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9th International Symposium on Image Processing,
Wavelet and Applications

5-8 November 2017, Kars-Turkey



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**9th International Symposium
on Image Processing,
Wavelet and Applications,**

5-8 November 2017, Kars-Turkey

**9th INTERNATIONAL SYMPOSIUM ON IMAGE PROCESSING,
WAVELET AND APPLICATIONS (IWW2017), KARS, TURKEY**

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PREFACE

The 9th International Symposium on Image Processing, Wavelet and Applications (IWW2017) will be held in Kars, Turkey between **November 5 - 8 2017**. IWW 2017 will be organized by Kafkas University with the co-operations of İstanbul Aydın University, EURAS EURASIAN UNIVERSITIES UNION, Marmara University, Kocaeli University, Sharda University and Altınbaş University.

Wavelet analysis can provide a unique decomposition of time series into signal and noise components. From the overall spectrum, independent spectra can be extracted allowing the separate detection and monitoring of the world problems. The participants will discuss major issues of importance for integrated wavelet implementation, including development experiences worldwide wavelet applications.

The wavelet methods provide avenues for proper understanding of real world problems. These scientific meetings are intended to provide opportunity for interaction of scientists, engineers, planners, social scientists, agricultural scientists who are applying wavelets in their research. Mathematical studies are often aimed to analyze and visualize real world problems. Discussion on this theme during ICIAM2003 in Sydney by Prof. Dr. A. H. Siddiqi and his group, mooted the idea of holding symposium on wavelets.

Keeping in view importance of wavelet tools, Istanbul Commerce University (Turkey) had organized the First International Workshop on Applications of Wavelets to Real World Problems during 17-18 July, 2005. The “International Workshops II and III: Mini Symposium on Applications of Wavelets to Real World Problems: IWW07 and IWW08” were organized by Istanbul Aydın University with the co-operation of The Abdus Salam International Centre for Theoretical Physics-Office of External Activities (ICTP-OEA, Italy). “The Fourth International Workshop on Applications of Wavelets to Real World Problems (IWW2009)” was organized by Kocaeli University with the co-operation of ICTP-OEA in June 2009. A fairly good number of active researchers of the field participated in its deliberations, and the papers presented were published in the Proceeding of the Workshop. Encouraged by the success of the series

of Workshops, The Fifth International Symposium on Wavelet Applications to World Problems (IWW2010) was held in Istanbul Aydın University with the co-operation of ICTP-OEA, between 7th and 8th of July, 2010. The sixth International Image processing & Wavelet on real World applications conference (IWW2012) was organized by Boğaziçi University with the co-operation of Istanbul Aydın University in Istanbul. The seventh IWW2013 was organized by Universitat Politècnica de València in Valencia, Spain. The 8th International conference on Image Processing, Wavelet and Applications (IWW 2016) was held in Istanbul, Turkey between September 22 – 24, 2016. IWW 2016 was organized by Marmara University with the co-operations of Istanbul Aydın University and Sharda University. We welcome all researchers and specialists in wavelet to exchange information during The 9th International Symposium on Image Processing, Wavelet and Applications (IWW2017) in Kars.

Organizing Committee
Kars; November 2017

Conference Topics

All the research areas of Numerical Analysis and Computational Mathematics

- Image Processing and Wavelet Application
- Signal Processing and Wavelet Application
- Applications of Wavelet to Real problems
- Numerical ODEs
- Numerical PDEs (Inc. BVPs)
- Scientific Computing and Algorithms
- Stochastic Differential Equations
- Approximation
- Numerical Linear Algebra
- Numerical Integral Equations
- Error Analysis and Interval Analysis
- Difference Equations and Recurrence Relations
- Numerical problems in Dynamical Systems
- Applications to the Sciences (Computational Physics, Computational Statistics, Computational Chemistry, Computational Engineering etc.)
- Differential Algebraic Equations
- Numerical methods in Fourier analysis

All the research areas of Applied Sciences and Mathematics

- Mathematical Physics and Wavelets
- Computers simulations and Wavelets
- Mathematical Physics
- Mathematical Chemistry
- Mathematical Biology and Mathematical Medicine
- Optimization and Operational Research
- Theoretical Mechanics
- Discrete Applied Mathematics
- Statistics
- Probability
- Dynamical Systems
- Algorithms
- Experimental Mathematics
- Theoretical Computer Science
- Applied Analysis
- Scientific Analysis
- Environmental Analysis
- Wavelets in Environmental Problems
- Wavelets in Engineering Problems
- Mathematical Modelling including but not limited to:
 - mathematical modelling of engineering processes, manufacturing, and industrial systems, heat transfer, fluid mechanics, CFD, and transport phenomena environmental modelling
 - solid mechanics and mechanics of metals
 - electromagnets and MHD
 - reliability modelling and system optimization
 - decision sciences in an industrial and manufacturing context
 - civil engineering systems and structures
 - mineral and energy resources
 - relevant software engineering issues associated with CAD and CAE
 - materials and metallurgical engineering,
 - mathematical modelling of social, behavioral and other sciences

- Wavelets in Engineering Problems
- Decomposition and Reconstruction Algorithms, Subdivision Algorithms
- Continuous and Discrete Wavelet Transform
- Wavelets in Finance (Economics)
- Wavelets in Geophysics
- Wavelets in Medicine
- Time-frequency Localization
- Phase – Space Analysis
- Subband Coding
- Image Compression
- Real – Time Filtering
- Radar and Sonar Applications
- Transient Analysis
- Medical Imaging
- Multigrid Methods
- Frames
- Bifurcation and Singularity Theory
- Deterministic Chaos and Fractals
- Solution and Coherent Phenomena
- Formation of Pattern
- Evolution
- Complexity Theory and Neural Networks
- Analytical Approaches and Simulations for more Accurate Descriptions
- Predictions
- Experimental Observations and Applications of Nonlinear Phenomena in Science and Engineering
- Theoretical and Applied aspects of Computational Geometry
- Control Theory and Automation
- Fuzzy Sets and Systems and Fuzzy Logic
- Applied Algebra
- Quality Theory of Differential Equations
- Neural Networks
- Robotics
- Miscellaneous

Symposium Language

English is the official language of the IWW 2017 Conference

Details: You can find more details at IWW2017

Web Pages: <https://iww-conference.com/>,

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INVITED SPEAKERS



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Institute of Nuclear Physics Academy of
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Rashmi BHARDWAJ

Guru Gobind Singh Indraprastha University,
New Delhi, India

CURRENT TRENDS IN APPLICATIONS OF WAVELETS

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Abstract: Orthonormal wavelet system has been used in diverse fields of engineering and science, especially in signal analysis and image processing having industrial applications. In the recent past several variants of wavelet such as wavelet frames or framelets and wavelets defined by Walsh functions have been investigated. Presently our research group is interested in theory and applications framelets and Walsh wavelets. Some of our results will be reported, see for example monographs of Krivoshein, Protasov and Skopina [Springer, 2016] and Farkov, Manchanda and Siddiqi [Springer, 2017 in Press].

