

Automation	147
VIJAYNT AGARWAL AND ALOK PRAKASH MITTAL Mathematical Modeling of Machine Learning technique for the Solution of inverse harmonic non-linear equations	149
Computer Science	159
DOMOKOS JÓZSEF AND TODEREAN GAVRIL Continuous Speech Phoneme Recognition Using Dynamic Artificial Neural Networks . . .	161
BÉLA GENGE AND IOSIF IGNAT Syntactic Sequential Composition of Security Protocols	169
Mathematics	179
ANA MARIA ACU AND FLORIN SOFONEA Monosplines and Quadrature Formulas	181
OCTAVIAN AGRATINI AND SADDIKA TARABIE On Approximating Operators Preserving Certain Polynomials	191
FRANCISCO AGUILERA, DANIEL CÁRDENAS-MORALES, PEDRO GARRANCHO AND JUAN MARÍA HERNÁNDEZ Quantitative Results in Conservative Approximation and Summability	201
DORIN ANDRICA AND IOANA-CLAUDIA LAZĂR Discrete Morse Theory and Curvature Properties of Simplicial Complexes	209
LUCIA RODICA BLAGA, LIANA LUPȘA AND LUCIANA NEAMȚIU Model of a Dynamic Lexicographic Bi-criteria Transport Problems	221
EUGEN DRĂGHICI Inequalities and Subclasses of Analytic Functions in the Complex Unit Disc	229
ADRIAN HOLHOȘ The Rate of Convergence of Positive Linear Operators in Weighted Spaces	239
DANIELA INOAN Some Remarks on Several Pseudomonotonicity Notions in the Context of Variational Inequalities	247
MIRCEA IVAN On the Iterates of Some Positive Linear Operators	255
ZOLTÁN MAKÓ AND FERENC SZENKOVITS Connections Between the Weak Stability Boundary and the Capture Effect in the Elliptic Restricted Three Body Problem	259
VASILE MIHEȘAN On a General Class of Beta Approximating Operators of First Kind	267
DOREL MIHEȚ The Stability of the Jensen Functional Equation in Non-Archimedean Fuzzy Normed Spaces	283
ALEXANDRU I. MITREA Double Condensation of Singularities for Interpolating Operators Associated to the Sturm-Liouville Node Matrix	293
ION MARIAN OLARU Differentiability with Respect to Parameter for the Solution of Kalecki's Model	299
IOAN RASA A Family of Sequences	305
DANIELA ROȘCA A Class of Orthogonal Matrices of Dimension Four	309
MIRCEA DAN RUS Positive Solutions for Singular Nonlinear Second-order Boundary-value Problems Via Mixed Monotone Iterative Technique	317
MARCEL-ADRIAN ȘERBAN Spaces with Perturbed Metrics and Fixed Point Theorems	323
ALINA SÎNTĂMĂRIAN A Representation and a Sequence Transformation Regarding a Generalization of Euler's Constant	335
ȘTEFAN V. ȘTEFĂNESCU Estimating the Parameters of a Circular Area	345



Mathematical Modeling of Machine Learning technique for the Solution of inverse harmonic non-linear equations

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ABSTRACT: This article proposed a new method based on the clustering technique of artificial intelligence for the inverse solution of harmonic non-linear equations. In order to understand the proposed algorithm and to show the performance, simulation study of inverse equations which is highly non-linear involving transcendental (harmonic sine and cosine) are illustrated with reference to the problems of finding association rules in the data, and of setting up appropriate classification procedures.

KEY WORDS: non-linear equations, inverse jacobian matrix, singularity, AI, clustering

RECEIVED: July 1, 2008



Continuous Speech Phoneme Recognition Using Dynamic Artificial Neural Networks

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ABSTRACT: Phoneme classification and recognition is the first step to large vocabulary continuous speech recognition. This step represents the acoustic modeling part of such a system. In hybrid speech recognition systems phoneme recognition is made by artificial neural networks (ANN's).

