

# IJSCI

## INTERNATIONAL JOURNAL OF SYSTEMICS, CYBERNETICS AND INFORMATICS (July 2006) Table of Contents

Titles	Page Number
Action Planning In Multiagent Systems <i>S. N. Vassilyev, A. V. Davydov, A. K. Zherlov, N. N. Maksimkin</i> .....	009
Particle Filter for Identification of Parametric Space-Variant Blur <i>S. Ibrahim Sadhar, A. N. Rajagopalan</i> .....	013
Induction of Weighted and Interpretable Fuzzy Classification Rules for Medical Informatics <i>Rajen B. Bhatt, M. Gopal</i> .....	020
Generation of Derivationally Continuous, Smooth, and Fair Triangular Elements for Open and Closed Solid Surfaces <i>R. Sharma, O. P. Sha</i> .....	027
Multi-user Detection for CDMA Channels: Log Likelihood Ratio Based Approach <i>R. Radhakrishnan, K. R. Shankarkumar, A. Ebenezer Jeyakumar</i> .....	041
Performance Evaluation of a Novel Cluster Based Hybrid Key Management Scheme for Secure Routing in MANETs <i>P. Ramamoorthy, A. Shanmugam, S. Sangeetha</i> .....	047
Effective Data Mining Using Neural Networks with Instance Typicality <i>Shirish S. Sane, Ashok A. Ghatol</i> .....	053
Signal Processing Considerations of Deoxyuridine 5'-triphosphate nucleotidohydrolase (duTPase) Gene <i>P. Babita Naidu, Srihari Priya Patra, B. Rajasekhara Reddy, E. G. Rajan</i> .....	060
Software Project Management Manpower Modeling: A System Dynamics Approach <i>V. B. Gupta, Kumar Saurabh, Haragopala Pamula</i> .....	066
Normal Algorithms For Implementing Nonnumerical Signal Processing Operations Lecture Series-3 <i>E. G. Rajan</i> .....	072

# Abstracts

Sl.No.	Title of the paper	Abstract
01	Action Planning In Multiagent Systems	<p>This paper describes the facilities for intelligent control of underwater and other moving objects and their groups. An approach to devising the upper level of control systems for the said objects is developed. Action planning automation problems, including in the mode of cooperative mission performance, are considered.</p>
02	Particle Filter for Identification of Parametric Space-Variant Blur	<p>The inverse problem of space-variant blur identification given the input image and the degraded output image is known to be ill-posed. In this paper, a new method is proposed to estimate space-variant blur for a class of systems whose blurring functions can be parameterized. These include the Gaussian, the uniform, and the cylindrical point spread functions which are commonly used in most works. The main contribution of this paper is the development of a unified recursive framework for space-variant blur identification using the particle filter. For well-posedness, a smoothness constraint is enforced on the spatial distribution of the blur parameter. The prior and posterior probability distributions of the samples of the blur parameter are arrived at by propagating them through an appropriately derived state model and the given measurement model. The weights of the samples thus computed are used to arrive at the estimates of the blur parameter. The method is validated by demonstrating its performance on real images degraded by space-variant Gaussian blur, uniform 1-D motion blur and cylindrical blur.</p>
03	Induction of Weighted and Interpretable Fuzzy Classification Rules for Medical Informatics	<p>In this paper, rough set driven fuzzy tree growing algorithm is proposed to extract interpretable fuzzy classification rules from medical datasets. Each proposition of rule antecedent has been weighted to quantify its importance in specific rule. The concept of compact computational domain of fuzzy-rough sets has been utilized to make the algorithm computationally efficient on larger training patterns. Proposed algorithm is then experimentally compared with fuzzy-ID3 on various well known medical datasets in terms of accuracy, speed, and tree size.</p>
04	Generation of Derivationally Continuous, Smooth, and Fair Triangular Elements for Open and Closed Solid Surfaces	<p>Discretization of open and closed solid surfaces is an essential part of any CAD/CAM tool for effective and accurate geometric representation. Most of the existing techniques deal with generation of flat rectangular or triangular elements (i.e. <math>C^0</math> continuous), using tessellation over B-spline or NURBS surfaces defined over rectangular domain using rectangular patches, and thus may suffer from geometric and derivational inconsistencies in case of triangular domains. This paper explores the application of the possibility of the generation of derivationally continuous, smooth, and fair triangular elements using piecewise polynomial parametric surfaces which interpolate prescribed <math>\mathfrak{R}^3</math> scattered data using spaces of parametric splines defined on <math>\mathfrak{R}^2</math> triangulations for open and closed surfaces. The method is based upon minimizing a physics based certain natural energy expression (i.e. as a fairness norm) over the parametric surface. The geometry is defined as a set of stitched triangles prior to the generation of triangular elements. As for derivational continuities between the two triangular patches <math>C^0</math> or <math>C^1</math> continuity or both as per the requirements have been imposed. The <math>C^2</math> (approximate) continuity can also be achieved with the addition of a penalty term, and it has been also considered as a smoothness norm. The problems involving triangular element generation for flat, and non-flat plates, and closed solid surface have been presented.</p>
05	Multi-user Detection for CDMA Channels: Log Likelihood Ratio Based Approach	<p>In this paper, a computationally efficient and low complexity method for Multi User Detection (MUD) of DS-CDMA signal is proposed. Direct Sequence-Code Division Multiple Access (DS-CDMA) has been found to be attractive in applications such as Wireless Networks, Broad band local access and Cellular Telephony. The conventional DS-CDMA detector follows single user detector strategies in which each user is separately detected and more over which exhibits anomalous behaviour. A better way to improve detection of each individual user is Multi User detection. The reliability of a decision increases with increasing magnitude of Log Likelihood Ratio (LLR), as a result the error propagation associated with a wrong decision and the resulting error probability for the remaining user can be minimized. The proposed algorithm is efficient for both coded and uncoded signals. The performance of the detector is analysed in terms of BER and SNR with low and high correlation. Simulation results show that the performance of the proposed algorithm is superior when compared with the existing multiuser detection scheme under various situations. A brief description of optimal MUD schemes is given and implementation of some low complexity sub optimal detector also described.</p>

