CANTOR SETS

Ferdinand CHOVANEC

Abstract: The Cantor set is an interesting example of an uncountable set of measure zero and has many interesting properties and consequences in the fields of set theory, topology, and fractal theory. The principal aim of this paper is to introduce a generator of finite subsets of the basic Cantor (ternary) set and its generalization to the Cantor *n*-ary set. We compute the fractal dimension of these Cantor sets.

Keywords: Fractal, Cantor set, fractal dimension.

EXPERIMENTAL RESARCH OF THE MAGNETIC AURA OF A SMALL-SIZE JET-ENGINE AND THE POSSIBILITIES OF APPLICATION FOR DIAGNOSTICS AND CONTROL

František ADAMČÍK, Ján KABÁT, Jana MODROVIČOVÁ

Abstract: The contribution is presenting the results of experimantal measurement of the magnetic aura of a small-size jet-engine with focus on the effects of foreign bodies heated up. The experiments form part of the programe of the Laboratory of Intelligent Control Systems of the Faculty of Aeronautics of the Technical University Košice.

Keywords: The magnetic aura, jet-engine, diagnostics, magnetometer.

IMPROPER THRESHOLDING TECHNIQUES ELIMINATION

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Abstract: Image segmentation is an important stage in image processing. The purpose of segmentation is to detect and select significant image features. These can be suitably utilized in next image processing, such as classification, pattern recognition, texture analysis etc. From many segmentation methods contribution focuses on global thresholding. We suggest the algorithm detecting segmentation failure, based on resemblance of input and output image. It utilizes important image features in sense of significant edges according to Marr theory ideas. Implementation is realized by suggested edge operator, its application to input gray-valued image and definition of two functions describing detected edges distribution in binarized output.

Keywords: Successful Binarization, Edge operators, Edge Images, Optimal Thresholding, Image Segmentation.

A COMPREHENSIVE APPROACH TO DECISION-MAKING AND INTERACTION MECHANISMS THAT VALORIZE RELEVANT INFORMATION

Paul BECHET, Iulian ILIES, Amalia LEBU, Anca DINICU

Abstract: Effects-based organizational planning aims to synthesize the operational structure and strategies that enable organizations to achieve the desired effects in the context of a rapidly changing environment. The informational domain, as a link between the cognitive and physical domains of an organization sets forth to achieve “informational superiority” and valorize the valuable information of all organizational processes. Informational superiority does no longer refer to obtaining knowledge, but to how the valuable information produced within an organization is shared and applied by its members, as we are now witnessing a shift from a need-to-know, to a need-to-share approach to information. In this context, the competences of those actors participating in the “observe → monitor → decide → act” cycle as well as the interaction mechanisms established within or outside the organization become the key enablers. Our paper considers all the above mentioned aspects and introduces a basic model for the dynamic assignment of decision rights based on competences and interaction mechanisms.

Keywords: Collaborative environments, decision rights, comprehensive approach, knowledge management.

APPLICATIONS AND COMPUTATIONAL ASPECTS REGARDING THE COANDĂ EFFECT

Mircea BOŞCOIANU, Vasile PRISECARIU, Ionică CÎRCIU

Abstract: Coanda effect is the phenomena in which a jet flow attaches itself to a nearby surface and remains attached even when the surface curves away from the initial jet direction.In free surroundings, a jet of fluid entrains and mixes with its surroundings as it flows away from a nozzle. When a surface is brought close to the jet, this restricts the entrainment in that region. As flow accelerates to try balance the momentum transfer, a pressure difference across the jet results and the jet is deflected closer to the surface - eventually attaching to it.

Keywords: Slot, attached jet, static pressure, centrifugation zone, suction zone.

