with non-metric cameras. The solution solved by the authors in the measurements of shape anomalies of slender buildings was based on a prototype instrument allowing the installation of a KODAK DCS 760 camera on a Theo 010 theodolithe. In the paper the authors present the results of studies enabling them to assess the accuracy of the orientation level of pictures. The described solution makes a new chance for the digital photogrammetry of a close-to-zero distance by widening the range of economically justified applications of this method in engineering and construction. The application of author's algorithms of the detection of features in a digital image allowed the analysis and measurement with a sub-pixel accuracy. This enables an accurate definition of the terrain co-ordinates of the measured points (elements).

Keywords: close-range photogrammetry, engineering photogrammetry, photogrammetric camera, non-metric camera, digital camera

Natalia Borowiec, Barbara Zabrzaska-Gąsiorek: **Orthophotomap in urban areas** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Orthophotomap is a very beneficial layer in a GIS – it provides accurate base map with advantages of the photograph. In urban areas the conventional orthorectification based on a Digital Terrain Model has encountered many difficulties, because do not consider the surface of buildings, bridges, etc. Such objects remain in perspective view and have radial distortion on the resulting orthophotomaps. If buildings and other elements higher then ground describes a Digital Surface Model, the displacement can also be corrected, and results are called “true orthopho-

tomap" – imagery without building lean. This paper presents the problems of the generation digital "true orthophotomap" in urban areas with acquisition of laser scanner data.

Keywords: true orthophotomap, Digital Surface Model, laser scanning

Aleksandra Bujakiewicz: **Quo vadis, photogrammetry?** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

The article presents a short discussion referring to selected directions photogrammetry is following. Many new approaches in obtaining and processing digital images, their mutual combination and direct georeferencing create new possibilities in their application. Making photogrammetric measurements automatic has been included into basic studies for many years. However, despite long-lasting efforts the level expected at the beginning, when photogrammetric measurements has not been achieved. Our expectation for the future are photogrammetric measurements made in real time and satisfactory results obtained on request.

Keywords: direct georeferencing, Mobile Mapping Systems, real-time photogrammetry

Jarosław Bydłosz: **Presence and future of the standards of cadastral data exchange** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

In the paper the concept of information and cadastral data was introduced (concerning Ground and Building Cadastre). As the information, the concept referring to a single item of the cadastre was accepted, while the data might be understood as a set of information and relationships between them. In this paper the exchange and access to cadastral data were shown and the issues related to information were not discussed. Legal bases of giving access to cadastral data were also presented, this implied the answer to the questions who could have access to cadastral data and what the principles of such an access should be as well as the recommendations referring to software for handling the Ground and Building Cadastre, as given in a Technical Instruction G-5. The most important substantial part of the paper is the presentation of data standards used nowadays in the transfer of data on Ground and Building Cadastre, with the description of their present applications and the analysis of the possibilities of their further development and use.

Keywords: ground and building cadastre, the Standards of Cadastral Data Exchange, DXF, GML, SWDE, XML

Tadeusz Chrobak: **The automation of cartographic generalization and it's map results methods** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

This paper shows the application of the Molenaar formal data structure model in a MRDB-type database meant to objects automated elimination and simplification while scale changing and those objects visualization methods. Generalization process and visualization results objective criteria are established in the solution. In the elimination process there are classes and objects hierarchies used, which are based on the graph theory. The simplification process is based on the hierarchy of points describing the object, established using relative extrema. Both these processes verification is based on the drawing recognizability criterion. In the object simplification results visualization methods there are normal distribution's properties and drawing recognizability criterion used to establish so called generalization thresholds (of the simplified objects). The thresholds are used to establish the scales ranges for the generalization results visualization methods.

Keywords: geoinformation, database, generalization cartography

Piotr Cichociński, Piotr Parzych: **Geographic Information System as a necessary element of a common evaluation of real estates** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

One of the basic ways of the definition of the market value of real estates is its evaluation carried out in a comparative approach. This approach assumes that a market value of real estates is determined by comparison to other similar real estates of known transaction prices as well as prices differentiating these real estates and having a strong influence on their value. One of main difficulties is the necessity of having the information on real estates similar to the one that is to be evaluated. Such real estates should be a subject of pursuing in a given market of real estates. The evaluation of required and available data and the knowledge of the functionality of GIS software enabled us to present the proposal of the content of a database on real estates and the range of data that can be transferred directly from other GIS bases or generated by analytical tools.

