

THE PROPERTIES OF SINGULAR VALUES OF IMAGE MATRIX

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Abstract: The image matrix represents digitized and encoded information about an image. A saving of complete information about this image requires a large computer memory for an image processing. The singular values of image matrix represent characteristic information about the image, but they require smaller memory than image matrix. The singular values are sensitive to the changes of image. This paper brings basic information about properties of the singular values.

Keywords: image matrix, singular values, Singular Values Decomposition (SVD).

ORTHOGONAL TRANSFORMS FOR DIGITAL MODULATION CLASSIFIERS

Marie RICHTEROVÁ

Abstract: This paper describes the using of Walsh–Hadamard transform (WHT) and Karhunen–Loeve transform (KLT) for the modulation recognition. The method of clustering analysis was chosen by theoretic recommendations for 2–class recognizer of FSK and PSK signals. The input signal is converted to the "phase image". WHT and KLT is provided on this image and itself performs the recognition by a minimum–distance classifier. The algorithm for a modulation recognition was realized in the programme MATLAB. The tests designed algorithm was the implementation on real pattern signals.

Keywords: orthogonal transforms, signal processing, modulation recognition, modulation classifiers, digital signals.

ESTIMATION OF STOCHASTIC COEFFICIENTS OF INERTIAL SENSORS

Miloš SOTÁK

Abstract: The main objective of this paper is to test the Allan variance as a unified method in identifying and modeling noise terms of inertial measurement unit sensors. The estimation accuracy is mostly affected by the time-dependent growth of inertial sensor errors, especially the stochastic errors. In order to eliminate the negative effect of these random errors, they must be accurately modeled. Usually the stochastic models are based on the 1st or 2nd Gauss-Markov models, where the key to successful implementation depends on how well the noise statistics of the inertial sensors are selected [9]. In order to improve the performance of the inertial sensors, the users are keen to know more detail about the noise component for a better modeling of the stochastic part to improve the navigation solution [6], [7].

Keywords: IMU, stochastic modeling, gyroscope, accelerometer.

APPLICATION OF WAVELET ANALYSIS TO INERTIAL MEASUREMENTS

Miloš SOTÁK

Abstract: The paper presents de-noising algorithm development for the inertial measurement unit (IMU). The problem with inertial measurements is that the required signal is buried into a large window of high frequency noise. If such noise component could be removed, the overall inertial navigation accuracy is expected to improve considerably. The paper is focusing on the determination of sensors errors that can be defined as measurement noises. The algorithm was created in simulation environment MATLAB. The results show that the de-noising algorithm is able to obtain accurate data from the raw data. Other errors like scale factor instability, axis misalignment, and non-linearity are not dealt with.

Keywords: wavelet analysis, inertial measurements, gyroscope, accelerometer, inertial measurement unit.

INCREASED UNCERTAINTY OF PROJECT'S COSTS IN A SEQUENTIAL PROJECT

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Abstract: What is the effect of increased uncertainty of project costs, on a project's value? In this paper, we will address this issue by modelling a sequential decision problem. By using a well known model, we will simulate an increase of uncertainty of project's costs and measure their impact on project's value. Two methodologies are used when calculating project's costs: a traditional net present value and a real options methodology. The latter will be analysed in more detail, because as was already shown in numerous papers, this methodology addresses the observed reality much more closely than other methodologies.

Keywords: uncertainty, real options.

BLUETOOTH BASED POSITIONING FOR AD HOC NETWORKS

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Abstract: Mobile positioning will play very significant role in mobile services in near future. These services will be provided in global geographic environment, i.e. outdoor and also indoor environment. The major utilization of Global Navigation Satellite Systems is only in outdoor environment, because they are not able to work reliable in indoor environment. The alternative positioning systems have to be used in these specific conditions. The alternative positioning system for indoor environment is proposed in this paper. This solution is based on Bluetooth technology and ad hoc networks. This technology is implemented in most of mobile devices and also in printers, etc. That was our motivation to design mentioned Bluetooth localization system. Finally, the positioning system is based on basic proximity localization method and its modifications.

Keywords: positioning, indoor positioning, proximity localization method, Bluetooth, ad hoc network.

HOW TO COPE WITH TERRORISM: CALL FOR CHANGES

Pavel NECAS

Abstract: After 9/11, global terrorism has become one of the major topics of today's political agenda. Reaction to global terrorism led to the US "War on terror" and various actions across the world that rarely seem to be coordinated or even on the same page. No issue has more pointedly divided the West in 21st century war than the perception of terrorism. As we will see, the global nature of terrorism provides unique challenges to states, organisations and individuals. The current approach dealing with global terrorism does not appear to be sufficiently effective. Existing and developing threats require different approaches to counter the spread and impact of terrorism, which poses the question: Is a Change Needed in the Approach to "Fighting" Terrorism?

Keywords: terrorism, approach to cope, different instruments of power, comprehensive approach, international cooperation, communication lines, identification of the roots, International Organizations, effect based approach to operations, complementarity, effective impact.

