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An Alternative Way of Weight Measurement of Hard Gelatine Capsules Using X Ray

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ABSTRACT: The production of hard gelatine capsules in pharmaceutical industry is subject of a strict 100% weight control. The goal is to recognize capsules with incorrect dosage quantities during the production, so that patients are not endangered under any production circumstances. The today's procedures for weight regulation use predominantly the gravimetric principle. Unfortunately, this cannot be always used, due to the mechanical dimensions and the requirements to the environment. The following article presents an alternative method, based on low power X-Ray, inserted in a capsule filling machine of type GKF1700.

KEY WORDS: machine GKF1700, measuring system, x-ray, Gauss filter



Hardware Concept of a Compact Microprocessor Controlled Actuator for the Packaging Industry

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ABSTRACT: Fractional small power drives are widely used today in different areas like automotive, industrial automation, or consumer products. Their employment in vehicles and automation technology rises continuously. At the same time, the increased degree of automation in the industry requires new solutions from technical designers' and developers' point of view: reduced dimensions of the assigned drives, reduced costs, and limited electric current. Latest developments of magnetic materials and control solutions lead to a continuous enhancement of the drives. This paper describes the realization of a simple, economical, and safe current supply and the implementation of hardware control functions for a 24V DC actuator, used as control drive for the automation of the mechanical format conversion of a packaging machine.

KEY WORDS: actuator FCD850, bi-directional control, microprocessor, electronic circuits

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Experimental Identification and Numerical Simulation of Thermal Processes Associated with the Furnace with Rotary Hearth

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ABSTRACT: This paper describes the procedure of experimental identification of the thermal process relative to the first sector of the furnace with rotary hearth and the numerical simulation of its evolution in time.

KEY WORDS: furnace with rotary hearth; identification; equations with partial derivatives (PDE); Taylor series

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Comparison Between Ipv4 and Ipv6 Using ICMP and FTP Protocols

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ABSTRACT: This paper presents a compared study of ICMP and FTP traffic using IPv4 and IPv6 protocol. The application generates traffic between two hosts and measures the bandwidth. The topology of the network consists of two computers that communicate through a router (they are in separate VLANs so the traffic is forced to be routed by the router). The experiment consisted in various length of the packets, different number of threads and the final result is an average of many runs so it should not be affected by other traffic. The results show a better performance using IPv6 in both protocols used (ICMP and FTP) with a significant percentage, especially in response time (ICMP). The difference begins when the size of the packet reaches 1500 bytes which is Maximum Transmission Unit used by the network.

KEY WORDS: IPv6, IPv4, transfer rate, FTP, ICMP

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Positional Suspicion Value Calculator (PSVC): A Mechanism to Assess User's Suspicion of Being in Context Honeypot

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ABSTRACT: A Context Honeypot attempts to determine whether a user is a masquerader or a bonafide user through a query-answer session using synthetic information. It aims to confirm the suspicion over a suspected user. An important prerequisite of success of context honeypot is opaqueness i.e. absence of user's suspicion that he has been directed to honeypot. In this paper we propose a methodology to quantify the suspicion, called Positional Suspicion Value Calculator (PSVC). It assigns a prior suspicion value initially to the user, when the user enters a query-session and then incrementally updates this value subsequent to each query. The updated value helps honeypot to choose appropriate synthetic information for the next query. The suspicion value at the end of the session quantifies the suspicion of the user being put in honeypot. This in turn represents loss in opaqueness of the system. We give results of experiments conducted in a medical domain.

