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Recent Advances in Image, Audio and Signal Processing

- Proceedings of the 9th WSEAS International Conference on Remote Sensing (REMOTE '13)
- Proceedings of the 1st WSEAS International Conference on Image Processing and Pattern Recognition (IPPR '13)
- Proceedings of the 1st WSEAS International Conference on Acoustics, Speech and Audio Processing (ASAP '13)

Budapest, Hungary, December 10-12, 2013

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Preface

This year the 9th WSEAS International Conference on Remote Sensing (REMOTE '13), the 1st WSEAS International Conference on Image Processing and Pattern Recognition (IPPR '13) and the 1st WSEAS International Conference on Acoustics, Speech and Audio Processing (ASAP '13) were held in Budapest, Hungary, December 10-12, 2013. The conferences provided a platform to discuss sensor design and calibration, data acquisition and processing, image processing, pattern recognition, satellite images, environmental monitoring concepts, geological applications and climate, urban planning and development, remote sensing for energy and environmental systems, image/video coding and transmission, mathematical models in acoustics, noise control engineering, mathematical models in music, computers in music composition, mathematical analysis of musical instruments, music and psychology etc with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

Plenary Lecture 1: Change of Climate and Its Impact towards Malaysia 12
Mandeep Jit Singh

Plenary Lecture 2: Clustering Digital Data by Compression: Applications to Biology and Remote Sensing 13
Bruno Carpentieri

Plenary Lecture 3: Learning Sample Generation Using Computational Intelligence Techniques to Improve Pattern Classification Accuracy 14
Victor-Emil Neagoe

Plenary Lecture 4: Applying Web Mining Application for User Behavior Understanding 15
Zakaria Suliman Zubi

Plenary Lecture 5: MPEG High Efficiency Video Coding: Codec Deployment Performance Study 16
Zoran Bojkovic

Plenary Lecture 6: On Using Channel Impulse Response in Speech and Audio Processing - A Review 17
Septimiu Mischie

Energy-Efficient Priority-Based Routing Scheme for the Healthcare Wireless Sensor Networks 19
Ather Saeed, Andrew Stranieri, Richard Dazeley

Estimating Soil and Streambank Erosion in the Great Lakes Watersheds 28
Chansheng He, Lanhui Zhang

Secure Ownership Request Validation and Ownership Transfer Protocol for RFID System 35
Biplob R. Ray, Morshed Chowdhury, Jemal Abawajy

A Neural Unsupervised Pattern Recognition Approach with Cluster Optimization for Earth Observation Imagery 45
Radu-Mihai Stoica, Victor-Emil Neagoe

Simulation and Analysis of Satellite Mobile Systems 53
Savitri Bevinakoppa, Anastasiya Panova

Clustering Digital Data by Compression: Applications to Biology and Medical Images 59
Bruno Carpentieri

Comparative Study of One Class Outlier Detection Method in Wireless Sensors Network 65
Oussama Ghorbel, Hichem Snoussi, Mohamed Abid

Target Validation and Image Calibration in Scanning Systems 72
Costin-Anton Boiangiu, Alexandru Victor Ştefănescu

ISBN: 978-960-474-350-6

Using Data Mining Techniques to Analyze Crime Patterns in the Libyan National Crime Data 79
Zakaria Suliman Zubi, Ayman Altaher Mahmmud

Detection and Location of Anonymous Signal Using Sensor Network 86
Savitri Bevinakoppa, Manikant Baile, Avinash Mutthun Akumalla

A Deep Learning Approach for Subject Independent Emotion Recognition from Facial Expressions 93
Victor-Emil Neagoe, Andrei-Petru Bărar, Nicu Sebe, Paul Robitu

Air Temperature Forecasting Using Radial Basis Functional Artificial Neural Networks 99
I. El-Feghi, Zakaria Suliman Zubi, A. Abozgaya

Distributed Implementations of Cell Nuclei Detection Algorithm 105
Sandor Szenasi

Pyramidal Layer Format – Transfer Rate Control and Compression 110
Andrei Tigora, Mihai Zaharescu

Experimental Images Analysis with Linear Change Positive and Negative Degree of Brightness 116
Ratko Ivkovic, Branimir Jaksic, Petar Spalevic, Ljubomir Lazic, Mile Petrovic

An Improved Approach for Spatial Domain Lossless Image Compression Based on Adaptive Block Size 121
I. El-Feghi, Zakaria Suliman Zubi, Wajeeh Elwalda

