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PREFACE

This abstract book includes all the abstracts of the papers presented at the *6th Annual International Conference on Computer Science & Information Systems, 25-28 June 2010* sponsored by the Computer Research Unit of the Athens Institute for Education and Research (AT.IN.E.R.). In total there were 20 papers and 21 presenters, coming from 14 different countries (Algeria, Austria, Canada, Czech Republic, China, Finland, France, Hong Kong, Malaysia, Poland, Slovenia, Spain, UK and USA). The conference was organized into 6 sessions that included areas such as Education & Networks, Human Computer Interaction, Modelling, Health Informatics e.t.c. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 100 international conferences and has published over 80 books. Academically, the Institute is organized into four research divisions and nineteen

research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
Director

The Distribution of a Hello Message Waiting Time

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Wireless Ad Hoc networks are composed of various computer systems, more or less complex, constituting nodes. These have the ability to communicate independently using radio waves. Nodes can cooperate and interact to exchange services.

The Hello messages play an important role in maintaining connectivity between nodes in an ad hoc network, and location of the latter.

Two key variables control the determination of connectivity: the Hello interval and the loss left by the Hello messages. The Hello interval specifies a maximum interval between two successive receptions of a Hello message from one node before considering it lost.

It is important that the calculation of the value of the Hello interval is based on waiting time of Hello messages at the receiving node.

In this work, we model the reception of Hello messages at a node by a queue where customers are the Hello messages; the service is defined as the processing of these messages. Using the theory of random walks, we determined the exact expression of the distribution of waiting times.

Rendering Locally Disorderly Images

Andrew Baker

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This paper details an alternative approach to rendering 3D digital environments using fixation-based cubic disorder fields that maintain object saliency and provide greater depth perception across the entire visual field. The research undertaken compares the effects of applying disorder to both still images and animated sequences.

The emergence of computer systems and graphical algorithms has developed through a strong western visual percept dating back to the engineers and architects of the Italian Renaissance. Optical aides such as the camera obscura, camera lucida and curved mirrors played an important role in the image creation process during this period. Technological leaps made in lens-based photography continue to play a central role in how we perceive the world around us. Research suggests that the depiction of visual reality through Western European cultural conventions has influenced the development of this technology. However, lens-based imagery is not akin to visual perception. What we see is not simply a translation of retinal stimuli. Although the camera is capable of mimicking the optical properties of the human eye, (i.e. light falling on the retina), it is unable to transform that data into meaningful information needed to actually see / understand an image.

Much research has been undertaken to establish how we perceive relative space when viewing an image. Extracting accurate 3D depth cues from 2D images can be difficult to assimilate, especially when camera position / settings are unknown. In optics, a sense of depth is achieved through the focal length. Converging light appears sharp and 'in focus', whilst poorly converging light appears blurry and 'out of focus'. However, adding blur to an image has its drawbacks. More picture information is destroyed when the pixels of an image are blurred (averaged together), compared to when they are 'scrambled'. It has been argued that whilst both images lose information, the scrambled image contains more information than the blurred one.

The initial results achieved identify key areas where local disorder both decrease depth perception and create visual confusion when applied to animated sequences. This paper proposes an alternative approach using cubic disorder fields that overcome these problems when applied to both still and moving images.

The research compares both object saliency and depth perception, within the peripheral region of human vision, between images rendered using (optical) blur functions and those using cubic disorder fields.

Computer-based Workpiece Detection on CNC Milling Machine Tools Using Optical Camera and Neural Networks

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Workpiece detection on CNC milling machine tools is very important task of NC programming. The main aims are:

- detecting the workpiece and the position on machine tool table,
- detecting the workpiece shape,
- detecting the workpiece origin (co called “Zero point”).

In this paper, the system for optical determination of the workpiece origin on the CNC machine tools is described. The purpose of our research is to develop a low-cost (inexpensive) system for non-contact deter

Determination of workpiece origin is very important procedure in order to speed-up the set-up process on machine tools and NC. When the camera is installed on the machine, it is first necessary to calibrate the system, so that the relationship between the image coordinate system and machine coordinate system can be determine (extrinsic parameters). Intrinsic camera parameters (focal length, image format,...) are also determined in the calibration. Calibration procedure is using developed feed-forward neural networks. With this method the calibration procedure is simplified and the mathematical derivation of camera model is avoided. Learned neural network represents the camera calibration model. After neural network learning is complete, we can begin using the system for determining the workpiece origin. The image of workpiece is captured with the help of low-cost camera. With appropriate algorithms for digital image processing the information of interest is separated. In our case, we want to find an area that represents the workpiece zero point (an end point on the workpiece). The input in the learned neural network is the workpiece zero point position in image coordinate system and output of the neural network is the position of the workpiece zero point in the machine coordinate system.

