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Alaa Elsayad

Building tomorrow's electrical engineers

Isam Zabalawi

Higher Education Consultant, Jordan

Abstract

Technology has often been cited as the major driving force behind innovation in higher education and for educational reform in a variety of contexts. Modern digital technologies such as computers, telecommunications, and networks are reshaping and eventually revolutionizing both our society and our social and educational institutions. A new society, the knowledge society is thus arising, the elements of which coexisting with the constitutive elements of the industrial and postindustrial society. The most obvious aspect of the new society is the speed of use, application and dissemination of the communication and information technologies, which puts in the shade the fact that there occurs a major transformation of concepts, structures and institutions specific to the previous society. Within the technological context, electrical engineers play a significant role. They develop new design, manufacturing processes and products. They advance and manage communication, transportation, health care devices and energy systems. They address the environmental issues and the make technology work. The electrical engineering activities generate a remarkable potential for the private and the public sectors to develop the national wealth and strength. The chairman of the American National Academy of Engineering noted that "the nation the best engineering talent is in possession of the core ingredient of comparative economic and industrial advantage".

Index-Terms: Electrical Engineering.

Biography of the speaker: Dr. Zabalawi was born in Amman, Jordan (1950). He received his B.Sc. honors with distinction in electrical engineering (communications)in 1974 from Cairo University (Egypt), and his M.Sc. with distinction in Microwave Communication Engineering form Leeds University (England) in 1976, and his Ph.D. in Electrical and Electronics Engineering from Leeds University (England) in 1979. He was granted The Leeds University award for graduate studies for three years 1976-1979.

Dr. Zabalawi is specialized in analog and digital signal processing and communication techniques. His interests include: communication industry, information technology, and technology transfer and higher education development.

Dr. Zabalawi served as the founding president for the newly established private university in Syria the International University or Science and Technology (IUST) from May 2005 until May 2007.

Dr. Zabalawi was the minster of Higher Education and Scientific Research in Jordan during the period Oct.2003 until April 2005.

Dr. Zabalawi was the Chancellor of the University of Sharjah from 1999-2003. In 1999 he became the Chairman of the Higher Education Accreditation Council of Jordan. In 1996 he became the Vice-President (Scientific and Medical Faculties) of the University of Jordan. In 1994 he headed the Electrical and Electronics Engineering Dept. of the College of Engineering at Sultan Qaboos University, Sultanate of Oman. Between 1989-1993, he served as the Dean of the Faculty of Engineering and Technology, University of Jordan, Amman, Jordan. Prior that he chaired the Department of Electrical and Electronic Engineering at the University, where he taught a number of courses in his field at the undergraduate and graduate levels and he supervised a number of graduate theses.

Dr. Zabalawi was an active member in the higher education development team. He has organized and chaired a number of regional and international conferences and workshops. He is a well-published research scholar. He was a research fellow with the German Academy of Exchange (DAAD) at the University of Karsruhe, the Technical University of Hamburg, and the University of Erlangen, Germany. In addition he was a Research fellow, Electrical Engineering Dept., University of Victoria, Victoria, Canada and Research Fellow with Telenokia, Helsinki, Finland.

Dr. Zabalawi served (1993-1999) as the IEE (Institution of Electrical Engineering, UK.). Council Representative for Jordan and Gulf States. He is a Chartered Engineer and a senior member at the IEEE (Institute

of Electrical & Electronics Engineers, New York, USA, Fellow (FIET), Institution of Engineering and Technology , (IET) UK. He is a member of many societies such as, Circuits and Systems Society, IEEE, USA. Vehicular Technology Society IEEE, USA. Acoustics, Speech, and Signal processing Society, IEEE, USA. Member, Processing Society, IEEE, USA. Member Jordan Engineering Association, 1974.

Control and safety verification based on a paraconsistent logic program EVALPSN

Kazumi Nakamatsu

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Abstract

I have already proposed a paraconsistent annotated logic program called Extended Vector Annotated Logic Program with Strong Negation (EVALPSN),which can deal with defensible deontic reasoning. EVALPSN has been applied to various intelligent control and safety verification systems such as pipeline valve control, railway interlocking safety verification, etc. Moreover, EVALPSN has been developed to deal with before-after relation between two processes and it can be applied to process time control and process order safety verification. The developed EVALPSN is called bf (before-after) EVALPSN. It will be introduced how to apply EVALPSN and bf-EVALPSN to intelligent control and safety verification with some concrete examples and simulation systems in the speech.

Index-Terms: Control, safety, logic program EVALPSN.

Biography of the speaker: Dr. Kazumi Nakamatsu has been a professor at School of Human Science and Environment, University of Hyogo since 2004. His research focuses on application of formal logics, especially paraconsistent annotated logic program, with applications to computer science area. He has developed a paraconsistent logic program called an EVALPSN (Extended Vector Annotated Logic Program with Strong Negation), and applied it to intelligent control and safety verification for various systems such as railway interlocking safety verification, pipeline valve control, traffic signal control, etc.. He has applied a PAT in terms of intelligent process order control based on EVALPSN. In ad-

dition to the research listed here, Dr. Nakamatsu has published many journal articles, book chapters and conference papers, edited books published by major world-wide publishers, been the editor-in-chief of the International Journal on Reasoning-based Intelligent Systems(Inderscience Publishers,UK) and an editorial board member of some other international journals, and a chair of international conferences and symposium sessions.

Education: Dr. Sci. Informatics (Kyushu University) 1999 M.S. Computer Science (Shizuoka University) 1978 B.S. Computer Science (Shizuoka University) 1976.

Professional Experience: Department of Management and Informatics, Himeji College of Hyogo 4/1990-3/1998. School of Humanity and Environment Policy of Technology, Himeji Institute of Technology 4/1998-3/2004 School of Human Science and Environment, University of Hyogo 4/2004-

Research Interests: Development and Application of the paraconsistent logic program EVALP.