Keywords: Geographic Information System, evaluation, real estate attributes

Andrzej Ciołkosz: **From TIROS to QuickBird – half a century of space techniques development of acquiring data on the Earth** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Three years after launching the first satellite into the Earth orbit-satellite TIROS was launched. It started permanent imaging of the Earth globe from the orbital height. Since then 12 000 satellites of different kind were launched into the orbits. Only a small part of them were used in imaging the Earth surface and providing data enabling remote studies on environment. Fifty years of a satellite era brought us a great progress in terms of the development of remote sensing technology referring to objects and phenomena occurring on Earth. It can be seen in a more than one thousand times bigger spatial resolution of images. Spectral resolution increased from several bands of spectrum to several hundreds of bands. Radiometric resolution grew from initially registered several dozens of energy levels to above two thousand, and finally time resolution increased from several weeks to a few days. It should be mentioned that in this period a barrier limiting satellite images to an optic spectrum (preventing from taking images in cloudy days) was overcome. The progress in this field was made due to the application of microwave radiation for the imaging of Earth surface. Microwave images were taken in an active mood characterised by spatial resolution almost equal to the resolution of images taken in an optic spectrum, and specific features of their acquiring make them provide a lot of information impossible to obtain in visual and infrared part of the spectrum.

Keywords: satellite techniques of gaining data of the Earth

Ewa Dębińska, Piotr Cichociński: **Application of CASE tools to geographic information system databases design** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The base for the effective use of the Geographic Information Systems (GIS) is a correctly constructed database allowing quick and swift browsing of the data. Because of GIS specifics, it is necessary that such a database, apart from descriptive data of the objects, also stores information referring to their location and shape. Then such a database, containing geographical information, that distinguishes it from among another databases, can be named a geodatabase. The introduction of the geodatabase model allowed the application of the methods of designing relational databases, including CASE tools, also for geographic information. Apart from theoretical considerations, the paper presents an example of the data model for the evaluation of real estate, containing the definitions of necessary object classes and their relationships.

Keywords: Geographic Information System, geodatabase, UML, CASE tools

Jan W. Dobrowolski, Józef Jachimski, Beata Hejmanowska, Aleksandra Wagner, Adam Boroń, Wojciech Drzewiecki, Sławomir Mikrut, Małgorzata Śliwka, Robert Mazur, Mateusz Jakubiak, Barbara Patuła: **Interdisciplinary co-operation in the area of the protection of cultural landscape, focussed on the Cin-que Terre National Park (Italy)** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Our Faculty, as the only in Poland, participated in the EU project "Smart History". A new concept of education, integrating the residents of the regions of particular natural and cultural values and tourists – for sustainable development. A group of staff, doctoral students and undergraduate students of the Faculty participated in the interdisciplinary Workshop in the Cinque Terre National Park (Italy). The participants represented 11 countries. The Region of the Park was a model area for the consultation of experts and local decision makers as well as the residents in the cultivation of traditional forms of life, necessary to protect a unique cultural landscape. The activities were directed towards the diminishing of the concentration of tourism at the coastal area by encouraging tourists to visit mountain areas. A particular subject of our interest was related to GIS in the context of the needs of the national park, mainly the development of tourism and nature conservation. Remote sensing and photogrammetry techniques as well as GIS have been developed in the Department of Photogrammetry and Remote Sensing Informatics. They can be successfully implemented for the needs of the Park. A map of vegetation/land use was made based on satellite data. This can make a starting point for the monitoring in the aspect of land use changes. Some examples of photogrammetric documentation of historical monuments in the Park were also made, including spherical panoramic images. From the tourist point of view it is important to publish the information, including GIS data in the Internet, which is also a subject of the studies of the Department. A website was made, focussed on the promotion of tourist paths in mountainous areas of the Park, presenting GIS data and interactive panoramic images. Many of the proposed solutions can be applied in other protected areas. The methodological experience in the implementation of sustainable development in national parks of other countries was used, including interdisciplinary science-educational work carried out in Poland since 1968.