This developed system was through a number of tests proved to be reliable and suitable for use in practice. The system is implemented on a three-axis CNC milling machine Lakos 150 G. Optical system can be, without major modifications, used in other CNC machine tools and also on robotic systems. In the paper, working of system is illustrated with a practical example, which confirms the effectiveness of the implemented system in actual use on machine.

Teaching Databases with a Forensic Flavour

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Smart Classroom Design and its Application in E-learning

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This paper presents a smart classroom design and its application in e-learning. This work is distinguished by three contributions. One is the proposition of an automatic teacher tracking system which enables teachers to walk freely as they do in traditional classes. The second one is the proposition of an improved laser pen which enables teachers to write on PPTs. The last one is the proposition of an attention detection system which gives teachers feedback of students.

Topological Properties of Web Services Similarity Networks

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Web services are autonomous components which can be published, discovered and invoked for remote use. For this purpose, a description has to be associated to each Web service. It is basically an interface containing the set of operations implemented by the service. Each operation is defined by a name and a set of input and output parameters. Web services are to interoperate through the Internet, leading to composition processes. In a composite service several Web services are involved to solve a problem. But, despite the presence of a description, it may happen that some Web services are unavailable. This may affect the robustness of services composition. In the Web services space, we can assume the possible existence of several compatible services capable of performing the same or similar tasks. Those Web services may be substitutable under certain conditions. Substitution means replacing a Web service by another one. The replacing Web service must produce the same output and satisfy the same requirements as the replaced one. In other words, the two Web services must be similar. In this paper we aim at providing a snapshot of the Web services space from a similarity point of view. From this point of view, several kinds of similarity relations can be defined between Web services. We use those predefined relations named full similarity, partial similarity, excess similarity and relation similarity to describe different levels of similarity between Web services. From those relations we propose a formal definition of similarity networks. Using a set of real Web services we then build the four corresponding networks. Finally, we take advantage of methods and tools defined in the complex network area to analyze their underlying topological properties. The main contributions of the proposed approach are (i) the formal definition of similarity Web services networks, (ii) the building of similarity networks with real Web services descriptions, (iii) an extended investigation of the networks topology.

Security Protocols on Wireless Networks

Anna Feng

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The computing related security issues are investigated in this paper with an emphasis on the security protocols used by radio networks. In order to find an efficient methodology for wireless networks, a few applications are reviewed and evaluated, including risk assessment in a security field. The result of research and analysis has also been shown.

Human Computer Interaction and Theories

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This paper reviews the theories that were used for designing interfaces for facilitating pronunciation skills for children with severe speech impairments using multimedia based interfaces. Theories were surveyed from educational, psychological multimedia and social perspectives. The chosen theories were structured to support the chosen methodology used in this research.

Designing Rehabilitation Robots for the Brain Injured

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Jennifer C. George

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Although rehabilitation robotics have been used for helping disabled persons in various areas of disability, especially in the area of after stroke rehabilitation, very little research has been done with the brain injured persons and robotics. This paper discusses the implementation of a simple model, which consists of brain body interface, a computer, an interface program and an electronic circuit to interface the computer to a robotic arm. This was an exploratory research that was carried out that allowed a brain-injured person to do simple tasks using robotic arms. This paper also looks rehabilitation robotics past and present. The paper goes on to explore the new avenues available to enhance this exploratory research that. In this paper, we take the brain body interface communications a step further where the brain injured persons will not only communicate but will also be able to do simple tasks such as lifting a small item, opening a door, pushing a button etc.

The Malicious Insider: Approaching Organizational Crisis Management, Culture and Change

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Currently, security professionals, managers, investors and policy makers view insider threats as crucial problem raising diverse and manifold effects, exemplarily substantial financial and legal consequences, image damage, but also organizational consequences (e.g. new security responsibilities or positions, increasing efforts towards awareness of employees etc.). Thus, “organizational insiders (employees and other stakeholders who have physical and/or logical access to organizational assets)” (Alfawaz et al. 2010) might cause enormous threats to an organization.