Smart metering based on automated meter reading

Faouzi Derbel

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Abstract

The new EU Directive 2006/32/EC for the improvement of end-use of energy requires among others the introduction of smart metering. Smart metering is basically performed with automated meter reading (AMR). This paper presents a wireless automated meter reading system Siemeca AMR. The system allows the wireless collecting as well as the reading out of the meter values installed in flats in distributed buildings without the intervention of persons. The meters are battery powered and reach a battery life time up to 12 years. The wireless transmission is standardized in according to the wireless M-Bus (EN 13757). This standard is compatible to Konnex-RF (EN50090) which is suitable for home automation. The AMR system leads to many advantages in relation to the metering process as well as to the possibility to offer added services. The paper deals in addition with factors influencing the wireless transmission approach. Mechanisms in physical.

Index-Terms: Smart metering, automated meter reading, wireless automated meter reading, wireless transmission.

Biography of the speaker: Faouzi Derbel received the Master degree in Electrical Engineering from the Technical University in Munich, Germany in 1995. 2001 he obtained his PhD degree in Electrical Engineering from the University of the Bundeswehr Munich. He was involved in research areas dealing with advanced signal processing for multi sensor systems. From 2000 to 2005 he was product manager and systems engineer responsible wireless technologies in fire detection sys-

tems within Siemens Building Technologies in Munich, Germany.

At the same time he was lecturer at the University of the Bundeswehr Munich. In summer 2004 and 2005 he was guest researcher at the ENIS (Ecole Nationale d'ingeniwurs de Sfax) in Tunisia. 2006 he obtained the habilitation degree from the ENIS in the area of communication and signal processing for smart systems.

Since April 2005 he is head of the product innovation department and responsible for research & development as well as for product management within former Siemens Building Technologies electronics and now Qvedis Advanced Measuring Solutions in Mühlhausen, Germany.

Faouzi Derbel holds several patents and has authored and co-authored many papers. Faouzi Derbel is the conference chair of the conference Communication and Signal Processing within the IEEE Multi-Conference Smart Systems and Devices as well as the Editor-In-Chief of the Transaction on Communication and Signal-Processing published by Shaker Verlag in Germany.

Use of LDPC to improve the MIMO-OFDM systems performance

Omar Daoud

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Abstract

Orthogonal Frequency Division Multiplexing (OFDM) is a promising technique in the next evolution of the mobile telephony, However it suffers from Peak to Average Power Ratio (PAPR). It is a problem for broadcast engineers in many different applications. Nonlinearities can cause severe out-of-band radiation when confronted with high PAPRs. Previous work has shown that the application of coding just before the transmission frontend can help alleviate this effect. This paper presents a design for a Low Density Parity Check (LDPC) code that achieves a good error correction performance and is used to lower the PAPR in a Multiple Input Multiple Output Orthogonal Frequency Division Multiplex System. The paper will detail the results of software simulations, verified through hardware simulations that show that further reductions in PAPR can be achieved over previous work in this field. Finally, this paper will show that PAPR reduction can be achieved by employing LDPC coding prior to modulation.

Index-Terms: MIMO, OFDM, PAPR, turbo coding, LDPC.

PAPR Reduction in WPDM and OFDM Systems using an Adaptive Threshold Companding scheme

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Abstract

High peak-to-average power ratio (PAPR) of transmitted signals is a major drawback for multi-carrier modulation (MCM) systems such as orthogonal frequency division multiplexing (OFDM) and wavelet packet division multiplexing (WPDM). Companding transform is an efficient and simple method to reduce the PAPR for MCM systems. In this paper, a novel adaptive companding transform scheme is proposed to efficaciously reduce the Peak-to-Average Power Ratio of OFDM and WPDM signals. In this technique, only the signals, whose amplitudes are higher than the threshold, are compressed in the transmitter, adaptively. We propose a new formula for the threshold level and send the threshold value to the receiver as side information. Using a simple judgment process, the expanding operation based on the transmitted side information will be executed to the compressed signals in the receiver. Computer simulation results show that the adaptive threshold companding (ATC) scheme effectively improves the performance of PAPR by introducing a simple adaptive threshold judgment process.

Index-Terms: OFDM, PAPR, threshold companding, WPDM.

An efficient simulation methodology of networked industrial devices

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Abstract

Industrial Ethernet and WLAN have entered strongly into the fields of control and automation. Nowadays, data acquisition products offer many options regarding the networking of there devices using the above techniques. However, the planners and designer who used networked industrial products need to virtually test the performance of their automated or controlled systems prior to its installation. This paper presents a new simulation methodology of networked industrial devices using academic OPNET IT GURU package. This methodology is based on supplying the planners with a simple GUI and ready to use industrial models. In this work, a complete library of National Instrument (NI) devices was built. The simulation method was given in details and several examples were demonstrated. A complex real time substation automation system was simulated using a variety of simulated NI devices and the effect of the different parameters (network speed, topology, nodes performance, network stack, *etc...*) is examined. It was found that this simulation method with its full NI devices library would enhance the planning process and abstract the time required for project building.

Index-Terms: Opnet simulation, industrial ethernet, fieldbus, latency, national instruments

Planning and design of a WCDMA network compatible with existing GSM system in Mosul city

Farhad Mahmoud and Sami Mawjoud
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Abstract

The aim of the paper is the design a proposed WCDMA system for an area of (4km×2.5km) at Mosul city (in Iraq) which is compatible with existing GSM system in order to increase the number of users with good performance and reasonable cost. Using Network Planning Strategies for Wideband CDMA (NPSW) software. The main feature is the implementation of the topographical map to the NPSW program and suggestions to increase the number of users of the Wideband CDMA system.

Index-Terms: WCDMA, existing GSM system, Mosul city.

The agile all-photonic network: architectures, algorithms, and protocols

Imad Khazali and Richard Vickers

McGill University, Canada

Abstract

The Agile All-Photonic Network (AAPN) is a network that uses time division multiplexing (TDM) to better utilize the bandwidth of WDM systems. AAPN uses agile all-photonic switches as advances in the photonic switching technology made the design of all-photonic devices with switching latency in the sub-microseconds feasible. It proposes a simplified overlaid star network architecture that is deployable as a MAN or WAN network. This overlaid architecture, as opposed to general mesh architecture, scales network capacity to multiples of Peta bits per second, simplifies routing, increases reliability, eliminates wavelength conversion and the need for accurate traffic engineering. In this overview, I introduce the network structure, control plane protocols and algorithms that are designed to support the operation of the Agile All-Photonic Network.