SOME ASPECTS REGARDING THE FLIGHT DYNAMICS AND STABILTY OF QUAD-ROTORS MICRO AERIAL VEHICLES

Ionică CÎRCIU, Mircea BOŞCOIANU, Stanislav SZABO

Abstract: The actual interest is to develop micro aerial vehicles with VTOL (vertical take off and landing) capabilities that could better respond to the new D3 missions (dull, dirty, dangerous missions). The focus on downsizing aspects is essential because in this case it is possible to adopt new missions that are not possible for the conventional UAV systems. First we present the benefits of RW-MAVs together with a comparative analysis of the matching between the configuration and different mission scenarios. According to the new missions we define the basic requirements that RW-MAV that should be satisfied in order to successfully complete urban and indoor missions. We define the new 4RW-MAV architecture and we propose a comparative analysis with the characteristics and performances of different classic configurations. Based on a better maneuverability, portability and agility, the 4RW-MAV architecture is promising but depending on the geometry there are some differences regarding the performances, stability and the payload capacity. In urban or indoor missions the maneuverability is crucial and thus the new architecture should provide better movement capabilities. The 4RW-MAV configuration is effective in indoor narrow space with a capability to maneuver in a very fast and effective way, impossible for other configurations. The net effect relevant for control during autorotation landing is analyzed by adding a vertical offset relative to the vertical position predicted in the absence of ground effect. This vertical offset is estimated from flight data and taken into account accordingly.

Keywords: Micro aerial vehicle (MAV), quad-rotors MAV (4RW-MAV), VTOL capabilities.

THE EVALUATION OF INTERIOR CAR´S AIR QUALITY AND SAFETY OF TRAFFIC

Štefan ČORŇÁK, Pavel BRAUN

Abstract: Looking at the traffic accidents statistics which has been collated for long time period it is remarkable that the main contributors to the traffic accidents are drivers (more than 90 %). An environment quality it is one of the essential contributors to the driver’s performance apart of the good life style (feeding, corporal activities, sleeping, resting, etc.). The air quality of the driver's environment is the main contents of the contribution.

Keywords: Traffic safety, driver's environment, driver's microclimate, carbon dioxide.

DOMAIN-SPECIFIC LANGUAGES FOR COMMAND AND CONTROL SYSTEMS

Ľubomír DEDERA

Abstract: The paper tries to show the parallels in syntactical and semantic processing between traditional high-level programming languages and domain-specific languages. We also demonstrate the possibility of utilization of domain-specific languages in C2 systems.

Keywords: Domain-specific language, programming language, context-free grammar, parser, semantic routines, syntax, command and control system.

CATALOGUE OF ACCOUTREMENTS ALLOWANCES

Petr HARAŠTA, Jiří DVOŘÁK

Abstract: The primary goals and final outcomes of the project "Catalogue of Accoutrements Allowances" are presented in the paper. A virtual catalogue was developed as an application to be employed in the military information network with the aim to provide professional soldiers of any posts, ranks and specializations with a comprehensive survey of the accoutrements allowances contained in all relevant standards. The project was part of the research plan at the Department of Logistics of the Faculty of Economics and Management of the University of Defence in Brno filed under VZ04-FEM-K05-02-SED.

Keywords: Catalogue, standards, criteria, databases, materiel, allowances.

MOMENTS HAVING EFFECT ON A FLYING MISSILE

Peter LIPTÁK, Milan JOZEFEK

Abstract: The article describes effects of aerodynamic moments on the antiaircraft missile during the flight. Decomposition of the overall aerodynamic moment on the controlling, dampening and stabilization one enables to analyze their effect on the antiaircraft missile.

Keywords: Aerodynamic force, aerodynamic moment, antiaircraft missile, aerodynamic deployment of missiles.

INTELLIGENT AGENTS IN MILITARY DECISION MAKING

Florin MOISESCU, Mircea BOSCOIANU, Gabriela PRELIPCEAN, Mariana LUPAN

Abstract: Military decision making demands an increasing ability to comprehend and structure the critical information on the battlefield. As the military evolves into a networked force, strain is placed on headquarters and others to collect and utilize information from across the battlefield in a timely and efficient manner. Human capability in analyzing all the data is not sufficient because the modern battlefield is characterized by dramatic movements, unexpected evolutions, chaotic behavior and non-linearities. It results a great need of powerful AI assistance in military decisions.