Several scholars (e.g. Erlinger et al. 2009; Botta et al. 2007; Beznosov & Beznosova 2007) refer to the special need to understand the impact of organizational and human influencing factors on information security in organizations. They argue that technological factors are not the main key to ensure effectiveness of information security.

Additionally, the current market downturn and possibly a difficult financial and ‘emotional’ situation of employees and managers (e.g. fear of termination, uncertain or existence-threatening situation of the employing organization etc.) may increase the potential and liability of malicious insider opportunities and acts and therefore lead to expanded organization vulnerabilities.

Beside possible influences on insider behavior based on the current financial crisis, aspects of organizational culture and related management practices may play a certain role as well. Security in organizations is for example influenced by management’s understanding of information security issues and executive and line management’s ownership and accountability for implementing, reporting and monitoring on information security (see e.g. ISACA 2006).

Based on this outlined initial situation, the present paper aims on an analysis of 1) vulnerability to organizational crisis, possible factors of success and warning indicators, 2) the role of organizational culture and management practices on employees’ behavior, as well as 3) related change factors with a potentially positive influence to avoid criminal insider acts.

Towards Helmets that can Read your Mind

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In the field of Brain-Computer Interface (BCI), researchers have been investigating how to allow totally paralyzed or ‘locked-in’ persons to interact with software or to control hardware such as wheelchairs and prosthetics. A wearable electroencephalography (EEG) sensory system that can assess the effectiveness of advertisements or perhaps track the cause of disorders including neurodegenerative, obesity or drug addiction are among other examples. Enabling these applications with the aid of wearable and mobile computers can revolutionize our daily life. In this talk, we will present light-weight EEG signal processing methodologies for BCI and for resource constrained wearable platforms. The ultimate objective in design of wearable platforms is to reduce the power consumption, mainly to reduce the form factor and the battery size. We will illustrate techniques that identify and execute spatial, temporal and spectral templates in an optimal order such that the computational load is minimized. We will present our results on EEG data from inhibition task (‘Go’/‘NoGo’) and will demonstrate the effectiveness of our proposed techniques.

Electronic Textbooks: Are Developing Countries IT – Ready?

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Electronic textbooks (e-textbooks) are digitized form of textbooks which are able to substitute existing paper based textbooks. They are textbooks adapted to the national school curriculum. Despite available ICT technologies, traditional educational media such as textbooks has been largely unchanged.

It is crucial for the relevant National Body or schools to address their IT Readiness and identify the technological challenges they might face, as well as identifying the decisions and the projects they need to launch in order to provide an educational advantage for students that may be applied nation-wide.

In this paper we will demonstrate comprehensive assessment methodology to measure IT Readiness by self assessments which involve objective scoring. These assessments includes IT components necessary for the success of the widespread application of e-textbooks such as technology infrastructure, standardization, training of teachers and educational content. The assessment is followed by a framework that offers advice solutions for the preparation and usage of e-textbooks in the national curriculum of a developing country.

The assessment method consists of three stages: The Developing Stage in which computers are supplied to schools and computer networks are built at the basic level. Basic evaluation for the application of electronic textbooks is conducted; The Takeoff Stage is reached when the construction of infrastructures required for the usage of e-textbooks in schools is completed. At this stage, prototypes of electronic textbooks are developed; pilot-testing is conducted at school. This is followed by the Expansion Stage, where the technical stability of the electrical textbook is enhanced and the existing infrastructure can be upgraded with new educational content and the distribution of e-textbook will be conducted.

Design and Implementation of Autonomous Classification System Using .NET Windows Service Agent Technology

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The paper discusses the design, construction and implementation of an autonomous software agent system to gather data for analyzing spreadsheet features in order to classify spreadsheet developer competency. The Prometheus Agent Oriented Methodology is used for the design of this system. It also illustrates that agent based applications require significant infrastructure and services in order to implement the design goals. Various development toolkits can be utilized to meet these requirements. Microsoft's .NET Framework has been used to develop the main components of the agent system with database functionality provided by Oracle 10g. The agent system will execute continuously as a Windows service on a client machine and thus is able to function autonomously when the user logs on or when a spreadsheet is accessed. The multi-agent system presently consists of two agents, a Code Complexity Agent (CCA) and a Database Updater Agent (DUA), these agents operate automatically in order to collect and process the spreadsheet data. The CCA agent monitors usage of Excel spreadsheets and uses XML to temporarily store the collected data. The DUA agent then connects to the XML file and transfers this data to an Oracle table for the user classification stage.

