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# Abstracts

Sl. No.	Titles	Abstract
01	Analysis of Decision Diagram based Methods for the Calculation of the Dyadic Autocorrelation	<p>This paper discusses in a tutorial way, methods for calculation of the logic autocorrelation of switching functions. We compare calculation over function vectors and decision diagrams and perform an experimental analysis of performances of these methods with an emphasis on their time complexity.</p>
02	A Neural Network Approach To Multifacility Location Problem Under Semi-Open Rectangular Area Constraint	<p>The Multifacility Location problem is an extension of the singlefacility location problem. In the case of multifacility location problem we shall be interested in finding the locations of multiple new facilities with respect to multiple existing facilities in a given environment. A detailed literature survey reveals that a little attention has been paid to problem involving area constraints even though, perhaps every location problem is inherently bound by area constraint of some sort or the other. This has motivated us to take care of the area constraint aspect of multifacility location problem in the present study. The area constraint for the multifacility location problem can be of (i) Triangular, (ii) Circular, (iii) Semi-Open Rectangular, etc. in shape. The scope of our present study is limited only to Semi-Open Rectangular area constraint which is an extension of our work under triangular area constraint submitted to IJSCI for publication. Mathematical formulation of multifacility location problem with Semi-Open Rectangular area constraint has been considered and the solution has been obtained by using Kuhn-Tucker theory. The mathematical solution procedure is very complex and time consuming. Hence, an attempt has also been made to get the solution of a complex, constrained multifacility location problem under Semi-Open Rectangular area using Artificial Neural Networks (ANN).</p>
03	Fast Collision Detection for Virtual Environment Using Improved Ray Tracing	<p>The problem of Collision detection or interference determination between two or more objects is fundamental to virtual environment in which objects are involved in motion. We present an accurate collision detection algorithm, with complexity of <math>O(n \log n)</math> where <math>n</math> represents number of objects. The algorithm can be used directly for convex, non-convex objects and objects undergoing arbitrary motion. The algorithm works efficiently in virtual environment by reducing number of objects that need to be checked accurately for interference by distance check and sphere check filtering techniques; objects that remain after pruning stage are then accurately checked for interference using ray tracing. The algorithm uses sphere as bounding volume to be pre-computed and updated. The algorithm is efficient and simple to implement can be used in many applications, which involve objects under motion.</p>
04	Face Recognition Using Continuous Orthogonal Moment And Nonlinear Component Analysis	<p>The emergence of global network access has promoted increased chances of malicious attack &amp; intrusion. Passwords and personal identification numbers has been known as the most commonly safeguard measure against these intrusions, but designing a high security user authentication system still remains an unsolved problem. Thus it gives rise to the need for a more secured and reliable authentication method in accessing computer-based systems. It is this aim of our research to propose the design and the development of a Face Recognition system for user authentication using combination of different face classifiers, which can integrate the complementary information leading to improved classification accuracy. We use feature invariant approach for localizing the face. The system extracts the facial features using two different feature domains, Pseudo Zernike Moment Invariant [PZMI] that is invariant to shift, rotation and scale and a nonlinear projection method called Curvilinear Component Analysis (CCA), which can effectively reduce the original dimension of the image to the intrinsic dimension. The intrinsic dimension is estimated using Fractal based dimension called Correlation dimension. The extracted features are combined and given to the feedforward neural network for classification. Our system is giving a recognition</p>

rate of 97% which is invariant to size and tilt of the face, invariant to natural lighting conditions and able to produce the results within a reasonable time. The recognition rate is improved even though the subjects are increased. The test performance suggests that the proposed method can be used in medium / high security network environment for user authentication