Image Recognition with Deep Learning Techniques 126
Andrei-Petru Bărar, Victor-Emil Neagoe, Nicu Sebe

Fault-tolerant Congestion Control Scheme for the Acquisition of Datasets in Healthcare Wireless Sensor Networks 133
Ather Saeed, Andrew Stranieri, Richard Dazeley, Vanaja Karagiannidis

Assessment of Cartographic Potential of Airborne Hyperspectral Data for Large Scale Mapping 143
Lamyaa Gamal El-Deen Taha, Attia Abd Al Fattah Shahin

An Image Binarization Algorithm Using Watershed-Based Local Thresholding 154
Andrei Tigora

Automated Extraction of Fingerprint Features for Purposes of Analysis of Their Attributes 161
Pavol Marák, Alexander Hambalík

Long Term Evolution Network Planning and Performance Measurement 171
I. El-Feghi, Zakaria Suliman Zubi, A. Jamil, H. Algabroun

Impact of Color Space on Human Skin Color Detection Using an Intelligent System 178
Hani K. Al-Mohair, Junita Mohamad-Saleh, Shahrel Azmin Suandi

ISBN: 978-960-474-350-6

A Method for Automatic Coin Classification 188
Ştefan Nicolae Tică, Costin-Anton Boiangiu, Andrei Tigora

Precision Improvement of Content-Based Image Retrieval Using Dominant Color Histogram Descriptor 197
Szabolcs Sergyan

Image Recoloring Using Iterative Refinement 204
Andrei Tigora, Costin-Anton Boiangiu

Weaving Cloud Services into the Enterprise 210
George Fernandez

Applying Web Mining Application for User Behavior Understanding 217
Zakaria Suliman Zubi, Mussab Saleh El Riani

Applying Data Mining Techniques for Customer Relationship Management 225
Ahmed M. El-Zehery, Hazem M. El-Bakry, Mohamed S. El-Ksasy, Nikos Mastorakis

Real-Time Self-Stabilizing Scheme for the Localization of Faults in Wireless Sensor Networks 233
Ather Saeed, Andrew Stranieri, Richard Dazeley

Authors Index 243

ISBN: 978-960-474-350-6

Plenary Lecture 1

Change of Climate and Its Impact towards Malaysia

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Abstract: Climate change is an important factor that has been a concerned for mankind that has created mixture of environmental problems in the 21st century. Malaysia is located in between the Pacific Ocean and the Indian Ocean which strongly influences climate variability in terms of El-Nino and Southern Oscillation (ENSO) that pour in knowledge in terms of drought and floods experienced in Malaysia. ENSO has strongly influenced the inter-annual and intra-seasonal rainfall distribution in Malaysia. The increase in of tropical storms observed in South China Sea has contributed the rise of rainfall events in the East and West of Malaysia. Based on this annual trend analysis of temperature and rainfall have been analysed over the last 40 years. El Nino and La Nina have contributed of annual reduction and increment, respectively in the rainfall pattern for both Peninsular and East Malaysia throughout the years.

Brief Biography of the Speaker: Mandeep Jit Singh received his B.Eng. (with honors) and Ph.D. degrees in electrical and electronic engineering from the University of Notrhumbria, UK, and Universiti Sains Malaysia, in 1998 and 2006, respectively. From 2006 up to June 2009, he was attached at Universiti Sains Malaysia as a Lecturer. Currently, he is attached to the Universiti Kebangsaan Malaysia as a Senior Lecturer. His areas of specialization are radiowave propagation in satellite communication system, radar, antenna design, RF, and microwave. His current research collaboration is with the Association of Radio Industries and Business (ARIB) Japan to analyze the rain fade at Ku-band in tropical climate using satellite involving countries such as Thailand, Philippines, Indonesia, and Fiji. Singh has published 120 papers in journals, most in his special field radiowave propagation. He has reviewed more than 100 articles from IEEE Journals to PIERS Journals. He has an h-index of 9 and over 100 citations.

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Plenary Lecture 2

Clustering Digital Data by Compression: Applications to Biology and Remote Sensing

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Abstract: Data compression, data prediction, data classification, learning and data mining are all facets of the same (multidimensional) coin. Compression also inspires information theoretic tools for clustering, pattern discovery and classification.
For example it has been recently proposed a new, “blind”, approach to clustering by compression that classifies digital objects depending on how they pair-wise compress.
We will review this clustering method and we will show how this approach can be used in bio-sequences clustering and remote sensing applications.