Keywords: sustainable development, education, eco-tourism, national parks, geoinformatics

Wojciech Drzewiecki: **Cellular automata – a tool for spatio-temporal modelling and simulation in GIS** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The paper presents a cellular automata definition and functionality as well as ways of its integration with Geographical Information Systems. In the second part a short review of cellular-based GIS applications to modelling and simulation of dynamic spatial processes is given.

Keywords: Geographical Information Systems (GIS), cellular automata, modelling

Rafał Gawałkiewicz, Anna Szafarczyk: **Data situational orientation based on the azimuth measured using Callidus' electronical compass for hard taking mining excavation inventory** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Very popular now is a subject of protecting structures, which are the results of the miners generations work. The same refers to the natural, often unusual caves, which could be noticed and then restored and opened for the public. Such works could extend the region attractiveness. Many of those objects, according to their shallow covering could be dangerous for the surface and the buildings and structures located on this area. Nowadays the using of fully automatic laser scanners could make easy such works as inventerisation and documents bringing up to date. In the article there are presented results showing possibility of using electronical compass, which is an element of panoramic scanner Callidus, to situational orientation the clouds points

when classical instrument orientation is not possible. Using the gyrotheodolite Gyromat 2000, produced by DMT it was possible to calculate the real accuracy of Callidus electronic compass.

Keywords: laser scanning, magnetic orientation, mining excavations inventory

Władysław Góral: **Geoinformatical and astronomical aspects of Cracow's prehistorical mounds and mound Krak in Krakuszowice** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

The arguments that positions of the mounds: Krakus, Wanda and Krak are not random, but are strictly connected with particular directions of moonrise (moonset) and sunrise (sunset) are presented. The line determined by mound Wanda and mound Krak point out major standstill southern moonrise, and opposite direction gives major standstill northern moonset. Moreover, that line is parallel to the line Wawel Hill – mound Krakus. It also has been proved that direction given by mounds Krakus and Wanda (and also Krakus and Krak) determine two dates of sunrise and two dates of sunset. The above dates divide the year into four parts. That four days of the year are roughly midway between the solstices and equinoxes and they are strictly connected with Celtic holidays.

Keywords: archaeoastronomy, Cracow's prehistorical mounds, moonrise, sunrise

Stanisław Gruszczyński: **Geoinformatic instruments in the soil survey** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Present requirements in terms of the content and purposes of documenting soils, unlike traditional soil maps, differentiate three significant circumstances: the possibility of the application of digital techniques of collecting and analysing spatial data, the increase of the role of environmental criteria for the assessment of the quality of grounds, compared to dominating earlier indexes of their values viewed only in the aspect of the needs of agriculture and forestry, and supplementing the list of the goals of documentation with the prediction of the changes in soils influenced by different factors. All these circumstances cause changes in the ways of the interpretation and understanding of spatial soil data. In methodological sense, the tools of the new approach are: including the fuzzy inference as the proper for the procedures of the classification of soils and visualization of the ranges of their units, the application of knowledge discovery in databases (KDD) and data mining (DM) in the modelling of morphologic and spatial relations useful in predicting changes in soils in new environmental conditions. Nowadays, systems of spatial information, equipped with KDD algorithms make – in the relation to the documentation of soils in technologically advanced countries – systems of the extraction of knowledge and information, allowing environmental risk assessment related to the propagation of pollutants and complex studies of their transformations under the influence of multidirectional anthropogenic influence. In the paper the application of KDD algorithms was presented in the assessment of present and forecasted state of soils.

Keywords: soil records, data mining, extraction of knowledge, transformation forecasting

Wojciech Jaśkowski, Mieczysław Józwik: **The application of the computer system of the detection of a laser beam in geodetic measurements** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

In this article the authors presented a prototype of a device for the computer detection of a laser beam based on authors' inventions submitted into the patent office. The laboratory studies done to calibrate the instrument and industrial studies were also presented. In the further part of

the article the possibilities of the application of this instrument for the on-line inventory measurements of mining shafts, on-line monitoring of different kinds of engineering objects caused by their exploitation and the effect of external forces, as well as determination of the kinematics of these dislocations.