Keywords: *Wavelets, Framelets, Wavelets constructed by Walsh Functions, Multivariate Wavelet Frames*

THE SOLUTION OF THE HIERARCHY OF QUANTUM KINETIC EQUATIONS FOR CORRELATION MATRICES WITH GENERALIZED YUKAWA POTENTIAL

Nikolai (Jr.) **BOGOLUBOV**¹, Mukhayo **RASULOVA**² and Umarbek **AVAZOV**³

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Abstract

The present paper solves the Cauchy problem for the BBGKY chain for quantum kinetic equations, describing dynamics of the quantum system of particles interacting with each other by the generalized Yukawa potential. A chain of quantum kinetic equations for correlation matrices is defined on the basis of the BBGKY chain for density matrices. Solution of the chain of equations for correlation matrices using solutions of the Cauchy problem for the chain of quantum kinetic equations BBGKY for density matrices

Key Words: *Cauchy problem, quantum kinetic equations.*

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APPLICATION OF WAVELET METHODS TO INTEGRAL EQUATIONS

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Abstract

Integral equations appear in different areas of physics, chemistry and biology. One important type of integral equations is Fredholm integral equation of the first kind. Many mathematical problems like backward heat equation, inverse Laplace transform and numerical differentiation can be easily converted into the first kind Fredholm integral equation. It has been found to be extremely useful in medical imaging, geophysics, radiography, spectroscopy, immunology problem, atomic physics, gravitational problem, image processing and signal processing. Several methods like homotopy perturbation, variational method, Adomian decomposition method and successive approximation combined with regularization method have been proposed for numerical solution of these equations. A new technique is developed to find the numerical solution of Fredholm integral equations of the first kind. We have projected an approach based on regularization and collocation method using wavelets. Firstly, an ill-posed first kind Fredholm integral equation is replaced by a well posed problem using regularization technique and then wavelet Collocation method is applied to obtain the numerical solution of the resulting problem which converges to the solution of the original problem.

Key words: *Wavelets, First kind Fredholm integral equations, Regularization method, Collocation method.*

CONTINUOUS WAVELET TRANSFORM AND WAVELET COHERENCE IMPLEMENTATION AND APPLICATION TO THE DIVERSIFICATION ANALYSIS OF CARBON MONOXIDE (CO)

Rashmi BHARDWAJ

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Abstract

Carbon monoxide is a gas and is found in air. High levels of carbon monoxide are poisonous to humans and, unfortunately, it cannot be detected by humans, as it has no taste or smell and cannot be seen. The natural concentration of carbon monoxide in air is around 0.2 parts per million (ppm). Natural sources of carbon monoxide include volcanoes and bushfires. The main sources of additional carbon monoxide are motor vehicle exhaust and some industrial activities. In this paper, Wavelet squared coherence estimates based on the continuous wavelet transform measure the co-movements of daily data from different locations of Delhi, India for the last five years. The paper compares the results to coherency spectra based on Fourier transforms and comparison between a pair of time series of air pollutants using wavelet transform methods is studied. From Continuous Wavelet Transform (CWT) of two-time series of air pollutants we constructed the Cross wavelet transform (XWT) which exposed their common power and relative phase in time-frequency space.

A measure of Wavelet Coherence (WTC) between two CWT is studied to find significant coherence even though the common power is low. The cross wavelet transforms and wavelet coherence for examining relationships in time frequency space between two times series of same air pollutants recorded at different locations. For the wavelet analysis, it employs the commonly used Morlet wavelet and defines a new smoothing operator for wavelet coherence estimates with the latter function. Phase angle statistics is also studied to get more insight

in causal relationships between the time series into the problem. Results show an increased interrelation between CO monitored at different locations. Therefore, diversification benefits attained became less pronounced during the most recent years, especially for long- and medium-term predictions of air pollutants. The highest levels of CO typically occur during the colder months of the year when inversion conditions (when the air pollution becomes trapped near the ground beneath a layer of warm air) are more frequent. Continuous Wavelet transform using Complex Morlet Wavelet of Carbon Monoxide at Delhi Collge of Engineering and ITO-Crossing; Wavelet Cross Spectrum using Complex Morlet Wavelet of Carbon Monoxide between Delhi Collge of Engineering and Siri Fort and Wavelet Coherence using Complex Morlet Wavelet of Carbon Monoxide between Delhi Collge of Engineering and Mobile Van are shown in fig. (a), (b) and (c) respectively.

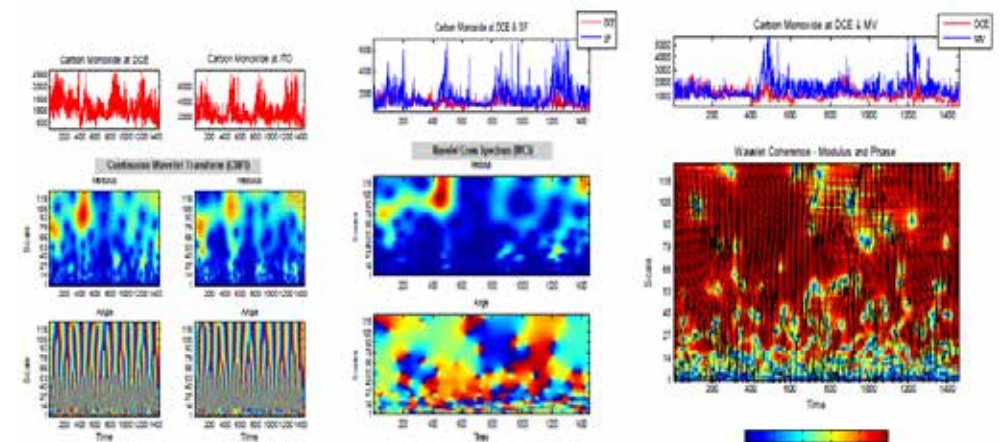


Fig. (a) (b) (c)

It is found that an essential factor of the analysis is played by the observation period over which the analysis is performed. As a consequence – as the analysis with the coherency spectrum revealed – the benchmark method seems to be affected, whenever the data bring about a time period of largely affected air pollution with large CO movements. Essentially, this is a consequence of the required stationarity assumption, which is unlikely to be fulfilled for time series.

The analysis with the continuous wavelet transform, however, is not dependent on such restrictive assumptions, is capable of detecting both high and low correlations in relation to time and frequency, and hence yields a better tool for the diversification analysis. Given this, it is evident that the analysis by means of squared wavelet coherence estimates provides an extremely useful and powerful tool for analyzing diversification and thus for making policy decisions to control the air pollution.

Key Words: *CO movements, Air pollution, CWT*

CLASSIFYING BREAST CANCER WITH MULTIFRACTAL METHODS AND SUPPORT VECTOR MACHINE ALGORITHM

Yeliz **KARACA**¹, Carlo **CATTANI**²

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Abstract

Mammography is the most sensitive method to detect breast cancer. In this paper, Brownian motion Hölder regularity functions for mammograms such as multifractal methods were applied to mammography images, aiming to easily identify distressed regions, in Breast Cancer patients. With these regions, we have proposed a Breast Cancer classification based on the multifractal method by using the Support Vector Machine polynomial kernel algorithm. Thus, we obtained a classification by identifying mammographic image pixels through multifractal methods and by diagnosing Breast Cancer patients through support vectors.

Key Words: *Multifractals, Support Vector Machine, Polynomial Kernel Mammographic images, Breast Cancer.*

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MENINGIOMAS ARE ALMOST ALWAYS EXTRA-LARGE...