Brief Biography of the Speaker: Bruno Carpentieri received the “Laurea” degree in Computer Science from the University of Salerno, Salerno, Italy, and the M.A. and Ph.D. degrees in Computer Science from the Brandeis University, Waltham, MA, U.S.A.
Since 1991, he has been first Assistant Professor and then Associate Professor of Computer Science at the University of Salerno (Italy).
His research interests include lossless and lossy image compression, video compression and motion estimation, information hiding.
He has been, from 2002 to 2008, Associate Editor of the journal IEEE Trans. on Image Processing.
He was recently chair and organizer of the International Conference on Data Compression, Communication and Processing 2011, co-chair of the International Conference on Compression and Complexity of Sequences, and, for many years, program committee member of the IEEE Data Compression Conferente and of other international Conferences in the field.
He has been responsible for various European Commission contracts regarding image and video compression.

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Plenary Lecture 3

Learning Sample Generation Using Computational Intelligence Techniques to Improve Pattern Classification Accuracy

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Abstract: In order to obtain a robust pattern classifier, the training set needs to contain a sufficient amount of samples to adequately represent the problem. Unfortunately, often the available set of vectors is too small to completely describe the partition or it contains low informative samples; in these cases one can have an underrepresentation yielding to poor classification results. The traditional way to cope with the small training set problem is interpolation, also known as noise injection. On the other side, in order to optimize the performance of classifier, the training set should be as small as possible by avoiding redundant samples and should include only most informative patterns. The problem is similar to feature selection for pattern recognition.
At the same time, enormous success has been achieved during the last decade through modeling of biological and natural intelligence, resulting so-called "nature-inspired intelligent techniques", which are included under the umbrella of Computational Intelligence (CI). This is why our two approaches of improving the quality of training for a given supervised classifier are based on two CI branches: Artificial Neural Networks (ANN) and Swarm Intelligence (SI).
On the other side, modern environmental remote sensing satellite imagery, due to their large volume data, offers greater challenges for automated image analysis and this is why we have tested the proposed models for multispectral imagery classification.
This lecture presents an original CI approach for improving performances of the supervised classifiers using either an SI technique for learning sample selection or an ANN model for generation of synthetic samples to optimize the training set. First proposed method called Ant Colony Optimization for Learning Sample Selection (ACO-LSS) uses ACO model to select the significant samples from a given set of labeled vectors to optimize the training quality of a supervised classifier. The second proposed model called Virtual Sample Generation by Concurrent Self-Organizing Maps (VSG-CSOM) is based on the idea of improving the learning set of a supervised classifier by substituting the initial labeled sample set with the „virtual" samples generated with a system of concurrent SOMs. The proposed models are implemented and evaluated for a LANDSAT 7 ETM+ image using a Support Vector Machine (SVM) classifier.

Brief Biography of the Speaker: Victor-Emil I. Neagoe was born in Pitesti (Arges county, Romania) on May 31, 1947.From 1965 till 1970 he attended the courses of the Faculty of Electronics and Telecommunications, Polytechnic Institute of Bucharest, Romania. In 1970 he received the M.S. degree of diplomat engineer in electronics and telecommunications as a head of his series (with Honor Diploma). He also obtained the Ph.D. degree in the same field from the same institution in 1976 as well as the Postgraduate Master degree in Applied Mathematics and Informatics from the Faculty of Mathematics, University of Bucharest in 1981.From 1970 till 1976 he has been an Assistant Professor at the Faculty of Electronics and Telecommunications, Polytechnic Institute of Bucharest, branches: Information Transmission Theory, Television, and Applied Electronics.From 1978 till 1991 he has been a Lecturer at the same Institute and Faculty, courses: Information Transmission Theory and Applied Electronics.Since 1991 he has been a Professor of the Polytechnic University of Bucharest, Romania, where he teaches the following courses: pattern recognition and artificial intelligence; digital signal processing; computational intelligence; data mining. He has been a Ph.D. supervisor since 1990. Prof. Neagoe has published more than 120 papers; his research interest includes pattern recognition, nature inspired intelligent techniques (computational intelligence), classification of multispectral and hyperspectral remote sensing imagery, emotion recognition from facial images, biometrics, sampling theory, image compression.He has been a Member of IEEE since 1978 and a Senior Member IEEE since 1984.Prof. Neagoe has been included in Who's Who in the World and Europe 500 . Particularly, he has been recently included in Who's Who in the World 2011and 2012 (28thand 29thEditions) as well as in Who's Who in Science and Engineering 2011-2012 (11th Edition).