Keywords: on line monitoring of different kinds of engineering objects, detection of a laser beam

Eligiusz Jędrzejec, Andrzej Kowalski, Piotr Gruchlik: **System Szkody ver. 4.0 as the support in the construction of the A4 motorway in terms of mining area deformations** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The paper presents a system created in the Main Institute of Mining. The system called Szkody ver. 4.0. is a 32-bit version of system allowing very quick calculation of deformations in Windows. Numerous tool programs allow, among others, graphical outlook of the calculated deformations in the areas of the grids of calculation points, assistance in making the timetable of mining, assessment of the amount of deposit, making auxiliary files for maps and graphs, etc. The examples of the application of this system as the support in the forecasting and the analysis of the measured deformations during the building of A4 motorway, especially the distance Wirek junction – Batory junction are given.

Keywords: exploitation, maining damage, maining terrain, control, computer program, technical opinion

Romuald Kaczyński, Ireneusz Ewiak: **High-resolution satellite images and airborne photographs** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The article presents the results of the studies on the accuracy of geometric correction and generating digital orthophotomaps of high-resolution satellite images IKONOS and QuickBird compared to the results of photogrammetric blocks of airborne photographs taken with cameras allowing the registration of the centres of projection with the dGPS method. The accuracies of geometric corrections of IKONOS and QuikBird images were examined with different methods and the minimal number of photopoints was determined for them. The accuracy on control points was 0.4 pixel. Digital orthophotomaps from IKONOS data can be generated with 1 m pixel, which corresponds to the accuracy of maps in 1:10 000 scale, and QuickBird data can be generated with the accuracy of 0.5 m pixel, which corresponds to the scale 1:5000. Advantages and limitations of high-resolution satellite images were presented compared to classical photogrammetric pictures.

Keywords: digital photogrammetry, NMT, orthophotomap, IKONOS, QuickBird, airborne photographs

Zdzisław Kulczycki, Piotr Trzcionka: **Geodesy in service to mining supervision** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Geological and Mining Law obliges entrepreneurs to have and supplement the surveying-geological documentation of mine. The works connected to doing it can only be lead by persons certificated as a mining surveyors with the certificate enacted by President of the State Mining Authority, which persons are, in the majority, graduates of the Department of Mining Geodesy and Environmental Engineering of the Mining and Metallurgy Academy. The activity of mining surveyors is under inspection of mining authorities. On the authorization of directors of district mining authorities the inspection is also lead by inspectors, who has the same certificates. Moreover, the tasks of they include enforcement of duties concerning to land protection (including

buildings), resource management, land reclamation as well as manage of post-mining lands. Works of surveying inspectors of district mining authorities are coordinated by the Department of Environmental Protection and Resource Management of the State Mining Authority.

Keywords: mine surveying, regulation of geological and mining law

Grzegorz Lenda: **The spline functions' creating and modification methods for describing shape of objects observed in a pointed way** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

This paper has been dedicated to describe a spline function course modification methods. Only use of them lets the splines to become a useful and precise tool, which serves to approximate shapes of any engineering objects. Some of these methods should be always applied (parametrical description connected with a proper parameterization, appropriate selection of the boundary conditions), the others are advantageous in depending on the surface's shape, number and accuracy of measured points (additional points insertion, approximant splines), and the rest (NURBS splines) are worth to utilize only in an exceptional cases, when the great deformations are generated by spline functions. The connection of these methods with schedule of the appropriately regularity location of measured points, will lets to obtain good effects of the spline functions approximation.

Keywords: spline functions, approximation, interpolation

Adam Linsenbarth: **Photogrammetry and remote sensing in European geoinformatic programmes** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

The policy of the European Union must be based on condense and up-to date spatial information, necessary both to create the policy of the European Union as well a to implement and monitor the resolutions resulting from the directives of the Union. Two programmes of the European Union meet these expectations. These are INSPIRE and GMES programme. This article presents these programmes, focussing of the role of photogrammetry and remote sensing. The work on the project of the INSPIRE programme, referring to the European Infrastructure of Spatial Data started at the end of 1990s. As the result of the activities of the Group of Experts of programme INSPIRE and several Working Groups, preliminary premises for the INSPIRE programme were made. The result of this work was making the project of the Directive INSPIRE, which, on 23rd July 2004 was submitted to the Parliament and Council of the European Union for the legislation process. As the result of the work done in both these bodies, a document was issued. The title of the document was: Common Statement of the Council. The term of voting is June 2006, at the plenary session of the European Parliament. According to this document, the basic source of terrain information should be satellite or airborne orthophotomaps. Programme GMES (Global Monitoring of Environment and Security) realized by the European Commission and European Space Agency refers to permanent monitoring of our continent and mainly the use of Earth and large city agglomerations. Main source of information in this programme will be medium and high resolution satellite images.