Index-Terms: AAPN, Routing algorithms, scheduling algorithms, routing protocols, signaling protocols

A simple and effective technique for peak to average power ratio reduction in OFDM systems

Emad Alsusa and Lin Yang
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Abstract

High peak to average power ratio (PAPR) is a particular disadvantage of orthogonal frequency division multiplexing (OFDM) systems and can significantly degrade the power efficiency at the transmitter. The aim of this paper is to propose a time-domain based PAPR reduction method based on generating various signal representations for a pair of symbols through linearly combining two, adjacent or non adjacent, OFDM symbols with the objective to minimize the PAPR at the transmitter. It will be shown that the proposed technique can provide significant PAPR reductions without excessive processing complexity.

Index-Terms: OFDM systems, Ratio reduction

Repetition-based packet lost concealment method for CELP-based coders in packet networks

Fatiha Merazka

University of Science & Technology Houari Boumediene, Algeria

Abstract

This paper presents a repetition based packet lost concealment (PLC) method for code excited linear prediction (CELP) based coders in packet networks. We perform a repetition of parameters of the last good frame to construct the missing of corrupted packet. Our approach consists in adding a muting factor, a random Jittering and bandwidth expansion. We applied this scheme to the standard ITU-T G729 standard speech coder for evaluation. Compared to the concealment method embedded in the ITU-G.729, each characteristic gives better performance in terms of average spectral distortion measure and enhanced modified bark spectral distortion tests (EMBSD), over the PLC embedded in the G729. we show that the repetition method outperform significantly the method implemented by the standard G729.

Index-Terms: Packet loss concealment, Spectral distortion, EMBSD

Weighted network reliability and modeling

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Abstract

This paper presents analysis, calculations, and modeling of weighted network reliability. Basic equations for the reliability evaluation are stated, and an algorithm presented for calculation of weighted network reliability and program written in FORTRAN language for implementing that. Reliability found for different both (weighted and unweighted) networks, and the results were compared.

Index-Terms: Weighted network, reliability, multipath communication systems, programming.

SAF-PS: Starvation Avoidance for Priority Scheduling

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Abstract

Conventional priority-based queuing is regarded as one efficient way of imposing hierarchy on disparate traffic when it comes to delay, jitter, size etc. The basic method involves having multiple queues at the processing node, built atop a heap structure, to cater to different priority traffic. The latter is then channeled through the media, one queue/priority at a time in decreasing/increasing order depending on the classification used. However, the downside of such an algorithm arises when the network experience high load from high priority traffic. This case results in the buffer queues being filled up fast enough leaving no time to flush the lower priority queues over the transmission lines, thus holding up some of the traffic indefinitely; a nuisance referred to as starvation. This paper presents a dynamic scheme aimed at Starvation Avoidance for Priority Scheduling (SAF-PS), while preserving the integrity of the priority algorithm. The results obtained in terms of decreased drop rate and average waiting time will demonstrate the advantages of the developed scheme.

Index-Terms: priority scheduling, priority upgrading, starvation.

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Support vector machines for automated knowledge extraction from historical solar data: a practical study on CME predictions

Mohammad Al-Omari, Rami Qahwaji, Tufan Colak and Stan Ipson

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Abstract

In this paper, Associations algorithms and Support Vector Machines (SVM) are applied to analyse years of solar catalogues data and to study the associations between eruptive filaments/ prominences and Coronal Mass Ejections (CMEs). The aim is to identify patterns of associations that can be represented using SVM learning rules to enable real-time and reliable CME predictions. The NGDC filaments catalogue and the SOHO/LASCO CMEs catalogue are processed to associate filaments with CMEs based on timing and location information. Automated systems are created to process and associate years of filaments and CME data, which are later arranged in numerical training vectors and fed to machine learning algorithms to extract the embedded knowledge and provide learning rules that can be used for the automated prediction of CMEs. Features representing the filament time, duration, type and extent are extracted from all the associated (A) and not-associated (NA) filaments and converted to a numerical format that is suitable for machine learning use. The machine learning system predicts if the filament is likely to initiate a CME. Intensive experiments are carried out to optimise the SVM. The prediction performance of SVM is analysed and recommendations for enhancing the performance are provided.

Index-Terms: Data mining, machine learning, information retrieval, SVM, Solar Imaging, space weather.

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Efficient computation of universal weights for maximally flat (at $\pi/2$) linear -phase integrators of various degrees

B.Kumar Smieee and Tajinder Singh Arora

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Abstract

In a host of signal processing situations, the desired (ideal) frequency response of the filter is a rational function $\tilde{H}(\omega) = 1/(j\omega)$ (a digital integrator). In such cases, IIR filters can be exploited but at the sacrifice of linearity of phase response. However, FIR structures are preferred to the IIR ones due to wellknown advantages of the former. We may also essentially require the FIR filter with its magnitude response having maximal flatness at $\omega = \pi/2$. A new efficient recursive formula for universal weights needed for integrators approximating $|1/\omega|$, maximally flat at $\omega = \pi/2$, has been proposed in this paper. A new formula for universal weights needed for integrators of degree r, $(r = 1, 2, 3...)$ approximating $|1/\omega|$, maximally flat at $\omega = \pi/2$, has also been proposed in this paper.

Index-Terms: FIR filters, integrators, maximally flat filters.

Improvement of the performance of distributed OS-CFAR system by ES optimisation

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[2] *Université de Constantine, Algeria*

Abstract

Genetic algorithms (GAs) are algorithms of exploration based on natural selection and on genetic. They are very flexible tools used to optimize very irregular functions, badly conditioned or complexes to calculate. The use of reproduction operators: crossover and mutation, and also the cumulative information prune the search space and generate a set of plausible solutions. Also, other techniques based on the evolutionary strategies (ESs) are proposed in literature as heuristic optimization techniques. In this work we propose an optimization of distributed OS-CFAR systems parameters by both a GA and an ES in order to optimize the threshold and also to give a comparison between the two manners to achieve the best performance in detection. The results showed that some improvement had brought by the use of the ES according to the number of sensors in the system, the number of cells in the sensor, the Probability of false alarm (Pfa), and the fusion rule.

Index-Terms: Distributed os-cfar system, genetic algorithms, evolutionary strategies.