The main objective of this paper is the investigation of dynamic ANN's, namely the Time-Delay Neural Networks (TDNN) and Recurrent Neural Networks (RNN) - that are the most suitable for recognition of time sequences. There are presented two types of TDDN's: Focused Time-Delay Neural Networks (FTDNN) and Distributed Time-Delay Neural Networks (DTDNN) respectively and a Layer Recurrent Neural Network (LRNN).

The development of a phoneme recognizer application using dynamic ANN's for OASIS Numbers databases is also described. There are also presented the phoneme classification experiments and the results for the ANN's. Finally some conclusions are drawn based on the experimental results.

KEY WORDS: continuous speech recognition, phoneme classification, dynamic neural networks, OASIS Numbers

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Syntactic Sequential Composition of Security Protocols

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ABSTRACT: Determining if two protocols can be securely composed requires analyzing not only their additive properties but also their destructive properties. In this paper we construct an enriched protocol model for analyzing instance-related properties and a canonical model for analyzing message structure-related properties. The protocol model provides for each participant the preconditions needed to run the protocol, the effects resulted from running the protocol, the generated message components and the transmitted and received message sequences. The canonical model integrates participant knowledge in the model reducing each message component to its basic type. This allows us to conduct a syntactical analysis on the canonical model and to detect multi-protocol attacks that can be constructed by attackers in case of composed protocols. The proposed method ensures the sequential composition of protocols with the satisfaction of preconditions and non-destructive effects.

KEY WORDS: Security protocols, sequential composition, syntactic model verification.

MSC 2000: 68M12, 68Q60

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Monosplines and Quadrature Formulas

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ABSTRACT: In this paper we studied a class of quadrature formulas, with the weight function $w : [a, b] \rightarrow R$, $w(t) = (b - t)^\nu(t - a)^\nu$, $\nu \in N$, obtained by using the connection between the generalized monosplines and the quadrature formulas. For smooth functions we give some inequalities for the remainder term.

KEY WORDS: quadrature rule, numerical integration, error bounds

MSC 2000: 26D15, 65D30

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On Approximating Operators Preserving Certain Polynomials

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ABSTRACT: The paper centers around a general class of discrete linear positive operators depending on a real parameter $\alpha \geq 0$ and preserving both the constants and the polynomial $x^2 + \alpha x$. Under some given conditions, this sequence of operators forms an approximation process for certain real valued functions defined on an interval J . Two cases are investigated: $J = [0, 1]$ and $J = [0, \infty)$, respectively. Quantitative estimates are proved in different normed spaces and some particular cases are presented.

KEY WORDS: positive linear operators, Popoviciu-Bohman-Korovkin criterion, Bernstein polynomials, Szász-Mirakjan operators, Baskakov operators, polynomial weight spaces

MSC 2000: 41A36, 41A25

RECEIVED: Oct 28 2008



Quantitative Results in Conservative Approximation and Summability

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ABSTRACT: The classical Bohmann-Korovkin theorem and the subsequent quantitative version on the convergence of a sequence of positive linear operators were formulated replacing the usual convergence by the notion of almost convergence introduced by G.G. Lorentz. Later on the results were unified through the use of the summability method introduced by H.T. Bell. Our aim with this work is to present quantitative results on matrix summability for certain conservative, non necessarily positive, approximation processes.

KEY WORDS: matrix summability methods, linear operators, simultaneous approximation

MSC 2000: 40C05, 41A25, 41A28, 41A36

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Discrete Morse Theory and Curvature Properties of Simplicial Complexes

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ABSTRACT: We present a combinatorial version to the classical Hadamard's theorem which states any complete, simple connected, nonpositively curved Riemannian manifold is contractible.

KEY WORDS: finite simplicial complex, combinatorial distance, geodesic triangle, $CAT(0)$ space, $CAT(0)$ inequality, discrete Morse function, Hadamard's theorem

MSC 2000: 53C21

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Model of a Dynamic Lexicographic Bi-criteria Transport Problems

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ABSTRACT: An important problem in the management of the screening program for the breast cancer is take to the mammographies for the women who live in a given localities. From the Health Economics point of view, the problem is to plan, for each day of a given period, the number of the women, from each locality, that have to go to radiological office to make their mammography, such that the total cost of the transport be minimum.