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Abstract

Meningiomas are almost always extra-axial tumours and represent the most common intracranial tumors. They originate from arachnoid cap cells of the meninges. and and Although these tumors are usually typically benign with a low rate of recurrence following surgery, in some instances, may be more aggressive. They are uncommon in patients before 3rd decade and should raise suspicion of Neurofibromatosis type 2 (NF2, Merlin gene on Chromosome 22) when found in young patients. Meningiomas are more common in women, with a ratio of 2:1 intracranially and 4:1 in the spine. In contrast, atypical and malignant meningiomas are slightly more common in males. Additionally, meningiomas demonstrate endocrinological sensitivity and may grow during pregnancy. Metastatic disease is rare, but has been reported. Even they are primarily classified intradural and/or extradural; can also be classified according to anatomical location; histopathological characteristics and also by aetiology. Grading of meningiomas follows the WHO classification for CNS tumours and includes both usual histological features (e.g. mitotic index) as well as a number of histological subtypes, some of which have been associated with more aggressive behavior. Meningiomas may also become clinically apparent due to mass effect their location and symptoms as headache, paresis, change in mental status, seizures, anosmia, visual field defects, cranial nerve deficits, obstructive hydrocephalus etc. may occur.

X-ray imaging studies no longer have a role in the diagnosis or management of meningiomas. Historically plain film features of meningiomas were as follows: enlarged meningeal artery grooves hyperostosis or lytic regions, calcification, displacement of calcified pineal gland/choroid plexus due to mass effect. Typical meningiomas usually appear as dural-based, homogeneous and well circumscribed masses on both MRI and CT and of course some vary in their

imaging appearance. Over 50 % of meningiomas demonstrate variable amount of vasogenic oedema in adjacent brain parenchyma. Correlation of oedema between age, gender, tumour size, rapid growth, location, histologic type, and invasion in the case of malignant meningiomas has been discussed in literature. The underlying mechanism is most likely multifactorial however it has been shown that there is a strong association between the presence and severity of the peritumoral vasogenic oedema and expression of the vascular endothelial growth factor (VEGF) or expression of CEA and CK.

CT is often the first imaging modality. Non-contrast CT reveal 60% slightly hyperdense to normal brain, the rest are more isodense, 20-30% have some calcification post-contrast CT brightly and homogeneously contrast enhance malignant or cystic variants demonstrate more heterogeneity/less intense enhancement. hyperostosis (5%) ,enlargement of the paranasal sinuses (pneumosinus dilatans) has also been suggested to be associated with anterior cranial fossa meningiomas. Lytic/destructive regions are seen particularly in higher grade tumours, but should make one suspect alternative pathology (e.g. haemangiopericytoma or metastasis) {ref needed}

MRI is the investigation of choice for the diagnosis and characterisation of meningiomas. CSF vascular cleft sign, dural tail, sunburst or spokewheel appearance of the vessels and arterial narrowing may be helpful signs in differentiating diagnosis. MRI signal characteristics of typical meningiomas reveal T1-W isointense to grey matter (60-90%) and/or hypointense (10-40%. T1-wC+ (Gd): usually intense and homogeneous enhancement. In T2-W imaging isointense to grey matter (~50%) or hyperintense to grey matter (35-40%) usually correlates with a soft texture and hypervascular tumours. Hypointense T2-W imaging (10-15%) usually correlates with harder texture and more fibrous and calcified contents.

Atypical and malignant subtypes may show greater than expected restricted diffusion in DWI/ADC MR imaging studies although recent literature suggests this statement may not be significant in prospectively predicting histological grade; whereas MR spectroscopy usually can help distinguish meningiomas from mimicking pathologies. MR spectroscopy characteristics increase in alanine (1.3-1.5 ppm); glutamine/glutamate; choline (Cho) and absent or significantly reduced N-acetylaspartate (NAA): non-neuronal origin and

creatinine (Cr) help meningioma diagnosis. MR perfusion good correlation between volume transfer constant (k-trans) and histological grade.

A well known angiographic (DSA) sign of meningiomas is the mother-in-law sign, in which the tumour contrast blush “comes early, stays late, and is very dense”. Catheter angiography is performed for preoperative embolisation to reduce intraoperative blood loss and alleviate resection of the tumour. Particles are favoured typically 7-9 days prior to surgery after risks and benefits should be thoroughly assessed. Even the majority meningiomas are predominantly supplied by meningeal vessels they can have a dual pial blood supply to the periphery of the tumour.

Extensive efforts of differential diagnosis may result pituitary macroadenoma, acoustic schwannoma, haemangiopericytoma, dural metastases (e.g. breast cancer), craniopharyngioma, hypertrophic pachymeningitis, extramedullary haematopoiesis, chondrosarcoma chordoma, Paget’s disease, fibrous dysplasia and other sclerotic metastases (e.g. prostate carcinoma). Treatment is usually with surgical excision. Degree of maximum surgical resection correlates with decreased symptomatic recurrence. Recurrence rate (%7-94) has been reported to vary with grade and length of follow-up.

Key Words: Tumors, meningiomas, imaging characteristics

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GAMMA KNIFE THERAPY AT BRAIN TUMORS

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OBJECTIVE: In this study, we aimed to improve the treatment efficacy at recurrent malignant gliomas by modifying applied dose and plan at stereotactic radiosurgery with in MR spectroscopy and MR perfusion, and to decrease the rate of complications.

METHODS: Thin-section perfusion MR and MR spectroscopy were obtained before planning in 10 patients with recurrent malignant gliomas. In MR spectroscopy, the points where the choline peak was prominent were determined and the common areas having hyperperfuse were determined as active tumor regions. While preparing the gamma plan, the tumor was divided into two, active and inactive regions. When the highest isodose was given to the active region, the lowest dose was given to the non-active region MR controls were done in the 3rd and 6th months of the patients.

RESULTS: When dose planning is included MR perfusion and MR spectroscopy in gamma knife therapy in patients having recurrent GBM, showed statistically significant high dose on active tumor area and low dose on a non active regions.

CONCLUSIONS: When gamma knife therapy is performed in recurrent glioblastomas, effective dosing on the tumor can be increased by modifying treatment planning with in MR perfusion and MR spectroscopy, and the dose given the peripheral brain tissue and the sensitive tissues that may be complications are reduced.

Key Words: Tumors, gamma knife therapy, MR

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BRAIN TUMOR STEM CELL AND FUTURE THERAPEUTIC OPTIONS

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Abstract

Glioblastoma (GBM), the most aggressive and the most common primary brain tumour in human patients. Clinical management consists of maximal surgical resection followed by radiation and chemotherapy. Over the last few decades, various therapies have been studied and tested clinically. Despite extensive molecular and genetic analyses of glioblastoma is median survival of only 12–14 months. The treatment regimens of glioblastoma needs for more effective therapies that explained the molecular biology of tumor and their signaling pathways. Glioblastoma stem cells (GSC) play a crucial role of brain tumors. Several studies have performed that GSC increase cancer aggressiveness. The discovery of cancer stem cells in glioma has created a paradigm shift in our understanding of this deadly disease. Glioma stem cells exhibit sustained self-renewal and potent tumorigenic potential and differ from their more differentiated progeny in response to current therapies. This presentation is aimed at establishing the glioblastoma stem cells, which this stem cell's signaling pathways and molecular markers will provide tailoring of personalized therapy with new opportunities.

Recent advances in the study of the cancer stem cells are rapidly transforming research in the field of molecular neuro-oncology. Studies of GSCs in malignant gliomas with defined molecular backgrounds will likely offer greater success in identifying important drug targets that are tailored for individual brain tumors.