A distributed workflow management system utilizing computational intelligence for decision support

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Abstract

Distributed workflow management systems are increasingly gaining momentum due to the emergence of virtual and distributed organizations, as well as cross-organizational workflows. This paper presents an effective development process for a distributed workflow management system (WKFMS) which is utilized to automate the management processes related to computer and peripheral repair requests in the Faculty of Engineering and Technology (FET) at the University of Jordan. First, the paper explores the reasoning and motivation behind the choice of the management processes involved in the WKFMS. Phases of the development process that is based on the rapid prototyping paradigm are then described. Particular focus is given to the modeling of business scenarios using the Model-View-Control (MVC) architecture. The distributed network layout and system security measures are also investigated. Reduction of manual human intervention in the decision process is achieved through the implementation of a neuro-fuzzy computational intelligence processor to automate the major decision making process of tasks distribution. It is shown that the application of the proposed development process helped in reducing the overall system development time and effort. The successful deployment and functional testing of the developed industrial prototype has proved that it works smoothly according to the desired features.

Index-Terms: Web-based distributed systems, Workflow management, Software prototyping, Network security, Computational intelligence

SVM synthesis by hierarchical structures of learning automata: Application for handwritten digits recognition

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Abstract

In this paper, a new SVM synthesis method is presented. This method is based essentially on training criterion optimization of this machine by a set of hierarchical structures of learning automata. This methodology is adopted for the development of off-line isolated handwritten digits recognition system. A comparison is taken between this new approach and that of a standard approach for SVM synthesis. These two methodologies are also compared with a neural network based classification method. The obtained results show the performances of the new suggested method for SVM synthesis.

Index-Terms: SVM, learning automata, handwritten digits recognition, classification, optimization.

Word-based handwritten arabic scripts recognition using DCT features and neural network classifier

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[2] *Technical University Braunschweig, Institute for Communications Technology (IfN), Germany*

Abstract

In this paper, a system is proposed for word-based recognition of handwritten Arabic scripts. Techniques are discussed in details in terms of three stages in the system, *i.e.* preprocessing, feature extraction and classification. Firstly, words are segmented from input scripts and also normalized in size. Then, DCT features are extracted for each word sample. Finally, these features are then utilized to train a neural network for classification. The proposed system has been successfully tested on IFN/ENIT database (version v2.0p1e) consisting of 32492 Arabic words handwritten by more than 1000 different writers, and the results were promising and very encouraging.

Index-Terms: Neural network, classifier, recognition, arabic scripts

Landmine detection with IR sensors using karhunen loeve transformation and watershed segmentation

Aseel Ajlouni and Alaa Sheta

Al-Balqa Applied University, Jordan

Abstract

In this paper, we present our idea of using the Karhunen Loeve Transformation (KLT) and Watershed Segmentation to detect landmine objects from Infrared images. On doing this, we proposed a simplified process for reducing the computation in the Karhunen Loeve Transformation using a smaller number of images than traditional methods do. We effectively used the Marker Based Watershed Segmentation to detect the mines with high performance detection rate. We tested our proposed method on three different mine fields with two different soil types. Our proposed method consists of four stages: feature extraction, enhancement, object segmentation, and object recognition. The results are promising.

Index-Terms: Landmine Detection, KLT, Watershed Segmentation, IR Sensors

Comparison of combination methods of arabic handwritten word recognizers

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Abstract

In this paper we present some methods to combine the outputs of a set of Arabic handwritten word recognition systems to achieve a decision with a higher performance. This performance can be expressed by lower rejection rates and higher recognition rates. The used methods range from voting schemes based on results of different recognizers to a neural network decision based on normalized confidences. In addition, several threshold functions for different reject levels are tested and evaluated. Tests with a set of recognizers, which participated in the ICDAR 2007 competition, and based on a set coming from the IFN/ENIT-database show that high recognition rate of about 95% without reject can be achieved.

Index-Terms: classifier combination, Text Recognition, Arabic handwriting recognition competition, IFN/ENITdatabase

Active RFID Tag in Real Time Location System

Centre For Development of Advance Computing, India

Abstract

This paper proposes a new upcoming model of Real Time Location System (RTLS) to focus and track the exact location of real time objects in vicinity. Overcoming the limitations of size, power, attenuation of GPS & DGPS system, the Active RFID tags can be easily affixed with objects. The TIA approach of distance calculation will minimize the errors occurred in RSSI method. Geographically fixed matrix of RFID readers at 50m to 1km apart, will monitor, track, and calculate the exact position of tagged-object by communicating with the tag and other co-readers. One 48MHz PLL enabled 8-bit CPU in RFID reader is enough to calculate the TIA with an accuracy of 3.3m distance. One active tag with 100mAh cell can respond many thousands of times using IEEE802.15.4 standard which makes it globally acceptable. DSSS and GFSK used in the tag for more reliable data communication. One central server is enough to store, filter, and handle the calculated data flowing from the matrix net of RFID readers.

Index-Terms: GPS-global positioning system, DGPS-differential GPS, RFID-radio frequency identification, TIA-time interval of arrival, RSSI-receiving signal strength indicator, PLL-phase locked loop, CPU-central processor unit, DSSS-direct sequence spread spectrum, GFSK-gaussian frequency shift keying.

Adaptive algorithm for increasing the efficiency of DSR algorithm in Ad Hoc network

Khalil Al Shqeerat

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Abstract

An ad hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any established infrastructure or centralized administration. In such an environment, it may be necessary for one mobile host to enlist the aid of other hosts in forwarding a packet to its destination, due to the limited range of each mobile host's wireless transmissions. This paper presents a protocol for routing in ad hoc networks that uses dynamic source routing. The protocol adapts quickly to routing changes when host movement is frequent, yet requires little or no overhead during periods in which hosts move less frequently. We present and evaluate some techniques to increase the efficiency of DSR namely Enhanced caching and extended usage of cache, improved error handling, load balancing, rerouting during transmission and rerouting notification. Based on results from a simulation of mobile hosts operating in an ad hoc network, the protocol performs well over a variety of environmental conditions such as host density, movement rates and traffic intensity. Simulation results show that the combination of the presented techniques not only result in substantial improvement of algorithm efficiency but also reduce the overheads.

Index-Terms: mobile ad hoc networks (MANETs), mobile hosts, route discovery, routing protocol.