KEY WORDS: dynamic transport problem, lexicographic multi-criteria transport problem, medico - economics problems

MSC 2000: 90C08, 90C29, 90C39

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Inequalities and Subclasses of Analytic Functions in the Complex Unit Disc

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ABSTRACT: Let Δ be the complex unit disc and A the class of all analytic functions $f \in \Delta$, which satisfy the conditions $f(0) = f'(0) - 1 = 0$. In the paper we will find some inequalities concerning expressions of $f \in A$ and of some of its derivatives (such as: $\operatorname{Re} \sqrt[n]{f'(z)}$, $\operatorname{Re} z f'(z)/f(z)$ and others, more general) in the case when f has certain geometric properties (such as: f is uniformly convex, f is quasi-uniformly starlike, f is starlike).

KEY WORDS: starlike function, convex function, uniformly starlike function, uniformly convex function, quasi-uniformly starlike function

MSC 2000: 30C45

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The Rate of Convergence of Positive Linear Operators in Weighted Spaces

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ABSTRACT: We estimate the rate of approximation of positive linear operators for unbounded functions defined on the positive semi-axis, in terms of the modulus of continuity of the first order and the rate of convergence of the function toward infinity.

KEY WORDS: weighted spaces, rate of approximation, positive linear operators

MSC 2000: 41A25, 41A36

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Some Remarks on Several Pseudomonotonicity Notions in the Context of Variational Inequalities

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ABSTRACT: We investigate in this paper different types of generalized pseudomonotonicity for set-valued mappings. We compare some of these notions, providing several simple examples and establishing a connection between algebraic and topological pseudomonotonicity. In the second part of the paper we also prove an existence result for the solution of a class of variational inequalities involving set-valued mappings.

KEY WORDS: pseudomonotone set-valued mappings, nonlinear variational inequalities

MSC 2000: 47H04, 47J20

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On the Iterates of Some Positive Linear Operators

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ABSTRACT: We study the iterates of linear positive operators $B: C[0, 1] \rightarrow C[0, 1]$ preserving affine functions and satisfying some supplementary conditions.

KEY WORDS: Linear positive operators, iterates.

MSC 2000: 41A36

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Connections Between the Weak Stability Boundary and the Capture Effect in the Elliptic Restricted Three Body Problem

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ABSTRACT: The Earth-to-Moon low energy transfers are based on the concept of weak capture at the Moon. This is a capture where the Kepler energy with respect to the Moon is nonpositive and the motion of the particle with respect to the Moon is unstable. Weak capture occurs in a special region of the phase space around the Moon called the weak stability boundary, WSB, rigorously defined by Belbruno (2004). Szenkovits et al. (2003) defined the capture effect of the planet to the captured body, as the total variation of the angle during the capture, as long as the Kepler-energy of the small body relative to the central planet is negative. In this paper the authors investigate the connections between the weak stability boundary and the capture effect. This connection is studied in the model of the elliptic restricted three-body problem, where the three bodies are the Earth, Moon and a massless particle.

KEY WORDS: weak capture, ballistic capture, weak stability boundary, capture effect

MSC 2000: 70F07, 70F15

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On a General Class of Beta Approximating Operators of First Kind

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ABSTRACT: We shall define a general linear transform, from which we obtain as special case the beta first kind transform. We obtain several positive linear operators as a special case of this beta first kind transform. We apply the beta first kind transform to Bernstein's operator B_n and we obtain different generalization of Stancu operator.

KEY WORDS: Euler's beta function, the beta first kind transform, positive linear operators

MSC 2000: 41A36

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The Stability of the Jensen Functional Equation in Non-Archimedean Fuzzy Normed Spaces

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ABSTRACT: We study the stability for the Jensen functional equation in a non-Archimedean fuzzy normed space under a triangular norm weaker than T_M .

