INTERNATIONAL CONFERENCE ON ADVANCES IN ICT FOR EMERGING REGIONS (ICTer) - 2013

CONFERENCE PROCEEDINGS

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Colombo, Sri Lanka.
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MESSAGE FROM THE CONFERENCE CHAIR

International Conference on Advances in ICT for Emerging Regions (ICTer) is an annual research conference organized by the University of Colombo School of Computing (UCSC) with the technical co-sponsorship of IEEE(SL) Section, aimed at providing an opportunity for researchers and academics from around the developing regions of the world to present their work to an international audience. ICTer is the successor to the International Conference in Information Technology (IITC) held during the period 1998-2008. In 2010, UCSC together with IEEE Computer Society Sri Lanka Chapter, relaunched the ICTer conference by linking it with IEEE and the ICTer Journal to provide a higher level of International exposure to the research work presented at the conference.

This year's conference was announced early in 2013 and there were two "Calls for Papers" from January to July. We received 112 submissions as full papers including 20 international submissions. Following a stringent peer review process using relevant experts in the domain, it was decided to accept 18 submissions as full papers and 22 submissions as short papers. At the same time, 15 papers were selected to be presented as posters. The conference is further enriched by eight invited keynote speakers, who are experts in their respective domains and coming from around the world. They are from universities of Australia, Japan, Sweden, Taiwan, United Kingdom, India, and Singapore. Some of these speakers are conducting workshops and tutorials as post and pre conference activities based on their topics in the keynotes.

The local ICT industry which has always provided its fullest cooperation to make the ICTer conference a success, is sponsoring the conference organization through workshops and tutorials. There will be 5 pre-conference workshops and another 5 workshops and tutorials as post conference activities. Hence, we hope the participants will have a better opportunity to learn about the latest developments in the field from different parties depending on their interest. At the same time, we intend to use social media as much as possible to share the outcome of these workshops/tutorials and main conference with general public.

Proceedings of ICTer2013 will be published in both print and electronic form and subsequently indexed in IEEE Explore. Selected high quality presentations will be invited to submit extended versions of their work to be published in the International Journal on Advances in ICT for Emerging Regions.

ICTer2013 conference is a result of team work of a large number of professionals in the field. We have obtained the service of more than 60 reviewers to review 112 submissions within a short period of time. At the same time, many volunteers including keynote speakers irrespective of their status and affiliation have provided their fullest cooperation to make ICTer2013 a better event than those held in the previous years. I would like to thank all those individuals on behalf of ICTer2013 organizing committee and University of Colombo School of Computing. Finally, I would like to wish all conference participants a fruitful four days of lively deliberations.

Dr. K. P. Hewagamage, Chair, ICTer2013

FOREWORD BY THE CO-CHAIRS

In an era of namesake conferences and journals ICTER has established a name in the region and in developing countries as a high quality academically inclined IT conference with a significant history dating back to late 1990's. It is primarily due to the conference chair's untiring efforts that this year's conference has emerged with all its strength. Many high quality papers from both local and foreign contributors have been received establishing ICTER's identity as a leading conference in the domain. A stringent double blind review of papers have been conducted with only high quality papers being accepted as full papers and others as short papers or posters. The acceptance rate is around 40% reflecting another facet of its quality. The conference is replete with tutorials, workshops and several key note speeches by leading exponents in the field. All presented material will be indexed by IEEE Explore and selected presentations will be invited to be submitted for the sister journal ICTER. There is no doubt that the conference will make itself an ideal forum for the practitioners and researchers a like both local and foreign to engage in fruitful exchange of ideas for the benefit of all, and in no less way contributing towards moving Sri Lanka becoming a regional knowledge hub. In this spirit we welcome all participants to the conference and wish you all a successful conference time.