A LINC amplifier utilizing digital signal processing applied to a DAMPS system

Mohammad Alkuran

ANADIGICS Inc, USA

Abstract

This paper is about implementing a LINC amplifier utilizing DSP in a DAMPS wireless system. First, the theory behind LINC amplifiers is presented. Then the I-Q representation of signals is studied. Followed by a look at $\pi/4$ QPSK schemes. Then, we'll show how to apply a LINC amplifier to a $\pi/4$ QPSK modulation scheme in a digital environment, and give the equivalent RF circuit. The digital concerns related to that procedure are then studied. Finally, a prototype system will be presented. Computer simulation of this system and the proposed implementation are both presented.

Index-Terms: LINC, DAMPS, PA, RF, Linearization, DSP.

Fractal dipoles as meander line antennas for passive UHF RFID tags

Ahmed Salama and Kaydar Quboa

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Abstract

In this paper, Two fractal dipole antennas has been designed and optimized for passive RFID tags at 900 MHz, one based on the third iteration of a modified Koch fractal curve and the other is based on the third iteration of the proposed fractal curve. The designed fractal dipoles have been simulated using IE3D simulator based on Method of Moments (MOM). The simulation showed that the modified Koch fractal dipole has better radiation characteristics and longer read range than the proposed fractal dipole antenna. The two antennas are fabricated using PCB technology and examined in anechoic chamber. The experimental results showed a good agreement with the simulation. The effect of different materials attached to the fabricated antennas are examined.

Index-Terms: RFID,passive tags,UHF fractal dipoles,method of moments.

Adaptive allocation of variable length codes for video transmission over OFDM system

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University of Mosul, Iraq

Abstract

This paper proposes a sub-channel partitioning based on adaptive allocation of Variable Length Codes (VLCs) with Unequal Error Protection (UEP) scheme for Orthogonal Frequency Division Multiplexing (OFDM) system. In this scheme, video data is partitioned into high-priority (HP) and low-priority (LP) coefficients according to the importance of the data, then it is allocated to sub-channels for transmission over OFDM system. A proposed technique is applied by interleaving the Resynchronization Markers between VLCs to isolate the propagation of error over video stream and completed by another technique to improve the performance of the video decoder decision at lower values of Signal to Interference Noise Ratio (SINR).

Index-Terms: Video transmission, OFDM, UEP

Radio frequency identification (RFID) working, design considerations and modelling of antenna

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Abstract

RFID is the acronym of Radio Frequency IDentification. It represents a new automated data-capture technology, based on the extraction of data contained in devices called RFID tags or transponders by wireless radio technologies. In the RFID appellation we find RF. For memory, who says RF says laws of the Physics such as, laws of Maxwell and those of Biot and Savart that manage the running of the RFID. Otherwise, the reader and the transponder communicate by using electromagnetic waves that assure the transfer of information and the self alimentation of transponders. For thus, the purpose of this paper is to explain the RFID technology and to survey the determination and evaluation of the parameters of a RFID antenna.

Index-Terms: IDentification, Radio frequency, RFID tags, Wave radio, Antenna.

A new selective encryption technique of JPEG2000 codestream for medical images transmission

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Abstract

In this paper, a novel selective encryption image scheme based on JPEG2000 is proposed, which encrypts only the code-blocks corresponding to some sensitive precincts. In order to improve the security level we introduce the permutation of codeblocks contributing in the selected precincts. Symmetric encryption AES with CFB mode is used to encrypt swapped codeblocks. The idea of combining permutation and selective encryption is used in order to minimize the amount of processed data encryption while ensuring the best possible degradation through the permutation. The proposed process encryption doesn't introduce superfluous JPEG2000 markers in the protected codestream, i.e, the protected codestream format is compliant to JPEG2000 codestream one. It keeps file format and compression ratio unchanged and doesn't degrade the original error robustness. The proposed scheme works with any standard ciphers and introduces negligible computational cost.

Index-Terms: security, JPEG2000 compression, selective encryption, AES,codeblocks, permutation, medical images.

An integrated fuzzy additive and impulse noise reduction method for color images

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Abstract

Noise reduction is a well known problem in image processing. Several filters have already been developed for reducing noise from color images. Since each filter is designed for a particular noise type, these filters reduce only single type of noise. To overcome this drawback, in this paper a new integrated fuzzy filter is presented for the reduction of two types of noise *i.e.* additive noise and impulse noise from digital color images. In the proposed filter an impulse noise detector is used initially to detect the impulse noise present in the filter. Impulse noise detector divides the set of pixels into two point sub-sets: impulse noise contaminated points and clean points without impulse noise. To select the corresponding filters with respect to the noise types, a filter selection module is designed. The filters reduce the noise and the enhanced image is obtained as the output of integrated filter after reducing both the type of noise. The proposed approach combines the advantages of both the additive and impulse noise filter. Experimental and comparison results show that the proposed approach is effective in removing the integrated noise even with severe contamination. The distortions of the microscope that were occurred during the analysis of the structure of tissues, cells and cellular constituents can be reduced using this filter.

Index-Terms: Additive noise, impulse noise, color images, fuzzy filter, noise reduction.

A fast technique for gray level image thresholding and quantization based on the entropy maximization

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Abstract

Presented is a fast technique dedicated to the multilevel image thresholding and quantization based on the Shannon's entropy maximization. The elaborated method uses efficiently the cumulative density function for the rapid determination of the optimal thresholds for segmentation. Some simulation results are reported for the aim of illustration and demonstration of its effectiveness.

Index-Terms: Multilevel image thresholding, entropy maximization, quantization, cumulative density function.

Image magnification and reduction using high order filtering on the cell broadband engine

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Abstract

The IBM Cell Broadband Engine (BE) is a multi-core processor with a PowerPC host processor (PPE) and 8 synergic processor engines (SPEs). The Cell BE architecture is designed to improve upon conventional processors in terms of memory latency, bandwidth and compute power. In this paper, we describe a 2D graphics algorithm for image resizing which we parallelized and developed on the Cell BE. We report the performance measured on one Cell blade with varying numbers of synergic processor engines enabled. These results were compared to those obtained on the Cell's single PPE and with all 8 SPEs disabled. The results indicate that the Cell processor can outperform modern RISC processors by 30× on SIMD compute intensive applications such as image resizing.

Index-Terms: Cell multi-core computing,image resizing.