Key Words: *Glioma, cancer stem cells, personalized therapy*

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SEIZURE DETECTION FROM PRE-ATTACK EEG SIGNALS USING ENSEMBLE EMPIRICAL MODE DECOMPOSITION

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Abstract

In this study, an Ensemble Empirical Mode Decomposition (EEMD) based epilepsy detection system was proposed. It is aimed to determine epileptic seizures using pre-attack EEG signals. For this purpose, the EEG data recorded from clinically diagnosed epilepsy patients at Izmir Katip Celebi University, Faculty of Medicine, Department of Neurology is used. EEG data is divided into three sections; *pre-attack*, *during the attack*, and *post-attack*. In our approach we first decompose this three sections of EEG data into intrinsic mode functions (IMFs) using EEMD. Then the most meaningful intrinsic mode function is determined and used to calculate the features for classification. Power spectral density and higher order time and frequency moments are calculated using Welch and Periodogram methods. It is investigated whether or not information about the attack can be obtained from pre-attack EEG data by comparing the features obtained from pre-attack and during the attack EEG data.

Key Words: *Seizure Detection, Welch Method, Periodogram Method, Ensemble Empirical Mode Decomposition.*

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SELF-ORGANIZING FEATURE MAPS IDENTIFY MAMMOGRAPHIC IMAGES TO LEARNING IN SCALE INVARIANT FEATURE TRANSFORM TECHNIQUE

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Abstract

Manual segmentation of microcalcifications into mammograms may provide useful information about the diagnosis of breast cancer and the progression of the disease. Applying automatic segmentation to the mammography data is helpful both in diagnosis of the disease and in planning the treatment. This paper used the Scale Invariant Feature Transform (SIFT) technique to calculate key points in diseased areas of mammography. In this approach, 516 benign and 445 malignant mammography data were subjected to SIFT algorithm to obtain 16 x 16 key points from mammography images. The data set generated from key points and the success of identification of malignant and benign patients have been proven through the Self Organizing Map (SOM) algorithm.

Key Words: *Scale Invariant Feature Transform, Self-Organizing Map. Mammographic images, Breast Cancer.*

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FACE RECOGNITION SYSTEM BASED ON GRADIEN OPERTORS

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Abstract

In this study, we present face recognition system with reference to the various gradient based operators (GO). Gradient-based methods are composed of Sobel, Prewitt, and canny Filters. We used these operators to obtain the best images edges. Another benefit of using the edge detection operation is to eliminate undesired data Segmentation is the next step after the edge detection process completes. As a feature extractor based on the PCA. A multilayer neural network (MLNN) is used for the classification process. BIO ID database is the dataset used in training and testing. We achieved satisfactory results with high accuracy classification according to experimental tests.

Key Word: *Face Recognition PCA; Neural Network; Sobel Filter Prewitt Filter; Canny Roberts Filter*

THE VOLATILITY OF EXCHANGE RATES IN TURKEY AND OIL PRICES ITS EFFECTS ON TURKISH ECONOMY

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Abstract

Following flexible exchange rates, all countries have been subject to uncertainty since 1972. Collapse of Bretton Woods's system was a turning point at global economy. Under uncertainty of foreign exchange rates, the disequilibrium at oil market added to problems of global economies to be solved. The uncertainty in foreign exchange and oil markets influenced many countries economics stability during 1972-1979 period. Even, it lead to radical change in their economic system. Currently, following global crisis of 2007 recovery, producers continue to oil production even though existence of excess supply. Fluctuation on oil prices were severe. Oil sources, oil price fluctuations are main concerns for the countries who import oil. However, Turkey has been following aggressive export led growth policy. In this paper, the effects oil price and foreign exchange fluctuation on Turkish export will be analyzed by using wavelet method.

Key words: *Turkish economy, volatility of foreign exchange, oil prices, crude oil prices volatility, export, wavelet methods*

MOBILE LIBRARY APPLICATIONS IN ACADEMIC LIBRARIES: A CASE OF ISTANBUL AYDIN UNIVERSITY INFORMATION CENTER

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Abstract

Mobile library services are developing rapidly to meet recent user trends. Concurrent with these library services, academic libraries have built mobile library applications (apps), and provide a convenient way for users to approach a library's services. Users can search a library's catalog view library events, reserve library facilities, and request interlibrary loan services.

There is no doubt that the mobile websites of academic libraries can provide great value to both universities and their academic and research libraries. Measuring their content and services (and their visibility, use and quality) would also allow us to obtain indicators reflecting their impact on the web, complementing the value of indicators from the non-mobile web, and demonstrating the online visibility of the academic library and its contribution to the academic website of the institution.

ICReserve (Information Center Reserve) is a unique mobile application developed by Istanbul Aydın University IT Department in order to improve the library services in terms of user satisfaction and management processes with an innovative approach and in line with the specific needs of the library spaces. ICReserve software is integrated to the institution's student information system and other mobile applications. This article contains technical information about mobile application development and aims to be a guide to software developers.

Key Words: *Mobile applications, library management processes, library software's, information Technologies, Istanbul Aydın University.*

COMPARISON AMONG WAVELETS FOR PREPROCESSING OF ECG SIGNAL

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Abstract

Cardiovascular diseases are one of the most common causes of death worldwide. Electrocardiography is mainly utilized for diagnosis and treatment of these diseases. Electrocardiogram (ECG) signal usually contains some noise. To obtain successful feature extraction from ECG signals, usage of a pre-processing stage is unavoidable. In this paper, we present implementation of Daubechies wavelet for removal of power line interference and baseline wander from ECG signal. Soft thresholding technique is used to compare the efficiency of our method. 7 ECG recordings from the benchmark MITBIH arrhythmia database are tested for our study. For the purpose of comparison, we also applied other wavelets to perform the denoising operation. The merit factor for ECG filtering can be measured in terms of the Signal to Noise Ratio (SNR).

Key Words: ECG, Pre-processing Stage, Soft Thresholding, Wavelet Transform, Noise Reduction.

COMPARISON OF DEEP LEARNING AND ARTIFICIAL NEURAL NETWORK FOR EPILEPTIC SEIZURE

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Abstract

Machine learning methods are frequently used for data sets in many fields for purposes of classification and clustering. This study includes significant signal obtained from EEG recording and belonging to 11500 instances. Many alternative methods are used nowadays to be able to show the strong and efficient features of Epileptic based on EEG records. Deep learning has formed a more skilful system in the classification of Epilepsy or Healthy by working with fewer sets of features compared to Feed Forward Back Propagation algorithm. Deep learning algorithm has a better accuracy rate in comparing the Epileptic and Healthy compared to ANN algorithm, which are among the supervised learning algorithm.

Key Words: Deep Learning, ANN, FFBP, Epilepsy, EEG.

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ON APPLICATIONS OF IMAGE INPAINTING WITH ELLIPTIC MASKING FOR MEDICAL IMAGES

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Abstract

Inpainting problem is important in many areas. One of these areas is medicine. Medically the inpainting problem is crucial for patients' health. For this purpose, in this study we deal with the inpainting problem for medical images. We developed an elliptical mask, applied it to some medical images. Later we used wavelet and shearlet algorithms to recover the original medical images. Our elliptical mask can be applied to medical images with arbitrary semi major and semi minor axis length. When the obtained results are examined, it turns out that the shearlet algorithm gives better results than the wavelet algorithm.