Keywords: photogrammetry, remote sensing, geoinformation, INSPIRE, GMES

Jadwiga Maciaszek, Rafał Gawałkiewicz: **The application of laser scanning in the diagnostics of the objects affected by mining** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

In the article the results of studies aiming at the definition of the degree of the usefulness of the technology of automatic laser scanning in the process of rectification (bringing back to verti-

cal) the inclined houses in the mining areas. The laser monitoring covered two objects: a five-storey building in Ruda Śląska was measured with the Callidus scanner (to compare the results also with the electronic total station Geodimeter 610+Serwo and Nikon NPL-352), while an eleven-storey built of pre-fabricated concrete in Katowice was measured with the scanning total station Trimble 5500 DR 200+Serwo. The measurement results from the Callidus scanner were obtained with the Extraktor program. The determination of the components of the inclination vectors of the edges of the segments of both building and their sum was graphically presented in the AutoCAD program.

The obtained results of the laser scanning indicate that this method allows precise diagnosis of the object and is helpful, particularly in the cases when the object gets deformed unevenly.

Keywords: laser scanning, diagnostics of the objects affected by mining

Stanisław Mularz, Tomasz Pirowski: **Methodical aspects of remote sensing data integration based on IHS method and ITS modifications** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Effective monitoring of urban and industrial agglomerations requires possessing image information of a great degree of accuracy. It is a necessary condition to capture the objects of relatively small size and reproduce structural and textural features characteristic for different elements of urban environment. Such a requirement is fulfilled by high-resolution satellite images, however receiving data is expensive and spectral registration limited to four channels (IKONOS, QuickBird) or only and exclusively to panchromatic channel (EROS, IRS 1C/D), which limits the interpretation and classification of information and makes particularly difficult sensing and valuation of urban green areas. On the other hand, a relatively cheap, multi-spectral system of Landsat TM is characterized by too low spatial resolution for this type of studies. The article presents the idea of integrating satellite images Landsat ETM+ (30 m) with panchromatic image IRS 1C (5.8 m). Properly done integration of this sort of data leads into getting remote sensing materials of rich spatial and spectral information. In the studies – as a initial method of integration IHS standard was accepted. From the analyses earlier carried out by the authors in the area of KWB Belchatów it can be stated that this method has great interpretation values, despite introducing high deformations into synthetic images. The studies carried out by authors go towards the limitation of this disadvantage by proposing the modifications of the standard. The obtained results were compared to standard IHS method and other classical methods of integration such as PCA, HPF, CN. To assess the content and the distribution of information and the degree of spectral deformation of combined pictures, statistic methods and visual interpretation were applied.

Keywords: satellite image, image enhancement, image merging, IHS methods, Landsat ETM+, IRS 1C

Stanisław Oszczak, Adam Cieccko: **The analysis of the accuracy of the measurement of agricultural allotments with GPS technique for the control of areas in IACS** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The paper presents the project carried out by University of Science and Technology (AGH) in Cracow, Poland in cooperation with University of Warmia and Mazury (UWM) in Olsztyn, Poland and Unité de Statistique et Informatique (USI) in Gembloux, Belgium. The project was commissioned by Joint Research Centre (JRC) of European Commission. Aim of the research was elaboration of validation methods for measurement of land parcels areas. Two measurement experiments were performed in the project: remote sensing (RS) and GPS. Remote sensing experi-

ment was made at AGH-UST Kraków, and GPS at UWM Olsztyn. Both experiments were designed and statistically analyzed at USI Gembleux. The article presents the guidelines, practical field tests and results concerning GPS part of the project. During field tests different types of GPS receivers were used, the measurements were carried out on parcels with different size, shape and border conditions (open horizon and obstructions by the trees). The huge number of repetitions and detailed statistical analyzes allowed to draw constructive conclusions.

Keywords: GPS, IACS

Wojciech Pachelski: **Role of standardization in spatial data infrastructures** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Key-terms for building European (INSPIRE) and national spatial data infrastructures (SDI) are: the spatial data infrastructure itself and interoperability of SDI's, as well as the role of standardization in providing such interoperability. The paper presents, on the ground of a Technical Report of the CEN/TC 287 Working Group 5 definitions and methodological and technological concepts of the two terms as prerequisites for the European standards in this field.