KEY WORDS: Suspicion, Context honeypot, Synthetic information

RECEIVED: July 23, 2009



Efficient Implementation of the NIST Statistical Test Suite

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ABSTRACT: A statistical test is a type of statistical procedure that is applied to some data to determine whether the results are statistically significant. One important application of statistical testing is to evaluate the randomness of a bit sequence generated by a random number generator. The tests cannot state that a sequence is 100% random, but can reject those that are not random, based on some statistical properties of true random sequences. One of the most known suite of statistical tests for random and pseudorandom number generators was developed by the National Institute of Standards and Technology (NIST). This battery of tests contains 16 statistical tests, out of which 15 are implemented. In an attempt to improve the implementation of the NIST Statistical Test Suite, we developed a new and more efficient implementation of the tests. So far we obtained a noticeable improvement in the execution time for 10 of the tests. The increase in performance is mainly due to shifting the paradigm from a bit sequence to a byte sequence and adapting the tests accordingly. Our implementation has shown not only improvements in the execution time, but also an increase in the maximum size of the sequence to be tested. The theoretical maximum size for the NIST implementation is 256 MB (although we noticed that for some tests the maximum size of the sequence that can be actually tested is less than 256 MB). For our implementation, the theoretical maximum size of the sequence is 2^{31} GB.

KEY WORDS: Statistical testing, random number generator, NIST STS, efficient implementation.

RECEIVED: July 11, 2008



SeqPseudoRand – A Sequential Pseudo Random Number Generation System

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ABSTRACT: Although most of the Pseudo Random Number Generators (PRNG) can be easily found in various software libraries, finding an integrated application that gathers all the major families of PRNGs is hard to find. Finding an application that, in addition, allows easy access to each generator, benchmarking facilities (both time and throughput), fine tuning of the output (at the bit level), generation of repositories of random sequences, and with a user friendly graphical interface is even harder. Therefore we developed SeqPseudoRand, an integrated software system that aims at filling this gap. To our knowledge, none of the existing libraries or applications of pseudo random number generators offer such a broad range of options, and such a high degree of flexibility and integration as SeqPseudoRand offers

KEY WORDS: Pseudo Random Number Generator, sequential implementation.

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Statistical Testing of Random Number Sequences using Graphics Processing Units

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ABSTRACT: Due to the great processing power available on today's Graphics Processing Units (GPU), we studied the implementation of statistical testing algorithms for this kind of hardware. Out of the testing algorithms proposed by the National Institute of Standards and Technology, only some were suitable for implementation on GPU, due to the computational format and restrictions of the hardware. Experimental results show a significant increase in performance from the execution time point of view, especially for large amounts of input data. We estimate that both the performance and the categories of testing algorithms suitable for implementation will increase over time, as new graphics processing units generations are developed and made available. In this light, using General Purpose Graphics Processing Units for testing sequences of random numbers is a viable and promising option for future research.

KEY WORDS: statistical testing, random numbers, GPU, GPGPU, HLSL

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Blending Surfaces on Circular Domains Generated by Birkhoff Interpolation

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ABSTRACT: In this article we use the univariate Birkhoff interpolation to construct the surfaces on circular domains. The surfaces match given circles. We study the parabolical points of these surfaces. These surfaces can be used in civil engineering or in Computer Aided Geometric Design (CAGD).

KEY WORDS: 41A05, 65D05

MSC 2000: surfaces, Birkhoff interpolation, parabolical points

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On a Jakimovski-Leviatan Type Operator

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ABSTRACT: We consider a generalized Jakimovski-Leviatan operator in exponential weighted space of functions of one variable. We give theorems on the degree of approximation of a function by the considered sequence of operators.

KEY WORDS: Szasz-Mirakyan operators, exponential weight

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About the Approximation of the Gamma Function

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ABSTRACT: The goal of this paper is to present a method to obtain representations for the gamma function through functions in a class of data functions.

KEY WORDS: Gamma function, Digamma function, speed of convergence

MSC 2000: 26D15

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Uniform Approximation by Positive Linear Operators on Noncompact Intervals

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ABSTRACT: We characterize the functions defined on a noncompact interval, which are uniformly approximated by a sequence of positive linear operators. The particular cases of the Szász-Mirakjan operators, the Baskakov operators, the Meier-König and Zeller operators, the Gauss-Weierstrass operators and the Bleimann-Butzer-Hahn operators are included.