Key Words: *Elliptic masking, Medical images, Inpainting, shearlet, wavelet*

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FUZZY LINEAR PROGRAMMING BASED ON THE FUZZY CHAOS APPROACH

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Abstract

The first approach to solving the fuzzy linear programming problem was introduced by Bellman and Zadeh. It should be noted that in majority of the existing works the fuzzy problems of linear programming are transformed to the form of crisp classical problems of linear programming. It is reasonable to realize optimization of actual processes both with the goal function, and with limitations in fuzzy representation, solving the fuzzy problem of a linear programming, not converting it to the classic problem form of a linear programming, and using the approach, which one would differ by the greater efficiency. In this study an application of fuzzy chaos to full fuzzified linear programming with fuzzy goal, fuzzy constraints, and fuzzy variables is presented. The fuzzy chaos approach to fuzzy linear programming problem is demonstrated on a concrete case, which results have shown high efficiency of the given approach to the problems of linear programming.

Key Words: *Fuzzy Logic, Linear Programming, Chaos Approach*

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LOGISTIC NETWORK DESIGN AND IMPLEMENTATION IN A 3PL

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Abstract

In recent years, the difficult condition of competition and the rapid development of technology has increased the importance of the issues such as customer service level development, reducing production times and delivery times, lowering stock levels etc. Firms have started to work on issues such as supply chain management, logistics management, production distribution planning to reach the necessary goals in these issues. The “Reverse Logistics” issue, which takes into account the return and recovery of products, has also become an area of much work over the last few years. This study includes the issue of logistic network design which has increased considerably in recent years. At the same time, it is a study that takes into account not only forward but also backward flows. In the work carried out in a 3PL (third party logistic) business; It is a multi-location problem with five shipping companies, two cargo collection centers, two airports, two delivery / distribution centers and four buyer cargo countries. At the same time, the study adds to the model the opportunity loss of delays and the reliability ratios of centers, while also covering the situation of cargo and collecting and supply branches. The purpose of this study is; where collection and delivery centers will be opened and what amounts will be sent between centers. Thus, the study will provide information on whether if the collection and delivery centers are open or closed and the flow between centers, airports, senders and receivers to the operation subject. The data in the study are directly derived from the 3PL company and the problem is modeled by mixed integer linear programming. In the problem, the demand is determinate and the model is deterministic in this direction. The network design model created as a minimization problem is solved using the GAMS Distribution 23.5.1 program.

Key Words: *Logistics Management, Logistic Network Design, Linear Programming, Mixed Integer Linear Programming, 3PL, Forward Logistics, Reverse Logistics, GAMS*

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HARMONIC ANALYSIS OF TURKISH CLIMATIC SERIES

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Abstract

With an aim of estimating climate change and its urban-induced bias in Turkey we have used quality controlled temperature and precipitation data of selected 53 Turkish stations in the period of 1950-2006. To eliminate the short-term fluctuations and examine the possible anomalies and trends in climate series, 365 day moving averages with their digital low pass filtered versions were generated. Furthermore, ‘relative difference’ signals were introduced and applied to temperature and precipitation series to observe the actual local changes in the climate data independent from large-scale effects. Fourier transform is used to generate harmonic series of the climatic variables. The first harmonic explained 98% of the temperature variation in the southern regions of Turkey. This percentage decreased towards the northern regions (Black Sea) to a value of 95%. The lowest first harmonic percentages in Black Sea region is explained by high percentages of the second harmonic that we believe to correspond to a great variability in weather systems. First harmonics of temperature were investigated for their peak to peak variation that correspond to temperature range and for their phase shift that is a signal showing the change in the arrival time of critical values. Low pass filtered temperature series showed more pronounced temperature increases for the continental regions of Turkey; Central Anatolia (CA), Southeastern Anatolia (SA), and Eastern Anatolia (EA) than the coastal regions; Marmara (MR), Aegean (AG), Mediterranean (MD) and Black Sea (BS). After the first half of the 1990s, when the second warming trend has been started, a rapid increase in the low pass filtered temperature values was obtained for all regions. Temperature increases during this 57-year period for CA, EA, SA, BS, MR, MD and AG regions were obtained as 1.00, 0.99, 0.77, 0.70, 0.69, 0.64 and 0.63 °C, in order.

Key Words: *Harmonic analysis, low pass filter*

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DEVELOPMENT OF A DIGITAL DATA TRANSMISSION PORTABLE BOREHOLE TEMPERATURE LOGGING SYSTEM FOR CLIMATOLOGICAL AND GEOTHERMAL STUDIES

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Abstract

High precision temperature-depth information from boreholes that are deeper than 100m have a variety of applications including recent change in the climate of the region where the borehole is located and geothermal exploration studies. Especially for climatological studies, intra-borehole temperature precision of 0.01 °C or better is required, which puts certain limits in the design of the logging system. Electrical wireline methods are widely used in temperature-depth logging. Analog systems are vulnerable due to potential electrical leakages in data transmission lines so they require use of high quality cables without any mechanical breakdown. We developed a digital data transmission system where the temperature information is acquired digitally from a silicon crystal sensor and transmitted to the surface at the same time using RS-232 protocol. By this way, the system is able to transmit the temperature information without interfering with other factors that can lower the quality of the information. Within the probe both temperature and inclination of the borehole is sent to the surface and recorded on a flash disc. On the surface, the winch used for lowering the probe is also automated. The pre-calibrated silicon-based temperature sensor has very low drift rates and the system does not require any calibration during its lifetime.

Key Words: *Digital data transmission, borehole temperature measurement.*

STATISTICAL EVALUATION AND WAVELET ANALYSIS OF WIND SPEED

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Abstract

This study covers some statistical results and wavelet applications on wind speed at five study areas in Turkey. In this study, hourly, monthly and seasonal variations of wind speed data have been analyzed based on automatic records at different geographical regions of Turkey in 2015. Temporal variations and scale analyses of wind speed at the selected areas have been evaluated. For the seasonal analyses of wind speed observations in Çanakkale for selected months: January, April, July and October are being taken into account. The accuracy of model results is compared with outputs of real observations. Together with observations and model outputs in Ordu (Black Sea Region), Mersin (Mediterranean Region), Afyon (Aegean Region) and Kayseri (Central Anatolia) are studied. Results on spatial and temporal variations of wind speed based on regional and seasonal analyses have been studied by using MATLAB Wave Menu. Daubechies wavelet techniques at level 5 (Db5) have been applied on hourly wind speed records. Wavelet decomposition and approximation using Db5 of each parameters are presented in seven parts namely s, a5, d1, d2, d3, d4 and d5. Where “s” represents signal or raw data; low frequency part “a5” gives an approximate of signal at level 5. High frequency parts d1, d2, d3, d4 and d5 contain the detail of “s” at different levels respectively. It is concluded that extremes of wind speed are generally associated with the large-scale events. Large-scale factors have a great importance on wind speed variations in Çanakkale, in January. Combined effects of large, meso and small-scale factors on wind speed have been observed in April. In July, generally small and meso-scale factors play an important role on wind speed variations. In this paper, the results have been compared with analyses at other regions. This work was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK) under the European Union ERANET + project titled New European Wind Atlas (NEWA); (Project No: 215M386).

Keywords: Wind Speed, Wavelet, Daubechies Wavelet.