Keywords: spatial data, definitions, methodological and technological concepts, normalization

Zygmunt Paszotta: **Idea and technological possibilities of the Internet photogrammetry** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

At present the internet allows sending and editing images with a great speed. This allows interactive implementations of some basic photogrammetric tasks such as visualization of photographs, visualization of orthophotomaps with making measurements, monocular measurement of terrain spatial co-ordinates. One can also realise more advanced tasks of the orientation of images and automatic measurement of terrain spatial co-ordinates for points. This technology has its limitations. First of all it is speed of transmission and legal conditions. The author presents general concept of the Internet photogrammetry, based on customer-server technology. This technology can be realised on customer's side in the form of dedicated application or applet performed in the environment of the internet browser. A particularly attractive concept is the second one, available for each user using any internet browser with JVM (Java Virtual Machine) installed. The author presents the examples of the implementation of basic photogrammetric tasks in this technology. They can be found in the website of the Chair of Photogrammetry and Remote Sensing of the Faculty of Surveying and Spatial Mangement of the University of Warmia and Mazury in Olsztyn (www.kfit.uwm.edu.pl/zp/). Programs were written in Java. In this article the algorithm are presented in UML. The methods of the automatization of the measurements with the use of image matching, are also presented. Also a concept of the visualisation of images from the area was proposed, with the use of co-ordinates from GPS receivers.

The author hopes that presented technology will contribute to the development and popularisation of photogrammetry.

Keywords: Internet photogrammetry

Tomasz Pirowski, Regina Tokarczyk: **The investigation of color space of digital camera Minolta Dynax 5D** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

The proposed method of the automatism of the measurement of markers in a photo-grammetric system of 3D positioning for medical rehabilitation purposes is based on the detection of

colours. Because the parameters of the calibration of colours determined based on one photograph are used in searching in many photographs, it is important to investigate how accurate in projecting colours a picture registering device (digital photo-camera) is. The studies referring to this phenomenon were carried out for the photo-camera Minolta Dynax 5D. A transparent test IT8 of known colour parameters in model L^*a^*b . was used in the studies. The experiments were made at day-light and artificial light, with different white balance and different speed of CCD. The results of the registration were compared in a formal and visual way with the pattern calculated into the space of colours RGB. Formal (statistic) approach allowed the detection of a difference on respective components R, G and B and defining standard deviation (noise) in single colour fields and the greyscale. In the conclusions it was stated which colours and which components get most deformed and in which range the colour balance for the greyscale is kept properly. To generalize – in order to compare different tests and – in the future – different digital cameras - a synthetic parameter was used – a so-called mean relative spectral error nQ – proposed by Wald [5].

Keywords: digital camera, colour space, automatic measurement of colour images, IT8 test

Edward Popiołek, Ryszard Hejmanowski, Artur Krawczyk: **Applied geoinformatics in the mining areas protection field** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

In the paper first attempt to using informatics in the field of mining areas protection was characterized. The pioneering work with informatics technique in that field was described with comparing to the other science center's. The software for post mining deformation calculation and databases designed for infrastructure information handling was presented. At the end of paper actual research directions connected to geoinformatics was discussed.

Keywords: mining areas, survey, GIS, geoinformatics

Antoni Rzonca: **Integration of laser scanning and photogrammetric data for inventory of Anna Jagiellonka monument in Cathedral of Wawel Castle, Cracow** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

The paper presents a possibility of usage of close-range photogrammetry and 3D laser scanning as integrated technological process. The approach was shown by solving the test model – considered the representative field material. As a model there was used the monument of Queen Anna Jagiellonka, established in renaissance period in Wawel King's Cathedral in Cracow, Poland. Developing of the technology required arranging two geometrical filters for point cloud preparation. Point clouds were used as geometrical information for orthorectification process. The obtained result positively verified author's hypothesis, that the integration of scanning and photogrammetric data is an alternative for classical orthophotogrammetric technology. Such a possibility is an effect of laser scanning technology potential.