Wavelet Shrinkage and Compression for SAR Images

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Abstract

The paper presents the wavelet shrinkage and the image compression for SAR images, based on discrete wavelet transform (DWT). It is very efficient to integrate these two procedures in a single process. First, a speckled SAR image is transformed by using multiple level wavelet decomposition. The variance of noise is estimated from wavelet coefficients to determine the threshold, which is used for soft thresholding in all high frequency subbands. The well-known threshold estimation includes SimpleShrink, NormalShrink, VisuShrink, SureShrink, and BayesShrink. The obtained wavelet coefficients are then encoded by using embedded zero-tree wavelet (EZW) to produce the output bit stream of the despeckled image. By means of an evaluating technique include S/MSE, MSE, and PSNR. Experimental results on JERS-1/SAR images are also given.

Index-Terms: Terms-image despeckling, Wavelet shrinkage, SAR image, Wavelet thresholding, Image compression.

Completely unsupervised image segmentation using wavelet analysis and gustafson-kessel clustering

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Abstract

Image segmentation is the first step towards image analysis and image understanding. However, most image segmentation algorithms require a prior knowledge of the number of partitions in the image to be segmented. This paper introduces a novel method for completely unsupervised image segmentation by using wavelet analysis and fuzzy Gustafson-Kessel (GK) algorithm. The proposed algorithm needs no predefined number of partitions nor the number of textures in the image. The algorithm employs wavelet transform to decompose the image into different spectral components and build a feature vector for every pixel. These vectors are grouped together into clusters using the GK clustering algorithm. GK is less sensitive to fall into local minima and it has the power to generate clusters with different geometrical shapes. The appropriate number of clusters, hence number of image segments, is determined to minimize the compactness and separation clustering validity measure. The algorithm is applied to segment artificial and real images where experimental results demonstrate the effectiveness of the proposed method.

Index-Terms: Segmentation, Wavelet, Clustering, Fuzzy c-mean, Gustafson-Kessel.

Face recognition based on 2DPCA, DIAPCA and DIA2DPCA in DCT domain

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Abstract

In this paper, we introduce 2DPCA, DiaPCA and DiaPCA+2DPCA in DCT domain for the aim of face recognition. The 2D DCT transform has been used as a preprocessing step, then 2DPCA, DiaPCA and Di-aPCA+2DPCA are applied to a w*w upper left block of the global 2D DCT transform matrix of the original images. The experiments which are performed on the ORL face database show that: in addition to the expected considerable gain in both the training and testing time, the recognition rate is higher using 2DPCA, DiaPCA and DiaPCA+2DPCA in DCT domain than applying these three methods directly on the raw pixel images.

Index-Terms: Principal Component Analysis (PCA), Two-Dimensional (2DPCA), Diagonal PCA (DiaPCA), DiaPCA+2DPCA, face recognition, 2D Discrete Cosine Transform (2D DCT).

A comparative study of SVM kernel applied to emotion recognition from physiological signals

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Abstract

This paper investigates the performance of Support Vector Machines with linear, cubic and Radial Basis function (RBF) kernels in the problem of emotion recognition from physiological signals.Five physiological signals: Blood volume pulse (BVP), Electromyography (EMG), Skin Conductance (SC), Skin Temperature (SKT) and Respiration (RESP) were selected to extract 30 features for recognition. The emotion classification model is Support Vector Machines (SVMs). Support Vector Machine(SVM)is a new technique for pattern classification, and is used in many applications. Kernel type in the SVM training process, along with feature selection, will significantly impact classification accuracy. Experiments are designed and carried out to find the best SVM kernel among linear, cubic, and RBF for emotions recognition. The experimental results indicate that the proposed method provides very stable and successful emotional classification performance over six emotional states.

Index-Terms: Emotion recognition, Physiological signals, Support vector machine, Classification, Linear, Cubic, RBF Kernels.

Minutiae extraction for fingerprint recognition

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Abstract

Automatic Personal Identification (API) represents a challenge for tremendous life applications such as in passports, cellular telephones, automatic teller machines, and driver licenses. It is important to achieve a high degree of confidence when handling such types of application. Biometrics is being more and more adopted in such cases. In the past years, the development of fingerprint identification systems has received a great deal of attention. The goal of this paper is to represent a complete identification process for fingerprint recognition throughout the extracting of matching minutiae. The performance of the proposed system is tested on a database with fingerprints from different people and experimental results are presented.

Index-Terms: Fingerprint, Minutiae extraction, Termination, Bifurcation.

A genetic algorithm approach for voice quality prediction

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Abstract

Multimedia applications play an increasingly important role in the world of communication. To be able to present an effective multimedia service, the quality of the multimedia service should be acceptable to the user. As measuring the multimedia and mainly the voice quality is needed while the network is running, therefore an automated, non-intrusive and overall accurate measurement of quality should be provided. The E-Model proposed by the International Telecommunication Union-Telecommunication Standardization Sector (ITU-T) achieves this, but it needs the expensive subjective tests to calibrate its parameters. A Genetic Algorithm (GA) approach is proposed in this paper to extend the E-model without the need for the subjective tests. The proposed solution is compared against the E-Model to prove similar results are obtained.

Index-Terms: Genetic algorithms, E-Model, Non- Intrusive voice quality

QRS complex detection based on symmlets wavelet function

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and Abdel-Rahman Al-Qawasmi

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Abstract

Wavelet theory is inspired the development of a strong methodology for signal processing and can be used as a good tool for non-stationary electrocardiogram (ECG signal) detection. In this paper a QRS complex detection method is proposed based on wavelet transform (WT) with Symmlets function. The proposed method show sharp results for ECG detection parameters. The fiducial points are easily detected and the results show that the sensitivity of the proposed detector is 99.8% and the specificity is 98.6%. The results obtained in this paper are based on real ECG signal.

Index-Terms: ECG signal, QRS complex detection, wavelet transform.