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STATISTICAL ANALYSIS OF TEMPERATURE AND PRECIPITATION SERIES OF TURKEY

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Abstract

Climate change is threatening the food production, drinking water supplies and sustainable development. Rising sea level, extreme weather events and desertification is especially dangerous for the millions of people living in less developed countries. This study aimed to investigate the presence and magnitude of climate change in Turkey. Primarily, the work focused on the compilation of up-to-date meteorological data extending up to 2014. Then, linear regression analysis, Pearson correlation and Mann-Kendall nonparametric trend test was applied to temperature and precipitation time series to determine any climatic changes in Turkey. Results show that Turkey is under the effect of warming and the regional increases in temperature is significant. Contrary, the variation in precipitation is not significant as it is in temperature. Temperature analysis show a cool period extending from 1960s until 1993, generally with the lowest temperature values on 1992-93 owing to the eruption of Mt. Pinatubo in Philippines. During the last two decades, significant warming trend is observed in the majority of the station based temperature series, giving rise to extreme temperatures and record high values.

Key Words: *Statistical Analysis, Climate Change*

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EVALUATION OF THE EFFECT OF SOIL SALTINESS ON PADDY YIELD BY FUZZY LOGIC

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ABSTRACT

The aim of this study is to evaluate the effects of soil characteristics monitored in paddy fields irrigated with different water sources and find out the effects of these characteristics on soil productivity using Fuzzy Logic. For this purpose, soil saltiness parameters (EC, Mg, Ca) were determined from soil samples taken from four paddy areas selected in Meriç-Ergene Basin of Turkey before and after harvesting. The impact on the efficiency of the changes in soil properties were analyzed by Fuzzy Logic model. In the model, saltiness parameters, which directly effects soil productivity, are considered as input variables, and productivity is considered as output variable. The fuzzy values of these variables were obtained and the productivity value (%) of each field was determined. Depending on the change in saltiness parameters, the change in the level of productivity varied according to area, measurement time and soil depth. While the average productivity obtained during the pre-October measurements was 40, 15, 15 and 15% for Aslıhan, Eşiköy, Uzunköprü and Delibedir respectively, they were found as 40%, 15, 18 and 15 in post-harvest measurements. According to the obtained results, it can be said that Fuzzy Logic model which is used in many sciences should be useful in agricultural field studies.

Key words: *Fuzzy logic, soil quality, modelling, productivity.*

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NUMERICAL ANALYSIS OF FRICTIONLESS CONTACT PROBLEM FOR A LAMINATED MEDIUM

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Abstract

Frictionless contact problems for a rigid punch have been known for a century. For homogeneous half-planes, the solution of contact problems is obtained in closed form for a parabolic or flat punch's. For transversely isotropic or orthotropic half-planes, contact problems were considered for layered half space by a lot of authors. The plane-strain problem for a smooth flat rigid indenter contacting a layered elastic half-space was considered and performed an analysis of interlaminar shear stresses for a laminated composite, which is modeled as a set of anisotropic layers separated by isotropic layers. To evaluate the effect of interlaminar stresses in a laminate used linear elasticity theory and finite-difference method.

The main objective of this research is to apply the finite-element method to study the interlaminar stress effects in layered medium unilaterally contacted with a rigid smooth punch. For this aim, a unilateral boundary value problem formulation of a contact problem for layered medium is presented. Based on this formulation, a finite-element analysis of boundary and transmission conditions and a new computational procedure for stress analysis are presented. Detailed finite-element simulation results, including the design of layered medium, distributions of normal and tangential stresses, influence of geometrical and mechanical parameters to interlaminar stresses are then presented.

Key Words: *Contact problems, interlaminar stresses, finite-element method, transmission conditions*

USAGE OF WAVELETS FOR HIDING BINARY IMAGES

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Abstract

The use of the internet for worldwide communication and data transfer has made it necessary to provide information and data security. The visual cryptography techniques let such security and privacy at some level. In this study wavelets are used for hiding binary images to increase the security of the secret images successfully.

Key Words: *Visual Cryptography, binary images, wavelet transform, steganography, secret sharing*

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WAVELET TRANSFORM AND NEURAL NETWORKS APPLICATIONS ON CARTOON DATA: TURKEY- AUSTRALIA COMPARISON

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Abstract

Art and science interaction emerges an important role on development of human civilization. Art, as discipline, tries to define itself through technology and technical advances. Besides, art concept changes revolutionary with contribution of science. In this sense, computer based methods are applied on cartoon data to underline a significant problem of art which is “originality”. The resembling cartoon data makes problem harder on defining cartoon’s exact artist for some reasons, as interaction between artists or their expert-student based relations. In general, it is a classification problem but moreover, this study can also be considered as redefining traditional cartoon through science and technology and its variations.

Key Words: *Cartoon, wavelet, neural networks, artificial intelligence*

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VIRTUAL INSTRUMENTATION BASED LANE DETECTION BY USING HOUGH TRANSFORM

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Abstract

In this paper, a Virtual Instrumentation based lane-line detection application is proposed. These kinds of studies are the basis of lane departure warning and lane keeping assist systems called as a subtopic of advanced driving assistance systems. Accurate automatic detection is an important feature for reducing the risk of accident and increasing driving safety. In many studies until today, it has been observed that MATLAB software is widely used. LabVIEW graphical development program is preferred in this study for most of the steps. However, “LabVIEW Mathscript Node” object existing under the Scripts & Formulas VIs palette was used for Hough Transformation part. Combining the benefits of text-based Matlab with graphical programming presents a new approach that offers users to choose the most appropriate syntax in a single platform. In the proposed method, segmentation is the initial processing block, which is done for the right and left lane-line region separation. Then, the pixel densities are inverted to reduce the adverse effect. In the next step, the edges were detected using the Canny Edge detector and morphological operations including dilation and erosion operators were applied on the image to enhance. Finally, line detection is performed by using the Standard HT algorithm. Experimental results show that this method works with high accuracy in shadow reflections and obsolete lane lines.

Key Words: *lane detection; driver assistance systems; Hough Transform; LabVIEW*

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ON THE STABILITY OF RETARDED FUNCTIONAL DIFFERENTIAL EQUATIONS

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Abstract

We study the stability behavior of the retarded functional differential equation with delay function. The asymptotic behavior of the solutions and the stability of the trivial solution are described by the use of an appropriate real root of an equation, which is in a sense the corresponding characteristic equation.

Key Words: *Retarded differential equation, Characteristic equation, Stability.*

DETERMINING THE SIZES OF PLATES IN THE PLATES SYSTEM BY USING ADDITIONAL CONDITIONS

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Abstract

Computer experiments are carried out and analyzed for numerical solution analysis deal with the bending of the system obtained by placing three elastic plates side by side when clamped boundary conditions are given at the boundaries of the plates system. By using initial data and the relation between the force affecting on the system and the maximum bending, sizes of the plates forming the system are found using the classical bisection method. A new method is developed by using a special parameter to get results faster. The approach speed of this improved multigrid method is compared with the approach speed of the bisection method. The numerical results obtained are shown in tables and graphs, numerical and geometrical interpretations of these results are given.