Extending HiP-HOPS with Capabilities of Planning Preventative Maintenance

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An effective preventive maintenance (PM) policy for components of an engineering system slows down the rate at which component fatigue accumulates, thereby minimising the occurrence of component failure. The benefit of PM at system level is improvement of dependability properties including safety, reliability and availability. Typically, while some components may need to be maintained at every minimum PM interval T , most components will need to be maintained at a longer PM interval typically multiples of T . Deciding on optimal PM times for the components of a system is becoming more difficult as engineering systems increase in scale and complexity. Indeed modern systems may incorporate large numbers of components including programmable electronic devices which introduce new and difficult to analyse failure modes. Therefore the assessment of dependability is becoming more difficult and hence, there is a need for automation, especially in the case of preventive maintenance where the dimension of time introduces extra complexity. The possibilities of different PM schedules are numerous and therefore techniques that will rapidly assess the effect of different PM schedules on dependability are necessary.

This paper extends a well-established automated dependability analysis tool (HiP-HOPS) with capabilities of planning preventive maintenance. The effect of periodic maintenance on components is first discussed and a mathematical model is developed to represent this in the context of HiP-HOPS. It is then shown how HiP-HOPS can be modified to enable prediction of dependability properties of a system, in which groups of components periodically undergo maintenance at regular intervals which are multiples of a minimum PM interval T . The concept is demonstrated on an example fuel system and the effect of two different maintenance schedules is shown. It is shown that the proposed concept can be combined with genetic algorithms to enable automatic optimisation of PM schedules.

Multilingual Focused Crawling: Fetching Topic-Specific Web Documents in Different Languages

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This study focuses on analyzing multilingual focused crawling which refers to the process of fetching topic-specific Web pages in multiple languages. A focused crawler that is able to identify similar link words in different languages based on fuzzy matching was developed in the study. The fuzzy matching feature allows the system to traverse through topic-specific pages written in different languages. The results reported in this paper are based on 15 test topics and 90 crawls in the domains of genomics, genetics, and rare diseases. The start URL pages were written in English, German, and Spanish. The languages of the crawled pages were detected by a standard n-gram based language identification algorithm. The crawling results contained documents written in 17 different languages. The percentages of documents written in these languages are reported. We also investigated the frequency of crosslingual links within a topic, i.e., the frequency of the cases where a relevant child document and its parent document are written in different languages. The results showed that the language of start URL documents largely determines the language of the obtained documents. That is, the documents obtained in crawling are to a great extent written in the same language as start URL documents. However, the share of English documents was high in all results. In agreement with these results, we found that relevant cross-lingual links are infrequent, with the exception of links to English pages.

Wireless Health Information and Hardware Technology and Systems

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One of the most urgent and daunting tasks of our time is provide quality healthcare in the face of increasing incidence of disease, an aging population, soaring costs, and declining public funding. A new community of researchers at UCLA has been formed with the Schools of Medicine and the Center for Health Sciences, Engineering, Public Health, Nursing and Business, and others to create a new low-cost healthcare model that applies technology to bring affordable care within the reach of every citizen. This model holds promise of revolutionizing the accessibility, quality, financing, and delivery of healthcare in much the same way that low-cost cellular phone technology has dramatically changed telecommunications worldwide. Wireless Health combines this ubiquitous wireless access with personal sensing technology and a foundation in medical research to support a large population with a powerful, low cost healthcare service.

Using a framework of wireless medical devices deployed in a real-world community, we target key challenges for pervasive wireless health systems: system signal searching and large-scale system failure detection and diagnosis.

This new wireless health technology combines standard, ubiquitous cellular telephony networking and consumer devices with wireless, wearable sensor monitoring. The system components include standard and available wireless network technology, wireless consumer devices, established sensing technologies, and services provided by the healthcare enterprise. These enabling new technologies combine the critical methodologies of biomedical and clinical sciences with system architecture and software systems provided by engineering research. We highlight a few key devices and systems, including the Smart Shoe, the SmartCane, the WANDA B. system, and the SOPHI infrastructure.

