

IJSCCI

INTERNATIONAL JOURNAL OF SYSTEMICS, CYBERNETICS AND INFORMATICS

(January 2009)

Table of Contents

Titles	Page Number
How To Constructivize Brouwer's Fixed Point Theorem <i>Dirk van Dalen</i>	11
Exploring Pre A*- Algebras As A New Paradigm <i>J.Venkateswara Rao, K. Srinivasa Rao, T. Nageswara Rao, R.V.N. Srinivasa Rao</i>	14
Optimal Fuzzy System Design Using A Real-Coded Genetic Algorithm With Imbedded Constraints <i>R. Sharma, O. P. Sha</i>	20
Generation Of Ternary Pulse Compression Sequence And Its Sidelobe Reduction Techniques <i>J. B. Seventline, D. Elizabeth Rani, K. Raja Rajeswari</i>	27
Torque Ripple Minimization In Direct Torque Control Using Fuzzy Logic For Switched Reluctance Motor Drive <i>P. Veena, R. Jeyabharath, M. Rajaram</i>	32
Fuzzy Model Reference Learning Controller For Pitch Control System of an Aircraft <i>P. S. Khuntia, Debjani Mitra</i>	36
Enhanced Models For Terrain Modeling <i>Josephine Prem Kumar, D. Jawahar, K. V. Ramakrishnan</i>	42
Comparative Analysis On Remote Sensed Data Fusion <i>S. Senthilkumar, S. Muttan</i>	49
Object Tracking And Servo Control Of Autonomous Mobile Robot <i>G. Sathya, Manish Prateek</i>	53
Real-Time Machine Vision Based Robot <i>G. Sathya, G. Ramesh Chandra</i>	61
Pattern Generation (Lecture Series – 13) <i>E. G. Rajan</i>	71

Abstracts

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Abstract

01 How To Constructivize
Brouwer's Fixed Point
Theorem

It is by now common knowledge that Brouwer gave mathematics in 1911 a miraculous tool, the fixed point theorem, and that later in life, he disavowed it. It usually came as a shock when he replied to the question “is the fixed point theorem correct?” with a point blank “no”. This rhetoric exchange deserves some elucidation. At the time that Brouwer did his revolutionary topological work, he has suspended his constructive convictions for the time being. He was well aware that he was using the principle of the excluded middle, indeed in [1], p. 950, he remarked that “In my philosophy-free mathematical papers I have regularly used the old methods, while at the same time attempting to deduce only those results, of which I could hope that they would find a place and be of value, if necessary in a modified form, in the new doctrine after the carrying out of a systematic construction of intuitionistic set theory”. And in the case of the fixed point theorem we are presented with exactly such a result. From the intuitionistic point of view the theorem is not correct because the fixed point that is promised can in general not be found, that is to say, approximated.

02 Exploring Pre A*- Algebras
As A New Paradigm

This paper is study on algebraic structure of Pre A*- algebra and we essentially prove that the relation $\theta_a = \{(x, y) \in A \times A / a \wedge x = a \wedge y\}$ is a congruence relation on Pre A*- algebra. We define the ternary operation $\Gamma_x(p, q) = (x \wedge p) \vee (x \% \wedge q)$, and obtain the important properties. We also prove that if A is a Pre A*-algebra and $x \in A$, then $A_x = \{s \in A / s \leq x\}$ is a Pre A*-algebra under the induced operations and A_x is isomorphic to a quotient algebra of A. i.e., $A / \theta_x \cong A_x$

03 Optimal Fuzzy System
Design Using A Real-Coded
Genetic Algorithm With
Imbedded Constraints

This paper presents optimal design of fuzzy systems with imbedded constraints using real-coded genetic algorithms (RGAs); i.e., automatic design of both fuzzy membership functions and rules subject to certain constraints. In this paper, a real-coded GA is developed, in which chromosomes are represented as real vectors. The constraints associated with the fuzzy systems are explicitly considered and satisfied during the training process of the fuzzy systems by the RGA. The satisfaction of the constraints is done primarily by using pre-selected genetic operators, which are designed based on the coding structure and the required characteristics of the fuzzy systems. To demonstrate the industrial application, we consider the optimal design of three fuzzy systems (i.e. fuzzy decision modelers FDMs) with RGAs to model and forecast economic activities in the container ship business of maritime transportation. The effects of the RGA's control parameters on the performance of the RGA, including the crossover and mutation rates, multiple mutation, and selection pressure, are explored in this paper. The results show that the RGAs are efficient in developing appropriate FDMs with good modeling and forecasting capabilities.

04 Generation Of Ternary Pulse
Compression Sequence And
Its Sidelobe Reduction
Techniques

This paper describes a novel procedure for obtaining ternary sequences with good autocorrelation properties applicable for radar pulse compression. Pulse compression technique giving low range side lobes is employed in radar and sonar to achieve good range resolution and accuracy compatible with a high detection capability while maintaining the low average transmitted power. The ternary sequences are derived from the logistic-map equation based on chaotic theory. The performance parameter of the proposed logistic map based ternary phase code (LMTC), which is the Peak Side Lobe Ratio (PSLR), has been estimated. The properties of LMTC are very similar to those of the random ternary codes. However, the generation of LMTC is much simpler, and the available LMTC is virtually infinite and not limited by the length of code. This paper also presents application of window functions and adaptive filtering based on least mean square (LMS) algorithm and Recursive least squares algorithm(RLS) in side lobe suppression for radar pulse compression.