05 Three Dimensional Concept-Based Indexing For XML Documents

XML (eXtensible Markup Language) is a general-purpose markup language and it is used to facilitate the sharing of data across different information systems. As more and more sensitive information gets stored in the form of XML, sophisticated indexing schemes are required to speedup document storage and retrieval. In keyword based information retrieval, a document can be viewed as meaningless pieces of text and it is identified by a set of keywords. Keyword based search does not care about the actual meaning of the terms present in the documents. Keyword based retrieval can encounter two difficulties such as synonymy and polysemy problems. These problems arise from the fact that the ideas in a document are more related to the concepts described in them than the words used in their description. Thus, effective retrieval methods should match the concept present in the query to the concepts present in the documents. In concept based indexing the documents are viewed as collection of concepts and indexed according to the meaning rather than terms. This will require construction of concept hierarchy which consists of collection of concepts and their interrelationships. The proposed system uses concept hierarchy to extract concepts from the XML document. The semantic importance of each term present in the concept is calculated and it is represented in 3D Lattice Cube. But this one is sparse and not efficient in terms of space and access time. To improve the performance of the information retrieval, K-Means clustering is employed to generate several smaller lattice cubes that are not sparse. Now the queries can be directed to appropriate cluster and also querying is faster in a smaller lattice cubes.

06 Control of a Non-Linear Process by Modeling PI and PD type Fuzzy, Self-Tuning Fuzzy and Neuro-Fuzzy Controller

In this paper we proposed robust scheme for Fuzzy Controllers (FC's), Self-Tuning Fuzzy Controllers (STFC's) and Neuro- Fuzzy Controllers (NFC's) to control the non-linear process. Then Proportional-Integral and Proportional-Derivative type of these controllers are applied to a typical dynamic non-linear system for analysis and comparative study. Especially the performances of the proposed NFC's are compared with those of the STFC's and conventional FC's. The different performance measures such as rise time ( $t_r$ ), settling time ( $t_s$ ), peak overshoot (%  $M_p$ ), integral absolute error (IAE) and integral-of-time multiplied absolute error (ITAE) are taken for comparative study. In this work, observed a remarkably improved performance of neuro-fuzzy controller compare to fuzzy controller. The self-tuning fuzzy controller is designed by adding a fuzzy gain-updating factor, whereas used back propagation technique to develop neuro-fuzzy controller.

07 Analog Based Studies On Human Leukocyte Elastase Inhibitors To Design Novel Lead Compounds For The Treatment Of COPD

Human leukocyte elastase is a serine protease that is released from leukocytes upon inflammatory stimulus. HLE is thought to aid in the migration of neutrophils to extra vascular compartments through degradation of a number of structural proteins including elastin. Normally this enzyme is kept in check by indigenous inhibitors, most notably alpha-1 proteinase. However alpha-1 p1 may be damaged by cigarette smoking, or because of genetic defect, produced in insufficient quantities, in either case, balance between HLE and alpha -1 p1 is upset which can lead to tissue damage which manifests itself in diseases such as chronic obstructive pulmonary diseases, asthma, emphysema ,cystic fibrosis, and adult respiratory distress syndrome. Consequently there has been concerted effort to develop low molecular weight inhibitors of HLE to treat these disease states. We have performed Pharmacophore and 3D-QSAR studies for developing novel HLE inhibitors using the Catalyst 4.7 and Cerius2 program suite. QSAR equations has been generated for 58 HLE inhibitors employing Molecular Field Analysis (MFA) as well as Receptor surface Analysis (RSA) using Genetic function approximation (GFA) as regression method. The best equations with training set consisting 40 molecules, produced  $r^2$  value of 0.845 and  $r^2_{cv}$  value of 0.839 in MFA-model and  $r^2$  value of 0.880 &  $r^2_{cv}$  of 0.856 in the RSA-model. For the 18 test set molecules predicted activities have