Keywords: 3D laser scanning, data integration, orthophotoplan, point cloud, geometrical filter

Piotr Sawicki: **Present digital imaging sensors in close range photogrammetry** · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

Digital images acquisition using optoelectronic systems has been predominant in close range photogrammetry for a dozen years. Digital imaging sensors are the basic hardware element of on-line and off-line photogrammetric 3D measurement systems. The classification of optical digital sensors is presented in the paper. The technical parameters of solid state sensors of CCD and

CMOS type were determined and the characteristics were compared. Various types of optical digital sensors – digital video cameras, still video cameras, high-resolution digital cameras, scanning cameras, panorama cameras and high-speed cameras – used in close range applications are discussed. An analysis of the current potential of photogrammetric close range digital imaging sensors and its future development is formulated.

Keywords: imaging sensor, CCD, CMOS, still video, digital camera, close range

Zbigniew Sitek, Władysław Mierzwa, Krystian Pyka, Andrzej Wróbel: **Development of orthophotomap generation technology and analysis of orthophoto usefulness – experience of AGH Photogrammetry Department** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

The Department of Photogrammetry, AGH possesses great experience in making orthophotomaps from surface, airborne and satellite images. First studies were carried out at the beginning of 1970s, after many years of improving analogue technology, it was replaced with digital technology. Apart from the very methodology of making orthophotomaps, their usefulness in the inventory of architectural and industrial objects was analysed as the base for the up-dating of the main map, inventory of grounds and buildings, and recently – the definition of the surfaces of plantations within the control of farmers' subsidies. The article presents the most interesting research and implementation studies referring to orthophotomaps done in the Department of Photogrammetry, AGH.

Keywords: photogrammetry, orthophotomap, digital technology

Jacek Szewczyk, Jadwiga Maciaszek, Artur Krawczyk: **Information system on archive cartographic collections referring to mining in the area of Poland** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

In 2005 the authors started the research project *Information System on Archive Cartographic Collections Referring to Mining in the Area of Poland*. In the article the principles of the project are presented. The objective of the project is to make a catalogue and put in a uniform system mining maps from the area of contemporary Poland. So far the maps have been dispersed into different units and private collections. The concept of the system MICARIS (Mine Cartography Information System) was presented. The system was based on the metadata base and available in the Internet. The system should enable to carry out simple spatial analyses. Predicted effects of the project were discussed as well as the state of the progress of work.

Keywords: archive mining maps, catalogue, MICARIS, metadata

Regina Tokarczyk, Michał Huppert: **Automatic detection and measurement of markers in photogrammetric system of 3D positioning of body for the rehabilitation purposes** • Geodezja • Tom 12 • Zeszyt 2/1 • 2006

Photogrammetric system of positioning for the purpose of medical rehabilitation is based on the images of digital cameras and allows the determination of spatial co-ordinates of selected points of human body. These points consist of characteristic places of skeleton transferred into the surface of human body. They are marked by light foamed polystyrene balls. Apart from these points, also patients' pupils were examined. Reference system is defined by flat paper sheets situated in one surface. The mentioned above points are measured manually, which makes the system not very competitive compared to other systems working in this field. In the framework

of developing and modernizing this system, studies on automatic detection and measurement in digital images of the mentioned above three groups of points were carried out. For the detection of markers on the patient's body the method of searching referring to a defined colour was chosen. This search is carried out in the HSI area of colours. For the groups of pixels discovered in the pair of images and making images of markers – centres are determined and then connected into homological pairs based on the following criteria: belonging to a proper epipolar line and minimum of vertical parallax. The proposed method was compared to the manual measurement and it was successful in terms of its accuracy. Because amateur compact digital cameras, used for the recording of the image, save this image in JPG, causing quality loss, the influence of the degree of compression on the accuracy of automatic measurement was examined.

Keywords: digital photogrammetry, medicine, automatic measurement

Bogdan Wolski: Operational reliability in theory and practice of geodetic surveys · Geodezja · Tom 12 · Zeszyt 2/1 · 2006

A reliability criterions of evaluation of technical systems performances and construction serviceability may be used in geodetic analysis if a survey problem can not be formulated by equation set. In the paper on the background of the reliability approach outline the proposal of an operational reliability has been given as the criterion of evaluation of some geodetic solutions. The definition of the operational reliability had been formulated as well as algorithm of reliability analysis. The problem has been exemplified by an optimization of the levelling network.

Keywords: reliability of geodetic survey, reliability of use