- 05 Torque Ripple Minimization In Direct Torque Control Using Fuzzy Logic For Switched Reluctance Motor Drive
In the direct torque control of switched reluctance motor, flux and torque are controlled directly by the selection of switching vector. However, the selected vector is not always the best one. In this paper Fuzzy logic approach is used to select the switching vector hence the torque and flux ripple is reduced and also no flux dropping caused by sector changes. This new technique implemented in real time with low cost DSP controller can give fast torque response.
- 06 Fuzzy Model Reference Learning Controller For Pitch Control System of an Aircraft
In this paper Fuzzy Model Reference Learning Controller (FMRLC) is designed for a pitch controller of an aircraft to obtain the desired pitch angle as required by the pilot. This controller utilizes a learning mechanism, which observes the plant output and adjusts the rules in a direct fuzzy controller, so that the overall system behaves like a "reference model" which characterizes the desired behavior. The performance of the FMRLC is demonstrated by simulation for various conditions with change in the aircraft dynamics caused due to change in speed of the aircraft and sensor noise.
- 07 Enhanced Models For Terrain Modeling
Terrain modeling is the study of ground-surface relief and pattern by numerical methods. It has become integral to ground engineering, hydrology, tectonics, oceanography, climatology, and geo-hazard assessment. Terrain data is used in a wide variety of applications such as earthworks, excavations, roads, pipelines, flood analysis, simulation, perspective views, fly-through, radio network planning, etc. This paper discusses the special requirements of terrain modeling. It is assumed that we have acquired data in a suitable form, which allows us to define the surface on a computer. This usually starts as a series of points lying on the surface and stored as x, y, z triples. This digitized data transformed into a Triangulated Irregular Network is available. The paper describes algorithms that can be used to improve the terrain models. A mesh must conform to the object or domain being modeled. The important issues in the triangulation process are the shape and size of the elements i.e. the triangles. These issues have two different effects on the triangulation. Small densely packed elements offer more accuracy than larger sparsely packed elements. However, the time required to construct and process a triangulation is proportional to the number of triangles. Hence selecting an element size entails trading off speed and accuracy. Also, models with very small angles cause problems; and are therefore to be avoided. The algorithms have been used for surface modeling with success. The surface model is output as coordinates of triangles. Results indicate that the processed mesh represents a given surface better. The algorithms are fast and robust. They readily lend themselves to post-processing of meshes such as grid and contour generation, automatic traverse drawing generation, longitudinal profile generation, cross-section, volume calculation etc.
- 08 Comparative Analysis On Remote Sensed Data Fusion
Extracting more information from multi source images is an attractive thing in remotely sensed image processing, which is recently called data fusion. There are many image fusion methods so far, such as IHS, PCA, WT, GLP etc. Among these methods WT preserve more image spectral characters than others and using qualitative and statistical data method MPCA. So here we adopt both wavelet and MPCA method (as it is proposed to show the better method which gives improved results in surveillance and navigation) by using wavelet analysis the images are decomposed into low and high frequency parts and then using different fusion rules, the low frequency parts alone are fused while the high frequency information such as edges, borders, corners etc. are unpreserved. So the resultant image is not accurate. Here we adopt a novel approach to decompose the original images into high and low frequency parts to the smallest pixel (to get high resolution) and then fuse both the parts separately using different fusion rules to get an accurate and high resolution image with greater details. The results are applied to different fields and verified on the basis of qualitative and quantitative analysis.
- 09 Object Tracking And Servo Control Of Autonomous Mobile Robot
The work presented in this paper is concerned with the problem of finding a feasible method for real-time tracking of a target (object) by an Autonomous Mobile Robot (AMR) using Machine Vision, Image Processing and Pattern Recognition and Tracking techniques. The major objective of the work reported in this paper is to develop a system for 'tracking of a specific object based on colour information' and it is achieved using a Real-Time Machine Vision Based Tracking Robot system consisting of a Parallax Boe-Bot Robot Kit, Basic Stamp 2 microcontroller, Board of Education, Robot's aluminium

body, two Parallax servo motors, four 1.5V AA sized batteries, a RS232 serial cable, and a wired USB web camera. The software tools that are used in developing this system are Visual Studio .NET 2008 with MSDN, DirectShow.NET API with AForge.NET wrapper, Webcam device driver, and Driver for USB to RS-232 converter. This paper provides a comprehensive composition of the results achieved due to a rigorous research work carried out by the author from January 2008 to March 2009 as a B.Tech project associate in Pentagram Research Centre Pvt. Limited, a research company of Hyderabad, India.

10 Real-Time Machine Vision
Based Robot

This paper discusses the practical implementation of a real-time machine vision based autonomous mobile robot. The relevant image processing concepts are implemented programmatically and the control of the servo motors is done using the Basic Stamp 2 microcontroller. Some minor concepts regarding the serial-port or RS-232 communication, and block diagram are discussed.

11 Pattern Generation
(Lecture Series – 13)

A cellular automaton evolves in discrete time steps, with the value of the variable at one site being affected by the values of the variables at sites in its neighborhood on the previous time step. The site-values corresponding to a configuration at a particular time step, say t , are updated, all at once, based on the values in their neighborhood, according to a definite set of updating rules. The resulting configuration at time step $t+1$, is the evolved version of the one at time step t . The initial configurations of a cellular automaton are broadly classified into two types: (1) Single-site seed configuration and (2) multi-site (say L sites) arbitrary configurations. The pattern generated by a cellular automaton evolving from a single-site seed configuration or from a multi-site arbitrary configuration, indicates the behaviour of the automaton.