LOCAL THRESHOLDING TECHNIQUES

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Abstract: Thresholding is one of useful techniques of image segmentation. Its goal is to localize significant parts of image. There are many thresholding algorithms. However we can divide them into six categories: histogram methods, clustering methods, entropy-based methods, object-attribute methods, spatial and local methods. The contribution describes most popular local methods. Also the algorithms are given in image algebra expressions. Finally, the new local technique is presented. The proposed technique is suitable for images which histograms are not bimodal. It's based on searching maximum absolute value of averaged discrete derivations in a small pixel's neighbourhood. Output image is binarized in sense of significant variation of intensity image function.

Keywords: image thresholding, thresholding techniques, edge finding, local properties.

NEW APPROACHES TO EVALUATING COMMAND AND CONTROL SYSTEMS IN NNEC ENVIRONMENT

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Abstract: Today's military conflicts and other security threats require rapid and efficient reaction from NATO and other government, non-government and humanitarian organizations. To evaluate maturity levels of Networking Information Infrastructure and C2 systems, theoretical maturity models for NEC were created. The models can be used for definition of milestones of C2 development with goal to improve effectiveness and military power of units using effective Networking Information Infrastructure, and as a framework for evaluation of cooperating units in future operations. The paper describes two possible approaches to evaluate C2 systems. The paper is based on actual work of SAS-065 „NATO Network Enabled Capability (NNEC) C2 Maturity Model“ working group and presents its achievements.

Keywords: NEC, NATO NEC, Command and control systems, Maturity model

THE PHYSICS LECTURERS' ENTRY CHARACTERISTICS OF STUDENTS AT THE ACADEMY OF THE ARMED FORCES

Eva BAJČIOVÁ JUREČKOVÁ

Abstract: The Academy of the Armed Forces of General Milan Rastislav Štefánik in Liptovský Mikuláš offers also a 4-year course of bachelor studies in the fields “Electronic Systems” and “Transport Machinery and Devices”. These two fields of study include also an obligatory subject Physics. This paper presents the results from the questionnaires distributed by the physics lecturers at the Department of Natural Sciences. These results helped the lecturers get the characteristics of students who entered the academy to study the above-mentioned courses. The information they obtained will be necessary for their future pedagogical work.

Keywords: physics, teaching, evaluating, students' attitudes, questionnaire.

DETECTION OF DANGER OBJECTS BY INFRARED SYSTEMS

Róbert BRÉDA

Abstract: The problem of locating the position of mines plays a very important role both military and humanitarian points of view. Lots of people, on a daily basis, get hurt or even killed – by remnants of military conflicts. Consequently, detection of mines is becoming the central issue of a much effort in research. Detection of dangerous objects – antitank and antipersonnel mines can be resolved also by the method of processing of the scanned visual information. The standard methods of locating anti/tank or anti-personnel mines are increasingly demanding in terms of time, the level of proficiency of mine-sweepers or engineers. The possibility of remote detection of mines from aircraft, helicopters or unmanned aerial vehicles reduces time demandingness of mine-sweeping actions, and costs and enables automation of the process thereby reducing the influence of human factor. The contribution is about a proposal of an algorithm of mine detection in via visual information in the infrared spectrum. It also contains a description of the procedures used by thermal image processing and that of the Hough's transformation used in the algorithm for detection mine in the image. The results of proposed algorithm designed to detect dangerous objects were used on real image of a minefield.

Keywords: mine detection, image processing, segmentation, Hough's transformation.

TYPES AND FUNCTIONS OF INFORMATION IN AIR DEFENSE

Zdzisław MAŚLAK

Abstract: The system of air defense is extremely complex. This complexity results from a large number of elements, the multiplied relations among them and also forms the variety of states that particular elements can be found separately and as a whole with high frequency and speed. The number of object classes, classes of relations in the distinguished objects are relatively small. That's why most of messages in the system of air defense can be reduced to relatively small number of message types with well-defined patterns.

Keywords: message types, air defense, information, types, functions.

NEC EDUCATION - FROM THE NATIONAL TO THE COALITION POINT OF VIEW

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Abstract: The paper deals with the NEC education support by the LMS Moodle at the Communication and Information Systems (CIS) Department of the University of Defence (UoD) in Brno. The experience in usage of the CIS Department Moodle is described. The proposal of the possible coalition approach can create a discussion about this important and current topic.

Keywords: education, LMS, Moodle, NATO, NEC, university.

COMPUTE UNIFIED DEVICE ARCHITECTURE (CUDA) GPU PROGRAMMING MODEL AND POSSIBLE INTEGRATION TO THE PARALLEL ENVIRONMENT

Miloš OČKAY, Marcel HARAĀAL, Miroslav LÍŠKA

Abstract: CUDA (Compute Unified Device Architecture) is a successful and promising implementation of unified architecture. CUDA simplified the development of parallel, general purpose applications on graphics accelerators and expanded possibilities of parallel processing. We are presenting a brief description of fundamental elements of this architecture.

Keywords: Compute Unified Device Architecture, CUDA, Graphics Processing Unit, GPU, Parallel computing, Stream processor, Application Programming Interface, API.

DECISION MAKING AND DECISION SUPPORT SYSTEMS IN MILITARY ENVIRONMENT

Milan SOPÓCI

Abstrakt: The contribution speaks about decision – taking and decision – making process in military environment. In the concrete cases presents decision support systems which were created on the base computer's software, by teachers and students of Air Defence Faculty.

Keywords: decision, decision-making, decision-support, military environment.