KEY WORDS: positive linear operators, rate of approximation, modulus of continuity

MSC 2000: 41A36, 41A25

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Study of Lipschitz Trigonometric Polynomial Approximation in Infinitely Many Variables and Connectedness

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ABSTRACT: This paper is dedicated to the study of Lipschitz polynomial approximation of functions defined on infinitely many copies of the circle group T . But in such a way that prefixed characteristics of the same study in T are preserved. In particular an extension of Mirkil theorem is presented. The problem in hand closely depends on the distance used to define the topology. Thus looking for conditions to ensure any scalar function in a small Lipschitz space is constant, the concept of *Lipschitz path-connected* metric spaces is introduced in a natural way.

KEY WORDS: Hölder approximation, trigonometric polynomials in finitely or infinitely many variables, connectedness by Lipschitz paths, Mirkil theorem.

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Localization Results for Multivariate Bernstein Operators on a Simplex

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ABSTRACT: We generalize the well-known localization results for the univariate Bernstein operators extending them to the multivariate case and also to the study of the convergence of the partial derivatives of the operators.

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Weibull Approximating Operators

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ABSTRACT: By using the Weibull distribution we shall define a general linear transform $W_{\beta,\gamma}^{(a)}f$, $a \in \mathbb{R}$, from which we obtain as special cases the Weibull first kind transform. We obtain several positive linear operators, as a special case of this operator.

KEY WORDS: Weibull distribution, Weibull transform, positive linear operator

MSC 2000: 41A36

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On an Inequality of Kečkić and Vasić

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ABSTRACT: The aim of this paper is to discuss a double inequality of J. D. Kečkić and P. M. Vasić [Publ. Inst. Math. Beograd N. S. 11(1971) 107-114]. Their inequality is a consequence of the fact that some two functions are monotonic and we prove here that these functions are in fact completely monotonic. We also establish new lower and upper sharp bounds for the gamma and digamma function.

KEY WORDS: Factorial function; gamma function; digamma and polygamma functions; completely monotonic function; sharp inequalities; Euler-Mascheroni constant.

MSC 2000: 30E15; 26D07; 4160.

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Functions with the Image of Cauchy Difference in a Linear Manifold

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ABSTRACT: In this paper we give a characterization of functions whose Cauchy difference belong to a subgroup or to a linear manifold.

KEY WORDS: Cauchy difference, linear manifold

MSC 2000: 39B72, 39B82

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A General Block Frequency Test

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ABSTRACT: Assessing the quality of a randomness source is not an easy task, usually accomplished by applying statistical randomness tests on its output sequences. One of the most widely used statistical suites is the NIST statistical test suite. Among the tests used by this suite, the block frequency test (frequency test within a block) determines the proportion of ones within equal and adjacent blocks of the tested sequence and compares this with the expected value for a truly random sequence. We present a generalization of this important test, that investigates deeper the structure of each block.

KEY WORDS: statistical testing, randomness, random number generator, NIST STS, block frequency test

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Some Sequences that Converge to a Generalization of Ioachimescu's Constant

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ABSTRACT: The purpose of this paper is to evaluate the limit $\mathcal{I}(a)$ of the sequence

$$\left(\frac{1}{\sqrt{a}} + \frac{1}{\sqrt{a+1}} + \cdots + \frac{1}{\sqrt{a+n-1}} - 2(\sqrt{a+n-1} - \sqrt{a}) \right)_{n \in \mathbb{N}},$$

where $a \in (0, +\infty)$, by giving sequences that converge quickly to $\mathcal{I}(a)$.

KEY WORDS: sequence, convergence, Ioachimescu's constant, approximation.

MSC 2000: 11Y60, 40A05.

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On a Stationary Non-uniform Subdivision Scheme

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ABSTRACT: In this paper we construct a new stationary non-uniform subdivision scheme, by combining the ternary 3-point subdivision scheme with Chaikin's scheme. This new scheme preserves the quadratic polynomials.

KEY WORDS: subdivision schemes, 2-scale relation, approximation order, quasi-interpolation, B -spline

MSC 2000: 65D05, 65D07, 65D17, 65T60

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