Key Words: *Bending, Biharmonic Equation, Finite Difference, Multigrid Method, Transmission Condition*

NUMERICAL APPROXIMATION OF TRANSMISSION CONDITIONS FOR BIHARMONIC EQUATION WITH DISCONTINUOUS COEFFICIENT ON NON-UNIFORM MESH

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Abstract

While the bending of plates with different properties is examined, the sizes of the plates forming the system may be different. When a numerical solution of such a system is obtained, it is impossible to process on uniform mesh. For this reason, in the system formed by plates with different properties, it becomes compulsory to use discrete expressions of transmission conditions at the common boundary of the plates system. In this study, numerical expressions of transmission conditions on non-uniform mesh are obtained. Since the coefficients of the equations are discontinuous, because of that the properties of the plates making up the system are different; it is not possible to give the finite difference approaches of the transmission conditions. That's why, after determining energy function corresponding to the problem, the transmission conditions are obtained by the method of functional approach and then the approach error is evaluated. Specifically, in the case of continuity of the coefficients, numerical expressions obtained by the finite difference method are compared.

Key Words: *Bending, Biharmonic Equation, Finite Difference, Transmission Condition*

FEATURE EXTRACTION OF ECG SIGNALS WITH WAVELET TRANSFORM AND SIGNAL CLASSIFICATION WITH ARTIFICIAL NEURAL NETWORK

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Abstract

Heart is the most vital organ; therefore, the disturbances in the heart must be diagnosed in advance and treated. These disorders can be diagnosed by biological markers. Electrocardiogram is one of the diagnostic techniques used for cardiac disorders. In this study, normal, right bundle branch block, left bundle branch block and premature ventricular complex electrocardiogram data will be examined. Noisy signals can be cleaned using MATLAB. Wavelet Transform will be used for feature extraction. In this way, meaningful information will be obtained from the ECG data in a short time. The features obtained after wavelet transform are to be used for inputs in Artificial Neural Network. After the training of the dataset by Artificial Neural Network, Electrocardiogram data will be classified into 4 groups mentioned above.

Key Words: *Electrocardiogram, Wavelet Transform, Artificial Neural Network, MATLAB*

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BRAIN TUMOR TREATMENT AND NANOTECHNOLOGY

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Abstract

Brain tumors represent some of the most malignant cancers in adult patients. Among the most malignant and aggressive forms of these tumors are glioblastoma multiforme (GBM). Current treatment regimens are safety surgical resection, ionizing radiation, and chemotherapy, with a median survival time of 12-18 months. GBM survival rates have remained largely unchanged since the 1960s. Understanding of the molecular mechanism GBM leads to better treatment options. Several molecular biomarkers and pathways have been identified that are being tested in numerous in vitro and in vivo studies for GBM. The development of alternative therapies of brain tumors biology is urgently needed. Recent developments at both molecular evaluation of tumor cell biology and nano technology present new equipments to researchers. For this aim, Nanotechnology is managed anti-cancer pathways blockers or drivers, transporter for bypass the blood brain barrier (nanocarriers). There are already clinical trials in progress with nanoparticles for GBM treatment. These findings provided new insights into the molecular basis of brain tumors, being a strong driving force behind development of targeted nanomedicines in this area.

Potential role of nanotechnology in brain tumors have been largely developed and studied for targeting different molecular biomarkers and signaling pathways of the tumour cells biology. It is clear that will be more effective than from at the present time.

Key Words: *Glioblastoma, Molecular targeted therapy, Nanotechnology*

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USING OF WAVELET MENU FOR STANDARDIZED PRECIPITATION INDEX ANALYSES IN DROUGHT EVALUATION

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Abstract

Turkey is among the 74 countries that receive the greatest impact from the drought. Drought indexes are important parameters in the field of sustainable water resources management. Because of increasing water demand, drought analyses have a great importance. In this study, the basin for samples, located in the southern and southeastern parts of the Aegean Region, which is, divided into two parts as Aegean and Central West Anatolian regions (as internal Aegean). Drought varies regionally and seasonally; it varies according to weather and rainfall conditions. In addition, weather conditions during a drought are commonly below-normal cloud cover, humidity, above-normal wind speed, and amount of precipitation. The average annual precipitation is also one of the important factors for evaluation of drought. Standardized Precipitation Index (SPI, McKee et al., 1993) are accepted as methods that are effective in determining, evaluating and tracking droughts. These measurements also have been used to analyses the spatial and temporal persistence of drought for large areas by using wavelet techniques. This paper covers discussion on using of wavelet model and its advantages for decision makers.

Key Words: *Agricultural ecology, drought index, rainfall, signal process.*

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**THEORETICAL DETERMINATION OF STRUCTURAL
PARAMETERS, ELECTRONIC, LINEAR
AND NON-LINEAR OPTICAL PROPERTIES OF
N-BENZYLIDENE-BENZOHYDRAZIDE
AND N - (4-SUBSTITUTEDBENZYLIDENE)
BENZOHYDRAZIDE DERIVATIVES**

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Abstract

In this study, *ab initio* Hartree-Fock (HF) and Density Functional Theory (DFT), using B3LYP functional, calculations have been performed to characterize the ground state geometrical energy, the dipole moment (μ), mean polarizability (α), the total first static hyperpolarizability (β), highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO) of N-Benzylidene-Benzohydrazide and N - (4-Substitutedbenzylidene) Benzohydrazide Derivative molecules using the 6-311++G (d, p) basis set. ¹H and ¹³C NMR chemical shifts calculations have been performed by using the DFT with B3LYP functional and HF methods, where the 6-311+G (2d, p) and 6-31G (d) basis sets were employed. In addition, using the calculated the highest occupied molecular orbital energies (EHOMO) and the lowest unoccupied molecular orbital energies (ELUMO), electronic properties of the studied molecules such as energy gap ($\Delta E = ELUMO - EHOMO$), chemical potential μ , electrophilic index ω , ionization potential **IP**, electron affinity **EA**, electronegativity χ , molecular softness **S**, molecular hardness η were obtained.

Key Words: *Density Functional Theory, Benzohydrazide Derivatives*

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**THEORETICAL STUDY OF STRUCTURAL
PARAMETERS, ELECTRONIC, LINEAR AND NON-
LINEAR OPTICAL PROPERTIES OF 4-AMINO-
3-FLUOROPHENYLBORONIC AND 4-AMINO-2-
FLUOROPHENYLBORONIC ACIDS**

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Abstract

In this study, the ground state geometrical energy, the dipole moment (μ), the polarizability (α), the hyperpolarizability (β) energies, the highest occupied molecular orbital energy (HOMO) and the lowest unoccupied molecular orbital (LUMO) of 4-amino-3-fluorophenylboronic and 4-amino-2-fluorophenylboronic acid molecules were calculated by using *ab initio* Hartree-Fock (HF) and Density Functional Theory (DFT/ B3LYP) using 6-311++ G (d, p) basis set. ¹H and ¹³C NMR chemical shifts calculations have been performed by using the DFT with B3LYP functional and HF methods, where the 6-311+G (2d, p) and 6-31G (d) basis sets were employed. Besides, using the calculated the highest occupied molecular orbital energies (EHOMO) and the lowest unoccupied molecular orbital energies (ELUMO), electronic properties of the studied molecules such as energy gap ($\Delta E = ELUMO - EHOMO$), chemical potential μ , electrophilic index ω , ionization potential **IP**, electron affinity **EA**, electronegativity χ , molecular softness **S**, molecular hardness η were obtained. All computational studies have been performed with the Gaussian 09W program.