06	Performance Evaluation of a Novel Cluster Based Hybrid Key Management Scheme for Secure Routing in MANETs	Ad hoc networks are a new wireless networking paradigm in which mobile hosts rely on each other to keep the network connected without the help of any pre-existing infrastructure or central administrator. This paper addresses key management, which is one of the most challenging tasks in developing security solutions for MANETs. The various steps involved in the project are clustering, key generation, determination of keys for secure symmetric and asymmetric communication and building a distributed certificate authority for secure routing. Clustering divides the network into non-overlapping clusters. The key generation protocol is based on GDH.2 algorithm. Decentralization of the certificate authority is done using (K, N) threshold cryptography. Simulation results show that the hybrid solution provides a significant improvement in the performance of the key management solution in terms of throughput.
07	Effective Data Mining Using Neural Networks with Instance Typicality	Concept of instance typicality can be used not only to build compact yet accurate models but also to build incremental models. It can easily be incorporated with any kind of classifier, however till date, only instance-based classifiers make use of it. This paper deals with the novel method of implementing instance typicality in terms of values at the outputs of neurons in the output layer of a neural network classifier to i) select best set of training instances to build compact and accurate classification models ii) to select best set of unseen instances and iii) to build models with incremental learning ability. Experimental results show that the method is efficient.
08	Signal Processing Considerations of Deoxyuridine 5'-triphosphate nucleotidohydrolase (dUTPase) Gene	duTPase plays a significant role of the enzyme in DNA metabolism, and it was proposed as a novel target for anticancer drug design. It has been shown that resistance to the widely used antineoplastic drug fluorodeoxyuridine correlates to an elevation of dUTPase activity, raising the hope that dUTPase inhibitors may improve therapeutic effectiveness. In fact, membrane-permeable substrate-analogous inhibitors of dUTPase were demonstrated to be efficient against human cancer cells in vitro. This paper describes the use of signal processing concepts in analyzing such an important gene.
09	Software Project Management Manpower Modeling: A System Dynamics Approach	Software development is a complex activity that often exhibits counter-intuitive behavior, in that outcomes often vary quite radically from the intended results. Assigning more programmers to a project running behind schedule will make it even later, due to the time required for the new programmers to learn about the project, and the increased communications overhead. When N people have to communicate among themselves (without a hierarchy), as N increases, their output M decreases and can even become negative i.e. the total work remaining at the end of a day is greater than the total work that had been remaining at the beginning of that day, such as when many bugs are created. This paper presents a system dynamics model of software development, and shows an example of where adding additional manpower to a project can lead to an increased overall delay in the project delivery time.
10	Normal Algorithms For Implementing Nonnumerical Signal Processing Operations Lecture Series-3	This paper discusses certain string manipulating techniques, which could be used in constructing normal algorithms for signal processing purposes. In the course of constructing normal algorithms for implementing various traditional signal processing operations, the author has found that any desired normal algorithmic signal processing system could be constructed with the help of a minimal set of certain basic and advanced string manipulation techniques.