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Plenary Lecture 4

Applying Web Mining Application for User Behavior Understanding

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Abstract: Web usage mining focuses on the discovering of potential knowledge from the browsing patterns of the users. It leads us to find the correlation between pages in the analysis stage. The primary data source used in web usage mining is the server log-files (web-logs). Browsing web pages by the user leaves a lot of information in the log-file. Analyzing log-files information drives us to understand the behavior of the user. Web-logs include web server access logs and application server logs. Web-log is an essential part for web mining to extract the usage patterns and study the visiting characteristics of user. Our proposal focus on the use of web mining techniques to classify web pages according to user visits. This classification helps us to understand the user behavior. Also we will use some classification and association rule techniques for discovering the potential knowledge from the browsing patterns.

Brief Biography of the Speaker: He received his Ph.D. in Computer Science in 2002 from Debrecen University in Hungary, he is an Associate Professor since 2010. Dr. Zubi, served his university under various administrative positions including the Head of Computer Science Department 2003-2005. He was also the head of the technical and cultural afire office at the university and sign out many academic MOU with a number of international university world wide. He was a member of the Libyan Tempus team in Libya. He was the postgraduate study coordinator in Computer Science Department. He was also the postgraduate study coordinator for the Faculty of Science for one academic year 2004-2005. He is also an undergraduate and postgraduate lecturer in the computer science department and supervised several research work and thesis in several Libyan universities. He publishes a great number of papers and researches in many scientific and international proceedings and journals world wide.
He is a reviewer of many scientific journals such as Word Scientific and Engineering Academy and Society (WSEAS) , Journal of Software Engineering and Applications (JSEA), Member of the International Association of Engineers (IAENG), Journal of Engineering and Technology Research (JETR) , World Academy of Science Engineering and Technology (WASET) journal, an Associate Editor in the Journal of the WSEAS Transactions on Information Science and Applications and more local journals in Libya. He is a member of the Association for Computing Machinery society (ACM), a member of IEEE society, a member of the Word Scientific and Engineering Academy and Society (WSEAS). He published as authors and a co-author in many researches and technical reports in local and international journals and conference proceedings.

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Plenary Lecture 5

MPEG High Efficiency Video Coding: Codec Deployment Performance Study

Professor Zoran Bojkovic
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Abstract: This Plenary Lecture seeks to provide codec deployment performance for MPEG High Effiency Video Coding (HEVC). With the increased growth of video traffic, coding and compression of video are as important as ever. Today, video related Internet and mobile traffic exceeds more than 50% of the overall in each domain. This process is expected to continue with some predictions forecasting video to be dominant type of traffic. The majority of the video bits are compressed using the H.264/MPEG-AVC standard, which has been the driving force behind high definition (HD) video. In recent years , a successor has been standardized : H-265 / MPEG-HEVC. The primary goal of this standard was to half the bit rates needed by its predecessor, i.e to optimize coding effiency. This means the ability to minimize the bit rate necessary for encoded video content to reach a given level of video quality, or to minimize the video quality achievable within a given available bit rate.
This presentation consists of two parts : HEVC technology development and performance results of reference codec implementation. The first part starts with standardization process. Then, video coding design together with video codec implementation are provided. All encoders are configured to use the same encoding techniques, The second part deals with coding efficiency, subjective video quality as well as video codec complexity. The coding efficiency of three generation of video coding standards is compared by means of peak signal-to-noise ratio (PSNR) and subjective testing results: MPEG HEVC, H.264/MPEG-4 AVC and H.262/MPEG-2.

Brief Biography of the Speaker: Prof. Dr. Zoran Bojkovic (http://www.zoranbojkovic.com/) is a Full Professor of Electrical Engineering, the University of Belgrade, Serbia, and a permanent Visiting Professor at the University of Texas at Arlington, UTA, TX, USA, EE Department, Multimedia System Lab. He was a visiting professor in more than 20 Universities worldwide and has taught a number of courses in the field of digital signal processing, communication and computer networks as well as multimedia communications. Prof.Bojkovic is the co-author of 6 international books/monographies, published in USA,China, India, Romania (publishers: Prentice Hall, Wiley, CRC Press Taylor&Francis Group, WSEAS Press,etc.): Also, he is the co-author in 19 Chapters of the international books, published by Springer, Elsevier, Alinea Editrice, NTNU Trondheim Norway, TICSP Finland. Prof. Bojkovic is co-editor in 75 International Books and Conference Proceedings. He has published more than 450 papers in peer-reviewed journals, conference proceedings and publications. He served as Editor-in-Chief in 2 International Journals ,Associate Editor in 4 International Journals ,and Guest Editor in 1 International Journal. Prof. Bojkovic has conducted many keynote/plenary lectures, workshops/tutorials, seminars and participated in many international scientific and industrial projects. He is a Senior Member of IEEE,member of EURASIP, IASTED Canada, SERC Korea, expert of IAMSET, full member of Engineering Academy of Serbia, and a member of Serbian Scientific Society.