Prof. G. N. Wikramanayake and Dr. D. N. Ranasinghe, Co-chairs, ICTer2013

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KEYNOTE SPEECHES

Video Forgery and Motion Editing

Professor Timothy K. Shih,
National Central University,
Taiwan

Video Forgery is a technique for generating fake video by altering, combining, or creating new video contents. We change the behavior of actors in a video. For instance, the outcome of a 100-meter race in the Olympic Game can be falsified. We track objects and segment motions using a modified mean shift mechanism. The resulting video layers can be played in different speeds and at different reference points with respect to the original video. In order to obtain a smooth movement of target objects, a motion interpolation mechanism is proposed based on reference stick figures (i.e., a structure of human skeleton) and video inpainting mechanism. The video inpainting mechanism is performed in a quasi-3D space via guided 3D patch matching. Interpolated target objects and background layers are fused. It is hard to tell whether a falsified video is the original. In addition, in this talk, we demonstrate a new technique to allow users to change the dynamic texture used in a video background for special effect production. For instance, the dynamic texture of fire, smoke, water, cloud, and others can be edited through a series of automatic algorithms. Motion estimations of global and local textures are used. Video blending techniques are used in conjunction with a color balancing technique. The editing procedure will search for suitable patches in irregular shape blocks, to reproduce a realistic dynamic background, such as large waterfall, fire scene, or smoky background. The technique is suitable for making science fiction movies. We demonstrate the original and the falsified videos in our website at http://www.csie.ncu.edu.tw/~tshih. Although video falsifying may create a moral problem, our intension is to create special effects in movie industry.

Enhancing Health Communication using Digital Media: Trends and Experiences

Associated Professor May Oo Lwin,
Nanyang Technological University, Singapore.

For decades, health authorities have utilized traditional media to reach various publics. Public health communication has depended primarily on dissemination of messages which originate from health organization to communities and individual public. These communication strategies utilized traditional media such as television, radios and mailers which lack individual reach. Recent developments in digital technology offer unprecedented communication opportunities via mobile and social media. Through strategies such as tailoring and crowdsourcing, health messages can now be targeted to individuals or groups, and further shared among their larger social networks. This talk will identify discuss key trends in the utilization of digital technology for heath communication to address public health issues. Case studies related to innovative digital solutions are presented. Each of these studies are conceptually bound (comprise alert, care and education) but address different health issues through a distinct integration of social media functions.

Document Image Analysis: Past, Present and Future

Professor Umapada Pal,
Computer Vision and Pattern Recognition Unit,
Indian Statistical Institute, 203 B T Road, Kolkata-108, India

Document Image Analysis (DIA) is the process that performs the overall interpretation of document images. It is one of the most fascinating and challenging areas of Pattern Recognition with various practical applications like: Reading aid for the blind, Postal mail sorting, Bank check processing, Forensic data analysis, Seal or logo based document indexing etc. Origin of this area can be found in 1870 when Carey invented a ratina scanner and at present many sophisticated techniques of this area can be found in the literatures. In this talk, we will briefly discuss the state of the art techniques staring from the beginning to present days including current trends and recent advances of DIA. Also some open and new challenging problems of DIA area will be discussed towards its future research for the benefit of the audience. Finally, for better understanding of the different DIA techniques, demonstrations of some DIA systems will be shown to the audience.

From Bioinformatics to Systems Biology

Prof. Mahesan Niranjan,
University of Southampton,
United Kingdom.

In recent years, we have seen rapid growth in the amount of biological data available to us. Rapid advances in instrumentation coupled with increasing ability to archive and distribute such data over the World Wide Web, and the systematic efforts going into collecting meta-data have contributed to this. Such data relate to the nucleotide sequences of thousands of organisms as well as individual humans, amino acid sequences of proteins, macromolecular structures, high throughput experimental measurements of gene and protein expression, and curated annotations of cellular functions curated from literature. It is widely acknowledged that extracting useful information from such datasets will involve extensive mathematical and computational modelling. Whereas past effort in the area of bioinformatics has primarily focused on the storage and distribution of data, modelling to understand cellular functions at the systems level is seeing increasing research activity. In this talk, I will review some basic principles and challenges faced in current research activity in the area. I will also describe in detail three problems of interest to my group: morphogene propagation in development, estimation of parameters for systems biology models and the regulation of cellular protein concentration.

Multimodality + Multimedia + Sensors = Pleasant Interfaces

Professor Masahito Hirakawa,
Interdisciplinary Graduate School of Science and Engineering,
Shimane University, Nishikawatsu 1060, Matsue 690-8504,
Japan

Knowing the computer is a machine to help people achieve their tasks with less effort, its functions should be fully usable. Otherwise, the machine, or the computer, doesn't make sense even if a lot of powerful functions are provided. This is why user interface development is a key technology in these days. While the notion of invisible interface has been recognized as a goal of its development, we say a pleasant interface is much preferable, which is beyond the invisible interface so that interfaces of future computers should make people fun and comfortable as well as usable without any special effort in advance of their use, that is, invisibleness. Meanwhile, some may claim that mind uploading is an ultimate user interface that is referred to as the process of transferring the totality or considerable majority of the mental contents from a particular human brain into a computer. Our approach of pleasant interfaces is quite different from mind uploading in the sense that we are interested in humans alive.We discuss trials which have been carried out in our laboratory as a step toward development of pleasant interfaces, which include multi-dip aqua interface, spatial auditory system, and footstep-based body motion analysis system.