Data Acquisition for Myocardial Infarction Classification Based on Wavelets and Neural Networks

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Abstract

This paper shows an approach for ECG signal processing based on Artificial Neural Networks ANN and transform domains (Discrete Wavelet Transform DWT and Fourier Transform FT). The Neural Networks NNs are introduced to solve different pattern recognition problems associated with ECG analysis. A Multi-Layer Perceptron Neural Network MLP-NN is used in the present work with Back Propagation BP algorithm to train the proposed network. The operation of a classification system based on DWT and FT was analyzed for diagnosing a set of real patterns (QRS interval of normal and MI disease) that were taken from many patients of MAC-1200 12 channel ECG system from two hospitals in Baghdad. An off-line method was then used for the extraction of ECG signals from ECG images papers by using special image processing techniques. The obtained accuracy for the WT-NN was 90%, whereas that for the FT-NN was 85%. The results showed WT-NN to be better for analyzing the nonstationary signals.

Index-Terms: Wavelets, neural networks, ECG signals, data acquisition.

Wavelet based multi carrier code division multiple access

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Abstract

Wavelet-based MC-CDMA has recently gained popularity in literatures and due to very high spectral containment properties of wavelet filters, Wavelet-based MC-CDMA can better combat narrowband interferences and is inherently more robust to ICI than traditional FFT filters. Moreover, since the classic notion of a guard band does not apply for DWT-MC-CDMA; an alternative strategy that mitigates interference without relying on the fact that the effective channel is shorter than the CP is presented in this paper, hence data rates can be enhanced over those of FFT implementations.

Index-Terms: Multi carrier, DWT, OFDM, MC-CDMA.

Papr reduction in wavelet packet modulation

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Abstract

Multicarrier modulation (mcm) technique is considered as the key element in realizing high-speed wireless and wireline digital communications. however, high peak-to-average power ratio (papr) of transmitted signals is a major drawback for multicarrier modulation systems such as orthogonal frequency division multiplexing (ofdm) and wavelet packet division multiplexing (wpdm). this paper investigates the papr of wpdm for high speed digital communications system and use three methods to reduce peak power of wpdm system. selected mapping (slm) technique and partial transmit sequence (pts) are two methods that are employed just in transmitter side. also in other design, wpdm signals are clipped to an acceptable peak level and an equalization method used at receiver to eliminate effect of clipping. the schemes are compared by simulation results.

Index-Terms: Clipping, decision aided equalization, papr, pts, slm, wpdm.

Speaker identification wavelet transform based method

Khaled Daqrouq, Wael Al-Sawalmeh, Abdel Rahman Qawasmi and
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Philadelphia University, Jordan

Abstract

One of the most important signal processing method in Digital Signal
Processing discipline is Speaker Identification Method (SIM). Because of
the difficult nature of speech signals and their fast variation with time,
the wavelet transform is used to reduce the complexity of such signals.
In this paper two identification methods are presented based on Continuous Wavelet Transform CWT. The first method is the male and female
identification method and the second is the SIM. The obtained results
showed a high recognition rate about 98%, which makes the speaker
identification wavelet transform based method to be very important in
digital security systems applications.

Index-Terms: Wavelet transform, Speech signal, Speaker identification, CWT

A rapid joint semi-blind estimation algorithm for carrier phase and timing parameter

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Abstract

Multi-path effect in HF communication not only changes the amplitude, but changes the phase of receiving signal as well. The rapid and random movement of ionospheric causes the oscillation of the phase. It could be viewed as the Doppler shift of highfrequency carrier caused by ionospheric. The shift of frequency should be corrected because it brings difficulty in recovering the carrier. The non-blind method needs much quantities of training (or pilot frequency) sequences at the cost of system recourse (bandwidth). However, the blind estimation will wildly encounter the vague phase. In this paper, a semi-blind parameter estimation method is introduced which uses few training sequences to distinguish the carrier. In this way, the carrier's phase and timing parameter could be recovered rapidly. Besides, this algorithm is easy to implement in hardware platform.

Index-Terms: Semi-blind, carrier phase, timing

Discrete wavelets transform based space time block code multicarrier direct sequence CDMA

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Abstract

Wireless digital communications is rapidly expanding resulting in a demand for systems that are reliable and have a high spectral efficiency. To fulfill these demands, the multicarrier modulation scheme, often called Multicarrier Direct sequence Code Division Multiplexing Access (MC-DS-CDMA), has drawn a lot of attention. On the other hand Space Time Block Code-MC-DS-CDMA techniques have been considered to be a candidate to support multimedia services in mobile radio communications. In this work, a new structure for STBC-MC-DS-CDMA that based on Discrete Wavelet Transform (DWT) is proposed. The proposed system has been examined with different channel models (AWGN, flat fading and selective fading) and proves that it has better BER performance than the conventional STBC-MC-DS-CDMA using FFT due to the low and high pass filters contained in the wavelet transform.

Index-Terms: OFDM, DFT, DWT, STBC, MC-DS-CDMA.

Analysis of the performance of subcarrier multiplexed transmission system employing optical single sideband (OSSB) modulation

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Abstract

In this paper, the performance of the subcarrier multiplexed (SCM) system employing binary phase shift keying (BPSK) modulation as microwave subcarrier modulation and optical single sideband (OSSB) modulation was analyzed and investigated by simulation through the use of OptSim software. The BPSK modulation technique was used because of its ability to provide high spectral efficiency and simple demodulation. The OSSB modulation was preferred in this system due to its advantage of high bandwidth efficiency. The system performance was investigated by varying the performance parameters of the components used, such as data rate of the source, optical modulation index (OMI), subcarrier frequency, phase shift difference between branches of the dual-arm Mach-Zehnder (MZ) modulator, fiber length and phase of the local carrier at the demodulator. The performance of the system was optimized by making tradeoffs between these performance parameters.

Index-Terms: Subcarrier multiplexed transmission, OSSB modulation

Error-driven adaptation for GOP video transport in Wireless channel

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Abstract

In this paper, we develop a new error-driven adaptation scheme based on a classical error control used at the frame-level of Group of Picture (GOP) for MPEG-4 video stream on a noisy wireless channel. A model adds extra parity packets to the original GOP frames using Reed-Solomon Forward Error Correction (RS FEC) scheme. Various packet-correction codes are examined at high bit error rate in order to achieve a maximum perceptual video quality at client. Further, we propose a scenario to adapt packet-errors with aim to improve the video quality under a condition that the video server can reduce the packet length once feedback threshold error report of TCP-Friendly protocol is delivered. The scheme reduces the video distortion at the decoder under bandwidth constraints. The reduction is achieved by efficiently protecting the different video frames from channel errors. Furthermore, this efficient decoding algorithm can reduce the decoding complexity of channel decoder. Numerical results clearly show that the proposed approach outperforms a classical RS FEC scheme.