Key Words: *Orbital Energy, structural parameters.*

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A SPATIAL ANALYSIS OF TURKEY WIND SPEED DATA WITH THE ENTROPY

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Abstract

Estimations and analyses of wind speeds come into prominence since the wind energy is of great importance among renewable energy resources. From this point of view, Turkey wind speed data are analyzed and mapped via the Shannon entropy. In Information Theory, the relationship between information and entropy is revealed with the Shannon entropy (marginal entropy). If there is a less probability regarding an event realization, this event carries more information because it has a surprise factor about realization or vice versa.

In the study, entropy maps of wind speed values are generated. Moreover, the Normalized Marginal Entropy (NME) has been proposed as an index that it represents the information come from data and expressed as a ratio between marginal and maximum entropy. High-normalized marginal entropy means high information about data. The starting point of the study is that data with the high Normalized Marginal Entropy can be predicted more accurately. Hence, the Normalized Marginal Entropy values of wind speeds are mapped and analyzed. Furthermore, stations with the highest and lowest entropy amounts have been determined and data of the stations are used in order to predict wind speed values using the Support Vector Regression (SVR). The idea of the Support Vector Regression is based on the computation of a linear regression function in a high dimensional feature space. It attempts to minimize the generalization error bound to achieve generalized performance. Besides, the Chaotic Approach (CA) has been implemented to prepare an input matrix for the Support Vector Regression and the Singular Spectrum Analysis (SSA) has been used to fill the gaps of the wind speed data. Performance criteria of the predictions and the entropy values are scrutinized to determine a relationship between the entropy and predictability.

The entropy and Normalized Marginal Entropy maps are not only compatible with Turkey wind energy potential atlas but also more detailed than the atlas. Prediction results supports that the more entropy data have, the more predictable they are.

Key Words: Entropy, Wind speed, Normalized Marginal Entropy (NME), Support Vector Regression (SVR), Chaotic Approach (CA), Prediction

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PHOTOSYNTHETIC ACTIVE RADIATION FORECAST VIA ARTIFICIAL NEURAL NETWORK, SUPPORT VECTOR REGRESSION AND MULTIPLE LINEAR REGRESSION

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Abstract

Micrometeorological studies in urban and rural areas are required photosynthetically active radiation (PAR) data and its dependence on different sky conditions. Most of the biological and physiological processes are controlled by this variable. Although PAR is of great importance for these processes, it is not continuously measured variable. In this study, temporal PAR, PAR fraction (PAR/Global solar radiation (R_g)) is determined over two vegetation surfaces for two years from hourly measurements in the Kırklareli city where locates northwestern part of Turkey. Relationships between PAR and R_g , clearness index (K_t) and water vapor absorption (w) in visible band and dew point temperature (T_d) are investigated.

To predict PAR values, some powerful methods such as Artificial Neural Network (ANN), Support Vector Regression (SVR) and Multiple Linear Regression (MLR) is implemented separately for univariate and bivariate forecast. In addition to these methods, Chaotic Approach (CA) is used to prepare the input data matrix because SVR that is a machine-learning algorithm requires a special input matrix. Most of the results are very promising and all model performance criteria show that SVR is the best method for forecast of PAR.

Key Words: PAR, Forecast, Artificial Neural Network, Support Vector Regression, Multiple Linear Regression, Kırklareli/Turkey.

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SYNTHESIS, SPECTROSCOPIC INVESTIGATIONS AND DFT CALCULATIONS OF DIAQUABIS(2- FLUOROBENZOATO-KO)BIS(N,N'- DIETHYLNICOTINAMIDE-KN')COBALT(II)

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Transition metals complexes have an important place in both organometallic chemistry and coordination compounds chemistry. The area of “transition metal chemistry” has gained increased attention, because of their structure architectures, biological and physical properties. The theoretical calculations of the parameters such as vibration frequencies, charge transfer characteristics and the bond lengths and angles, which are important contributions to the establishment and stability of crystal structure, nowadays, are done with the help of computer aided programs. Theoretical calculations have been widely used with experimental calculations since 1950s and, together with evolving technology, offer more accurate and effective results to users. In this present study, we reported synthesis and experimental characterization by elemental analysis and spectroscopic and thermal investigation (FT-IR, UV-Vis spectroscopy and TGA/DTA analysis) of Diaquabis(2-fluorobenzoato-κO)bis(N,N'-diethylnicotinamide-κN')cobalt(II). Additionally, FT-IR and UV-Vis spectra were simulated by means of DFT calculations by using the Gaussian09 program package. The experimental and theoretical spectroscopic data were also compared.

Key Words: Ni(II), 3-fluorobenzoic acid, DFT Calculations, FT-IR Spectroscopy, UV-Vis Spectroscopy

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DIAGNOSIS OF DIABETIC RETINOPATHY USING MACHINE LEARNING TECHNIQUES

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Abstract -The complication of diabetics causes an illness known as Diabetic Retinopathy (DR). It is very widespread among middle-aged and elder People. As the diabetes progresses, the vision of patients may start to deteriorate and cause DR. People lose their eye visions as a result of this illness. In order to cope with DR, an early detection is needed. Patients will have to be checked by doctors regularly which is a waste of time and energy. DR can be divided into two groups; one is non-proliferative (NPDR) while the other is proliferative (PDR).

In this study, machine learning (ML) techniques are used in order to diagnose DR at an early stage. These are ANN, SVM, Bayesian Classification and Clustering. These techniques will be evaluated and compared with each other to choose the best methodology.

A total of 300 fundus photographs are processed for training and testing. The features are extracted from these raw images using the image processing techniques. After an experiment, it is concluded that ANN has an accuracy of about 89%, Bayes Classifications 94%, SVM 97% and Clustering 87%. The preliminary results prove that SVM is the best technique for early detection of DR.

Keywords: Diabetic Retinopathy, Fundus Images, Retina, Support vector machine, clustering.

INVESTIGATION OF TRANSPORT MECHANISM IN MESOSPHERIC WATER VAPOR BY USING 3D TEM EQUATIONS

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Abstract

Mesosphere is the middle atmospheric layer between 80-105km. The planetary-scale stationary waves, which creates the transport mechanism, are regular features of the wintertime middle atmosphere. The 3D transport of mesospheric water vapor (H₂O) is investigated using general circulation model simulations with interactive chemistry (HAMMONIA) for winter. We also use H₂O distributions and balanced wind fields derived from Aura/MLS satellite data. The time-mean mass circulation and tracer transport of the middle atmosphere, also known as the Brewer-Dobson circulation, is usually examined by the zonal-mean (2D) residual circulation, which combines the 2D Eulerian and eddy time-mean flow as a function of the zonal-mean eddy heat fluxes. The picture of the evolution of the 2D residual circulation over the last decades is still uncertain, because the calculated changes of both the 2D residual circulation and the 2D wave driving strongly differ among the models used in the assessments, as well as between the models and assimilations. Local changes in the mass circulation might be stronger and more significant than identified ones by the 2D approach, but examinations of the three-dimensional (3D) residual circulation are very sparse. We showed that the large-scale planetary waves (wavelengths greater than 1000km), produce much of the observed stationary wave-1 pattern of the lower mesospheric H₂O (about 75km). Furthermore during northern hemisphere winter we find that the stationary waves in water vapor shows a pronounced zonal asymmetry, including cross-polar residual flow patterns in both the stratosphere and mesosphere, and down-welling in the centre of the polar vortex approximately located over North-West Siberia.

Keywords: mesosphere, water vapor, transport, middle atmosphere

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