Design-based Mobile Learning Research: Results and reflections on communication and sustainability

Prof. Robert Ramberg,
Stockholm University,
Sweden.

In the last decades design-based research has grown in application within the learning sciences. Key to design-based research within Technology Enhanced Learning (TEL), is that researchers, users and practitioner's work together to produce a meaningful change in contexts of practice. Much research within mobile learning has however come under criticism for being technology-driven with a large portion of studies lacking explicit educational foundations. Elaborated views of mobile learning have been articulated and these have constituted a significant step in the evolution of mobile learning, characterized by a shift of focus, from an imprecise and inadequate foregrounding of technology, towards a conceptualization of mobile learning that emphasizes social practices mediated by mobile technology. Crucial to design-based research in general and perhaps particularly to design-based research within TEL and mobile learning is that results from research are usable also to others than the research community.

Building on a design-based research approach, in the past five years a number of studies pertaining to mobile learning and design of out-door and in-door learning activities have been carried out in collaboration with a primary school in a suburb to Stockholm, Sweden. Results from these studies have among other things shown the importance of scaffolding and support across out-door and in-door learning activities. In my talk, I will present and discuss our design-based research process and results from studies conducted on out-door learning activities. I will also discuss and present different ways of trying to conceptualize and communicate results from the design-based research process in terms of guidelines for design and evaluation.

Statistical Relational Learning - Different formalisms and representations

Dr. Sushil Kulkarni,
Jai Hind College,
University Of Mumbai, Mumbai,
India.

Traditionally machine learning deals with homogeneous data taken from an entity and assumed to be independently and identically distributed (iid). Each entity corresponds to a single relation contains number of attributes. However in real life, data are assumed to be heterogeneous, unstructured, contains noise and uncertainty. Real life data taken from set of entities are related to each other. Moreover, it can be stored in different multiple relations, which are complex to understand and attributes of these relations are dependent on each other. The need to model such dependencies between entities has led to the emergence of a subarea in machine learning called Statistical Relational Learning (SRL). In SRL, it is assumed to forget i.i.d. assumption for data, which is made almost throughout in machine learning research. Combination of statistical learning and relational learning give SRL. Statistical learning deals with data uncertainty and relational learning address complex relational structures. SRL is a powerful tool to represent, model and learn complex relational structures. There are various methods available in SRL for representation or formalism, learning and inference.

In this talk, we first introduce graphical structures of SRL. We examine different formalisms and representations developed in SRL. For specific study, we first investigate logical and relational extensions of Baysian networks that include Bayesian logic programs and probabilistic relational models. Lastly we upgraded Markov networks to get Markov logic network.

Architecture for Digital Knowledge Ecosystems

Prof. Athula Ginige,
Professor of Information Technology - School of Computing, Engineering & Mathematics,
University of Western Sydney
Australia

Ability to access required knowledge in a timely manner has been a major contributory factor for enhancing the productivity and empowerment of an individual, organisation, country and the society as a whole. To achieve this first the knowledge needs to be captured, organized and stored in repositories at a suitable granularity with appropriate meta-data and associations. The knowledge that needs to be captured could already exit in some other form or need to capture in real time as events are happening.Development of the printing press greatly enhanced the unidirectional flow of knowledge; ie from author to thousands of readers. Electronic broadcast mediums; radio and Television and Web 1:0 further enhanced this unidirectional flow of knowledge. Web 2.0 technologies enabled every user to create and share content; text, images, photos, audio and video with an individual, group or with everybody. This bidirectional flow of information empowered the passive information consumers to become information producers. This resulted in new applications such as Facebook, twitter, YouTube, flickr etc. The number of users using these applications is growing very fast. This empowerment of users is now enabling the creation of Digital Knowledge ecosystems. In these systems users that consume the information also contributes to generating new knowledge through user actions. Such systems require suitable information architectures, effective information capture and access methods, new algorithms and approaches to discover new knowledge from user inputs and ways to identify user context to provide relevant information.We are currently working on few projects to provide information to users in the right context especially using mobile devices. In these projects we had to address the above mentioned research challenges. Based on these project scenarios and solutions that we found for the research challengeswe are now developing a generic architecture for digital knowledge ecosystems which I will present in this talk.