KEY WORDS: Fuzzy stability; Jensen functional equation; non-Archimedean fuzzy normed space; countable extension of a t-norm.

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Double Condensation of Singularities for Interpolating Operators Associated to the Sturm-Liouville Node Matrix

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ABSTRACT: A theorem which emphasizes the phenomenon of the double condensation of singularities with respect to a family of interpolating operators associated to a problem of Sturm-Liouville type is proved.

KEY WORDS: Sturm-Liouville node matrix, interpolating operators, double condensation of singularities, Lebesgue functions

MSC 2000: 41A05

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Differentiability with Respect to Parameter for the Solution of Kalecki's Model

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ABSTRACT: In this paper we study date dependence for a delay equation which models a business cycle.

MSC 2000: 34K10,47H10

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A Family of Sequences

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ABSTRACT: We consider a family of sequences and - in some cases - we find the corresponding limit.

MSC 2000: 40A05

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A Class of Orthogonal Matrices of Dimension Four

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ABSTRACT: The problem of constructing a class of non tensor product two-dimensional orthogonal wavelets involves the construction of orthogonal matrices of a certain form. In this paper we determine all the orthogonal matrices of dimension 4, with $1/2$ on the first column.

KEY WORDS: Orthogonal matrices, piecewise constant wavelets.

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Positive Solutions for Singular Nonlinear Second-order Boundary-value Problems Via Mixed Monotone Iterative Technique

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ABSTRACT: The existence and local uniqueness of positive solutions to a singular nonlinear second-order Dirichlet problem are established. A fixed point technique for mixed monotone operators in partially ordered Banach spaces is used for proving the existence and uniqueness and for approximating the solution. A graphical illustration of the iterative process for approximating the solution is provided.

KEY WORDS: Positive solution; singular two-point boundary-value problem; ordered Banach space; mixed monotone operator; fixed point.

MSC 2000: 34B18 (47H10, 47H07, 45G05)

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Spaces with Perturbed Metrics and Fixed Point Theorems

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ABSTRACT: In this paper we present new technique to obtain fixed point for selfmaps on a metric space by altering distances between the points with a continuous control function. There are studied which properties have to satisfy a control function $\varphi : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ in order to preserve the metric axioms from a distance function $d : X \times X \rightarrow \mathbb{R}_+$ to the distance function $\varphi \circ d : X \times X \rightarrow \mathbb{R}_+$. Also, there are studied the conditions for function φ which preserve the Cauchy property from the metric space (X, d) to the L-space $(X, \varphi \circ d)$.

KEY WORDS: generalized metric space, altering distance, fixed point

MSC 2000: 54H25, 47H10

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A Representation and a Sequence Transformation Regarding a Generalization of Euler's Constant

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ABSTRACT: We consider a generalization of Euler's constant as the limit $\gamma(a)$ of the sequence

$$\left(\frac{1}{a} + \frac{1}{a+1} + \cdots + \frac{1}{a+n-1} - \ln \frac{a+n-1}{a}\right)_{n \in \mathbb{N}},$$

where $a \in (0, +\infty)$. We give a representation of

$$\gamma(a) - \left(\frac{1}{a} + \frac{1}{a+1} + \cdots + \frac{1}{a+n-1} - \ln \frac{a+n}{a}\right),$$

for each $n \in \mathbb{N}$, and present a linear sequence transformation for some $\gamma(a)$.

KEY WORDS: Sequence, series, convergence, Euler's constant, approximation, sequence transformation.

MSC 2000: 11Y60, 40A05, 65B05.

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Estimating the Parameters of a Circular Area

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ABSTRACT: In this paper are analysed the statistical properties for more estimators designed to evaluate the three parameters of a circular area. A Monte Carlo simulation procedure validates the theoretical results. The proposed estimators could be used successfully to estimate an unknown area in biology or demography.

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