Index-Terms: Wireless video, video quality, TCP-friendly, quality of service (QoS), FEC, reed-solomon code.

Enhancement of throughput time using MS-TCP transport layer protocol for 4G mobiles

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Abstract

Many enhancements of the ordinary TCP are suggested to solve the handoff and Bit Error Rate (BER) problems that may be encountered by any wireless network, leading to decrease its throughputs, such as I-TCP, M-TCP, Snoop TCP, and Freeze TCP. These protocols concern their enhancements in solving one problem, either the handoff problem or the BER problem. In this paper, the MS-TCP protocol is suggested, it combines the features of the M-TCP and the Snoop TCP, which gives it the ability to overcome the handoff and BER problems in wireless network, the MS-TCP keeps the throughput of the sender before and after the handoff similarly, it has a local retransmission facility to retransmit the lost packets which caused by BER, and it is able to recover quickly from losses due to disconnections, to eliminate serial timeouts.

Index-Terms: M-TCP, snoop TCP, MS-TCP, 4G.

Bluetooth performance improvement over different channels through channel coding

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Abstract

(15, 10) code for error correction. In this paper, we propose different error correction coding schemes for this purpose. A comparison study between the Hamming (7, 4), the cyclic (15, 11) and the BCH (15, 7) codes is held in the paper to choose an alternative to the Hamming (15, 10) code. The simulation experiments are held over both an Additive White Gaussian Noise (AWGN) channel and a Rayleigh fading channel. The experimental results reveal the superiority of the BCH (15, 7) code to all other coding schemes if a large redundancy is accepted. If the issue of redundancy is of major concern, the Hamming (7,4) code is the best.

Index-Terms: Block codes, Bluetooth, Fading channels

A new and improved skin detection method using RGB vector space

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Abstract

This paper describes a new method for skin detection based on RGB vector space. Skin color has proven to be a useful cue for pre-process of face detection, localization and tracking. Image content filtering, content aware video compression and image color balancing applications can also benefit from automatic detection of skin in images. Numerous works for skin color segmentation and detection have been reported in the literature in the last few years. In this paper first few pixel based methods are presented and then Vector calculations as an efficient approach for determination of skin area based on implicit mathematical model is proposed. In order to evaluate our method we performed an experimental study. Results obtained are very promising and shows important advantages over other techniques.

Index-Terms: Color segmentation, color space, image processing, skin detection, RBG vector.

Independent component analysis (ICA) for texture classification

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Abstract

This paper presents a texture classification algorithm using Independent Component Analysis (ICA). ICA is used for creating basis functions or basis images bank. These basis functions are used in texture classification because they are able to capture the inherent properties of textured images. These properties enable us to use the ICA bank to generate feature vectors for effective texture classification. These feature vectors are used first for training and then for testing the classifier. The experimental setup consists of texture images from the Brodatz Album and a combination of some images therein. Experimental results for both two and multiple class texture have shown that the proposed algorithm which uses ICA has an encouraging performance. With ICA, a large classification improvement was observed. It obtains an average of just 2.85% misclassified pixels compared with 10.26% misclassified pixels by other methods.

Index-Terms: Image processing, ICA, texture classification.

Multi technique face recognition using PCA/ICA with wavelet and optical flow

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Abstract

Together with the growing interest in the development of human and computer interface and biometric identification, human face recognition has become an active research area since early 90ś. A number of current face recognition algorithms using face representations found by unsupervised statistical methods. Typically these methods find a set of basis images and represent faces as a linear combination of those images. This paper proposed an algorithm that uses PCA on wavelet subband and the Optical Flow (OF). In comparison with the traditional use of PCA, the proposed method gave a better recognition accuracy of up to (73.24%) on an image database of 157 human faces. Then a new method using the Independent component analysis (ICA) was used to improve the recognition rate. The relative performance of PCA and ICA are compared on the same database mentioned before. A recognition accuracy rate of (90.45%) was achieved with the ICA which is much better than the PCA.

Index-Terms: PCA, ICA, OF, DWT.

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Face detection based neural networks using robust skin color segmentation

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Abstract

This paper proposes a robust schema for face detection system via Gaussian mixture model to segment image based on skin color. After skin and non skin face candidates' selection, features are extracted directly from discrete cosine transform (DCT) coefficients computed from these candidates. Moreover, the back-propagation neural networks are used to train and classify faces based on DCT feature coefficients in Cb and Cr color spaces. This schema utilizes the skin color information, which is the main feature of face detection. DCT feature values of faces, representing the data set of skin/non-skin face candidates obtained from Gaussian mixture model are fed into the back-propagation neural networks to classify whether the original image includes a face or not. Experimental results shows that the proposed schema is reliable for face detection, and pattern features are detected and classified accurately by the backpropagation neural networks.

Index-Terms: Face detection, feature extraction, DCT, neural networks.

Content based image recognition based on QUIP-tree model

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Abstract

The need for efficient content-based image retrieval (CBIR) system has increased tremendously in many application domains such as biomedical, military, education, and Web image classification and searching. In this paper, we propose an heterogeneous image retrieval system based on QUIP-tree model (QUadtree-based Index for image retrieval and Pattern search). The QUIP-tree is used to classify a large index database considered by relevance features selection. The experimental results show that the proposed retrieval system is efficient only in case of small dimensions (*i.e.*, simple image database using only one or two same kind features for description).

Index-Terms: CBIR, QUIP-tree, feature extraction, heterogeneous image database

Comparisons of feature selection methods using discrete wavelet transforms and support vector machines for mammogram images

Husam Osta, Rami Qahwaji and Stan Ipson
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Abstract

In this paper, we investigate wavelet-based feature extraction from mammogram images and efficient dimensionality reduction techniques. The aim is to propose a new computerized feature extraction technique to identify abnormalities in breast mammogram images. In this work, dimensionality reduction is carried out using the minimal-redundancy-maximal-relevance criterion (mRMR). The classification accuracy for each set of features is measured and evaluated using machine learning techniques and support vector machines (SVMs).

Index-Terms: Mammography, Feature extraction, Wavelet transform, Support vector machine

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