- correlation of 0.845 and 0.880 for MFA and RSA with observed activities. Pharmacophore models were generated using 21 molecules as training set. The best quantitative pharmacophore model consists of hydrogen bond acceptor, hydrophobic aliphatic and hydrophobic aromatic feature. For the training set the accuracy in predicting active and inactive compounds was 80%. The best pharmacophore hypothesis yielded a RMS deviation of 1.06 and a Correlation coefficient of 0.943 with a Cost difference (Null cost minus Total cost) of 79.02. The obtained pharmacophore models were validated on 50 test molecules to give correlation value of 0.846.
- 08 Mining K-High Frequent Closed Patterns (HFCP)
- Mining frequent patterns is considered as an important problem in data mining applications like discovery of association rules, episodes. Various algorithms have been proposed for solving this problem. All these techniques have the overhead of the specification of precise minimum support value for generating K-high frequent patterns successfully. This paper proposes a new mining approach for determining closed frequent itemsets called *Mining 'k' high frequent closed itemsets* of length no less than  $min\_l$ , where  $k$  is the desired number of frequent closed itemsets to be mined, and  $min\_l$  is the minimal length of each closed frequent itemset. Starting at  $min\_support = 0$  and by making use of the length constraint,  $min\_l$ , the value of  $min\_support$  can be raised dynamically. HFCP reduces the number of tree traversals by adopting a new structure for header table. The closed frequent patterns are stored in the Result Hash Table in support descending order. HFP has high performance and scalability compared to previous techniques.
- 09 Spatial Load Forecasting
- Utilities are required to provide reliable power to customers. In the design stages, utilities need to plan ahead for anticipated future load growth under different possible scenarios. Their decisions and designs can affect the gain or loss of lakhs of rupees for their companies as well as customer satisfaction and future economic growth in their territory. The reliability, efficiency, and economy of a power delivery system depend mainly on how well substations, transmission lines, and distribution feeders are located within the utility service area, and how well their capacities match power needs in their respective localities. Often utility planners are forced to commit to sites, rights of way, and equipment capacities years in advance. A necessary element of effective expansion planning is a forecast of where and how much demand must be served by the future T&D system, a forecast with sufficient accuracy and detail to allow meaningful determination of sites and sizes for future substation, transmission, and distribution facilities. This paper proposed a scheme that can provide alternatives to distribution planners for spatial load forecasting.
- 10 Image Compression Using Memetic Algorithm Based Vector Quantizer
- Vector quantization (VQ) is widely exploited for many applications especially in the fields of computer graphics and image processing. In VQ, minimization of Mean Square Error (MSE) between code book vectors and training vectors is a non-linear problem. Traditional LBG types of algorithms used for designing the codebooks for Vector Quantizer converge to a local minimum, which depends on the initial code book. Memetic algorithms (MAs) are population-based meta-heuristic search approaches that have been receiving increasing attention in the recent years. These algorithms are inspired by models of natural systems that combine the evolutionary adaptation of a population with individual learning within the lifetimes of its members. It has shown to be successful and popular for solving optimization problems. In this paper we present a new approach to vector quantization based on memetic algorithm. Simulations indicate that vector quantization based on memetic algorithm has better performance in designing the optimal codebook for Vector Quantizer than conventional LBG algorithm. The Peak Signal to Noise Ratio (PSNR) is used as an objective measure of reconstructed image quality
- 11 Hybrid Concatenated Space-Time Coding Over Rayleigh Flat Fading Channel
- Two outstanding examples of transmit diversity schemes for the multiple-antenna flat fading channel are space-time block codes (STBC) and space-time trellis codes (STTC). In this paper, we propose a concatenation scheme, where we extract some advantages of both STBC and STTC for significant performance improvement. The use of space-time trellis code as outer code is aimed mainly to improve the power

efficiency and the space-time block code as inner code for its reduced complexity. The hybrid concatenation scheme gives an improved coding gain as well as diversity gain compared to a simple space-time code with multiple antennas. The performance of the scheme is demonstrated by simulation results. The achievable performance of the concatenated scheme for 4PSK modulation with varying trellis states is studied along with the performance of (STT) codes and (STB) codes in the context of schemes having an effective throughput of 2 bits/symbol (BPS) and 3BPS. It is shown that the concatenated space-time coding outperforms space-time block coding and space-time trellis coding under the same spectral efficiency, trellis complexity and signal constellation.

The purpose of this section is to study constructive signal processing systems in the framework of a *constructive logic* introduced by Markov [40], [41], [42], [43], [44], [45], [46]. This constructive logic is built on a *hierarchical system of languages* denoted by  $\mathcal{L}_\alpha: \alpha = 0, 1, 2, 3, 4, 5, \dots, \omega, \omega$ , whose main constituents are *alphabets*, *words* and *normal algorithms*. We first present a summary of the basic notions of this logic that are relevant for us and then introduce a theory  $\text{Th}(\mathfrak{R})$  for constructive signal processing. In later sections, we make use of this theory in the study of constructive systems in terms of homomorphisms and extended topological filters.