Modelling Highly Inflective Language for Target Applications Using Natural Language

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Language models are widely used in different applications including speech recognition, machine translation, handwritten recognition, stenographic codes conversion, and information retrieval. In such applications, language models are meant for constraining the search space by delivering a priori probabilities of possible word sequences. Language is a robust and necessarily redundant communication mechanism. Its redundancies commonly manifest themselves as predictable patterns in word sequences, and it is largely these patterns that enable language modelling.

Several methods for statistical language modelling were originally developed for English and declared as language independent. Although they do not incorporate linguistic knowledge of the English language, the results for other languages are only modestly successful. Our general goal is the treatment of inflective languages. The idea of the paper is to adjust language modelling methods to make them more powerful when modeling inflective languages. High inflection in a language is correlated with some degree of word-order flexibility. Morphological features either directly identify or help disambiguate the syntactic participants of a sentence. Modelling morphological features in a language not only provides an additional source of information but also alleviate data sparsity problems.

In this research Slovenian language is taken as an example of highly inflective languages. The results of comparative analysis of four language model types are presented: word-based, lemma-based, POS (Part-Of-Speech)-based and MSD (Morpho-Syntactic-Description)-based language models. Some combinations of them in terms of linear interpolation are investigated. Experiments are performed using the largest Slovenian corpus FidaPLUS. It is lemmatized and tagged with POS and MSD tags. Constructed language models are evaluated by perplexity values. Our experiments prove that interpolated models outperform a classical language model. The use of language models is demonstrated in two prototype systems: speech recognition and machine translation.

Agent-Based Modeling of Reputation for Sellers in an eMarketplace

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In this paper we present an agent-based mechanism for modeling reputation for sellers in an eMarketplace based on the ratings for transactions. Most traditional online businesses publish reputation profile for traders that reflect average of the ratings received in previous transactions. This method of modeling a reputation profile is highly susceptible to noisy ratings or manipulation by sellers (for example by using shilling) to artificially inflate their ratings. This paper proposes an adaptive ratings-based reputation model that is robust and is not easily affected by strategic behavior or noisy ratings. The model is based on a trader's transaction history, witness testimony, and other weighting factors. To validate the proposed model a multi-agent system is built to simulate the interactions among buyers and sellers in an electronic marketplace. The performance of the proposed model is compared to that of other traditional models using a simple scenario where the sellers are selling only one type of product.

A Security Model for Virtual Web Services

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Nowadays, academic as well as industrial communities focus one part of their research and development activities around Web services technology. It seems to be a promising basis to provide a solution for inter-operability between heterogeneous environments. Web services are, usually syntactically, described with standards like (UDDI, SOAP, and WSDL).

To control and secure the access to Web services recorded in various distributed data sources became during these years a challenge. Nowadays, there is not yet a defined architecture to access control when Web services are composed into a complex and virtual application. The Web services composition is the ability to provide a new functionality obtained from a combination of several Web services offered by various providers.

The access control is a security policy which defines the rules of using resources in order to ensure the confidentiality (the data neither available, nor revealed to the entities unauthorized), integrity (data neither modified, nor changed during) and the availability of the data (data is accessible). A security policy must identify the objects containing sensitive information (data to access to the resources and subjects).

In this paper, we propose a flexible security mechanism to virtual and semantic Web services which in one hand, it ensures the protection of Web services against unauthorized accesses, and in another hand, it resolves few conflicts which can occur when a client submits a composite request of access. We introduce a mixed mechanism which is based on XML language, semantic annotations of access rights, the controlled hierarchy of the authorisations, different degrees of sensitivity of an information and a set of access modes in order to reinforce the security of the services in Intranet and extranet. We illustrate the robustness and the efficiency of our proposed approach by the prototype implemented in java which can support different security policies.

PHD: A Semantic Toll and Hybrid Database for Information Resources

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Hybrid databases are not only becoming an important part in the development of software engineering but also in the development of specialised subject gateways, digital libraries, etc. The research project, which we hereby detail, has been utterly dedicated to design a suitable repository to gather information resources called PHD (Potnia Hybrid Database). A multidisciplinary group of Research/Teaching staff has been working hard with the purpose of finally obtaining a new hybrid repository which provided a new approach to information stored in a relational repository and make possible to accompany the basic information by a tagging language that enables an alternative search process faster and more efficient and helps to improve the display interface for the information.