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Plenary Lecture 6

On Using Channel Impulse Response in Speech and Audio Processing - A Review

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Abstract: Channel Impulse Response is used to model the propagation of the sound from a source (a speaker) to a receiver (a microphone). Thus, the signal recorded by the microphone can be computed by the convolution between the original source and the channel impulse response. There are methods which measure the channel impulse response: sine sweep method, maximum length sequence method or image method. First two methods use a hardware setup and the last is a simulation method. Also some adaptive methods which use the original source and the recorded signal can be used. Solutions to implement all these methods are presented in this review.
A good knowledge of channel impulse response is very important in many speech or audio processing system. Three such systems will be presented in this review.
A speech separation system considers a number of speech sources (loudspeakers) and a number of microphones. These microphones record mixtures of the sources generated by the loudspeakers. The function of this system is to recover the original sources from the recorded mixtures.
A dereverberation system has the task to cancel a part of the reverberation components which are added to the original source. Such a signal is obtained when a microphone is used to record the signal in a room.
Estimation of the direction of arrival considers two microphones and an acoustic source and its task is to determine the angle which corresponds to the position of the source in comparison with the two microphones.
This review presents the most used methods to implement the three systems which were presented previously. These methods include experiments achieved using a Personal Computer together with the sound card equipped with microphones and loudspeakers and MATLAB environment but also dedicated systems with microcontrollers and digital system processors.

Brief Biography of the Speaker: Septimiu Mischie received the Bachelor Engineering and Ph.D. in electronics and telecommunications from “Politehnica” University of Timisoara in 1989 and 1998, respectively. He joined Faculty of Electronics and Telecommunications of “Politehnica” University of Timisoara in 1991 and now is an associate professor with the Department of Measurement and Optoelectronics. His research interests are in speech processing (vector quantization of Line Spectral Frequencies, speech separation), instrumentation and measurement, data acquisition and embedded systems. He is author of more than 40 research papers in Conference Proceedings and Journals (9 of these papers are indexed in ISI Web of Science). Also he is principal author for three books and coauthor for other three. Three of his papers presented at WSEAS Conferences have received the Best Paper Awards.

ISBN: 978-960-474-350-6

Authors Index

Abawajy, J. 35
Abid, M. 65
Abozgaya, A. 99
Akumalla, A. M. 86
Algabroun, H. 171
Al-Mohair, H. K. 178
Baile, M. 86
Bărar, A.-P. 93, 126
Bevinakoppa, S. 53, 86
Boiangiu, C.-A. 72, 188, 204
Carpentieri, B. 59
Chowdhury, M. 35
Dazeley, R. 19, 133, 233
El Riani, M. S. 217
El-Bakry, H. M. 225
El-Feghi, I. 99, 121, 171
El-Ksasy, M. S. 225
Elwalda, W. 121
El-Zehery, A. M. 225
Fernandez, G. 210
Ghorbel, O. 65
Hambalík, A. 161
He, C. 28
Ivkovic, R. 116
Jaksic, B. 116
Jamil, A. 171
Karagiannidis, V. 133
Lazic, L. 116
Mahmmud, A. A. 79
Marák, P. 161
Mastorakis, N. 225
Mohamad-Saleh, J. 178
Neagoe, V.-E. 45, 93, 126
Panova, A. 53
Petrovic, M. 116
Ray, B. R. 35
Robitu, P. 93
Saeed, A. 19, 133, 233
Sebe, N. 93, 126
Shahin, A. A. A. F. 143
Snoussi, H. 65
Spalevic, P. 116
Ştefănescu, A. V. 72
Stoica, R.-M. 45
Stranieri, A. 19, 133, 233
Suandi, S. A. 178
Szabolcs, S. 197
Szenasi, S. 105
Taha, L. G. E.-D. 143
Tică, S. N. 188
Tigora, A. 110, 154, 188
Tigora, A. 204
Zaharescu, M. 110
Zhang, L. 28
Zubi, Z. S. 79, 99, 121
Zubi, Z. S. 171, 217

ISBN: 978-960-474-350-6