Keywords: Artificial intelligence (AI), AI algorithms, military decision making, course of action (CoA).

IRANIAN WAR ON INSECURITY: ROADMAP FORWARD?

Pavel NEČAS, Miroslav KELEMEN, Jaroslav UŠIAK, Peter SPILÝ

Abstract: At present, the attention of the world is turned towards the Middle East. The Middle East is an area of global strategic importance and of considerable economic and political interest. Especially Iran is today a potential source of threat to the whole world. After numerous verbal attacks against Israel, Iran has shown strong determination to continue its uranium enrichment program, despite pressure from the United States, the EU and Russia. Iran has therefore been subject to several series of economic sanctions in order to leverage prevention of the proliferation of weapons of mass destruction, countering international terrorism and promotion of democratic government, all named major goals of the international community. In order to pursue the world developed countries' foreign policy goals, these have been increasingly using the tool of economic sanctions, as in the cases of Iraq, Libya and Syria or the still remaining case of North Korea. The international community does not look for but insists on the sanctions as such for the vein only. But in the absence of a negotiated solution, the process of imposed international sanctions will extend by damaging the Iranian economy for a long time and preventing Iran from enjoying all the benefits of international cooperation.

Keywords: Instruments of Power, International Pressure, Rules of Engagement, Business Conditions, Sanctions and Restrictions, National Caveats.

KERNEL DEPENDENCIES IN A MODERN GENERAL-PURPOSE GPU ARCHITECTURE

Miloš OČKAY, Marcel HARAKAĽ, Miroslav LÍŠKA

Abstract: CUDA (Compute Unified Device Architecture) allows programmers to access massive power of graphics processing unit (GPU) and offload several compute intensive portions to the GPU. Massive parallel coprocessor is now available for central processing unit (CPU) to make computation process faster and accurate, even across the huge datasets (vector, matrix). In this paper we highlighted main aspects of GPU parallel program (kernel) sizing to achieve high performance results and we described dependencies of the main parts of GPU computational process. Kernel sizing theory is compared to the results of our benchmark.

Keywords: Compute Unified Device Architecture, CUDA, Graphics Processing Unit, GPU, Parallel computing, Kernel, Application Programming Interface, API, High Performance Computing, HPC.

ADAPTIVE FILTERING FOR NAVIGATION SYSTEMS OF ROBOT-AEROCRAFT

Andrey Victorovich PROLETARSKY, Konstantin Avenirovich NEUSIPIN

Abstract: The objective of this research are to design and implement an adaptive algorithm with Kalman filter that aimed to increase accuracies for measurement navigation systems of robot-aerocraft.

Keywords: Kalman filter, navigation system.

CONTRIBUTION TO ESTIMATION OF ECONOMIC CONSEQUENCES OF DISASTER

Jaroslav SLEPECKY

Abstract: In this paper I deal with the economics of disasters and related problems to this subject. The paper is divided into two main parts. First part provides a perspective toward disaster related research with focus on theoretical consequence of disasters. In recent years significant progress has been made in economics of disasters worldwide. The review is carried through new findings from recent studies and research. The second part point on losses of disasters and is dividing them into three types, direct losses, indirect losses and secondary effects of natural disasters. Each type is characterized by individual characteristics.

Keywords: Economics of Disasters, Economics of Catastrophes, Crisis Management.

INTERACTIVE VISUALIZATION OF ABSTRACT DATA

Martin ŠPERKA, Peter KAPEC

Abstract: Information visualization is a large research area. Currently with more powerful computers and graphic accelerators more and more visualization techniques become part of daily use. In this paper we discus visualization of abstract data – data that is difficult or impossible to manually grasp. Using visualization of abstract data we can gain better insight. We present several experimental methods for visualizing graphs and show possible applications in the software visualization field.

Keywords: Information visualization, visual data mining, software visualization.