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Extended Abstracts Volume

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Mathematics & Computer Science

"Aurel Vlaicu" University of Arad, Faculty of Exact Sciences *Address:* 2 Elena Drăgoi St., 310330, Arad, Complex M (Micalaca, 300 area) *Tel./ Fax:* +40 257.219.000 *e-mail:* stiinte.exacte@uav.ro, *Web:* studmathit.uav.ro

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Nonlinear Systems and Nash Type Equilibria

Andrei Stan Scientific Advisor: Radu Precup

Abstract: In this paper fixed point arguments and a critical point technique are combined leading to hybrid existence results for a system of three operator equations where only two of the equations have a variational structure. The components of the solution which are associated to the equations having a variational form represent a Nash-type equilibrium of the corresponding energy functionals. The result is achieved by an iterative scheme based on Ekeland's variational principle.

Keywords: Nash-type equilibrium; Perov contraction; Ekeland variational principle

1. Introduction

Many nonlinear equations can be seen as a problem of fixed point, N(u) = u, where N is a certain operator. One says that the equation has a variational form if it is equivalent with a critical point equation E'(u) = 0. In the paper [4], R. Precup studied systems of the form

$$\begin{cases} N_1(u,v) = u \\ N_2(u,v) = v \end{cases}$$
(1)

in a Hilbert space, where each of the equations has a variational form, i.e. there are two C^1 functionals E_1 and E_2 such that $E_{11}(u, v) = u - N_1(u, v)$ and $E_{22}(u, v) = v$ $- N_2(u, v)$, where E_{11} and E_{22} are the partial Fréchet derivatives of E_1 and E_2 with respect to u and v, respectively. Sufficient conditions have been established for that the system admits a solution which is a Nash type equilibrium for the functionals E_1 and E_2 , that is

$$\begin{cases} E_{1}(u, v) = \inf_{x} E_{1}(x, v) \\ E_{2}(u, v) = \inf_{y} E_{2}(u, y). \end{cases}$$
(2)

The concept of a Nash equilibrium goes back to 1838 when Antoine Augustin Cournot [1] used it in his economics studies about the best output of a firm depending on the outputs of the other firms. The existence of such an equilibrium in the framework of the game theory was proved later in 1951 by John Forbes Nash Jr [3] by using Brouwer's fixed point theorem. Now the concept is also used outside economics to systems of variational equations. From a physical point of view, a Nash-type equilibrium (u, v) for two interconnected mechanisms whose energies are E_1 , E_2 is such that the motion of each mechanism is conformed to the minimum energy principle by taking into account the motion of the other.

(4)

2. Main result

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In this paper, we consider a system of three equations

$$\begin{cases} N_1(u, v, w) = u \\ N_2(u, v, w) = v \\ N_3(u, v, w) = w \end{cases}$$
(3)

in which N_2 , N_3 have a variational form, but N_1 does not. For example, one arrives to such a situation from three-dimensional differential systems in which one of the equations is implicit. We are interested to determine a solution (u^*, v^*, w^*) of the system, such that (v^*, w^*) is a Nash type equilibrium for the functionals E_2 , E_3 associated with N_2 and N_3 .

The result is obtained by applying Banach contraction principle together with Ekeland variational principle [2] in order to obtain an approximation sequence $(u_k, v_k, w_k)_{k \in \mathbb{N}}$. The most important part consists in guaranteeing that the finding sequence $(u_k, v_k, w_k)_{k \in \mathbb{N}}$ is Cauchy. To this aim, a Perov contraction condition is used and some upper bounds related to the matrix of the Lipschitz constants are obtained. Next, we use the following extension of a well-known lemma: If for two sequences of nonnegative numbers $x_{k,p}$, $y_{k,p}$ depending on a parameter p one has

$$a \cdot x_{k,p} + b \cdot y_{k,p} \le a' x_{k-1,p} + b' y_{k-1,p} + q_{k,p}$$

where $q_{k,p}$ is a sequence converging to zero uniformly with respect to p and a, b, a', b' are positive numbers with $\frac{b'}{-} \leq \frac{b}{-a'a}$, then $x_{k,p}, y_{k,p}$ tend to zero uniformly with respect to p. Finally the conclusion follows by passing to limit and having in mind the way $(u_k, v_k, w_k)_{k \in \mathbb{N}}$ was constructed.

3. Conclusions

In the presented paper, an existence result for a Nash equilibrium is generalized in two directions, by increasing the numbers of equations and by weakening the condition on one of the equations. The proof of the new result combines Banach contraction principle, a main tool in fixed point theory, with Ekeland variational principle, a fundamental tool in critical point theory. It also uses the concept of vector contraction in Perov's sense. The result can be extended to *n* equations of which only a part has a variational form.

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Stan Andrei, "Babeş-Bolyai" University of Cluj-Napoca, Faculty of Mathematics and Computer Science, stan.andrey@yahoo.com

Prof. Radu Precup, PhD, "Babeş-Bolyai" University of Cluj-Napoca, Faculty of Mathematics and Computer Science, .precup@math.ubbcluj.ro



Comparison Between "Proexplorer" and Other Educational Software

Rebecca-Monica Pui

Scientific Advisors: Prof. habil. Dorin Herlo, PhD and Assoc. Prof. Crina Bejan, PhD

Abstract: Due to the Covid 19 pandemic, the global issue in education has shifted from face-to-face to online (e-learning) either synchronously or asynchronously. To achieve this goal requires the implementation of e-learning methodology that highlights the ability to use the computer (in the form of any tool - desktop, laptop, tablet, iPhone, Smart Phone...) by educators (teachers) and educables/students, to run specialized programs dedicated to learning (educational software). Educators are called to provide educables/students with specialized expertise and software, either developed or selected by them and educables/students are required to go through the recommended educational software for self-instruction and assessment or to contribute to the development of educational software.

Keywords: e-learning; educational software; proexplorer;

1. Introduction

In this context it is my intervention at this event, by presenting the application "Proexplorer", that comparative to other software it is base on student-centered learning and is dedicated to learning a part of the history of the Middle Ages by gymnasium's students. The graphics are similar to the popular game Fornite (popular among high school students) and the music is taken from that era. Plus, the value of the application lies in the interactivity with the user (searching for lost historical relics and manuscripts, the description of a community with various concerns of the time) as well as the insertion of a personal assistant (based on AI). I thought of all these for the benefit of the student to facilitate the understanding of that historical era through didactic play, solving problems, cooperation with other students in a pleasant, relaxing and problematic way. The student can run the application anywhere (as a location), 24/7, at his own place, being flexible and adaptable to any IT tool.

2. Conclusions

The application is based on a real student-centered learning, involving an interactive learning (through problematization, problem solving, brainstorming, reflection, learning by discovery, etc.) that motivates and empowers the student, guiding him to success through the well-known concept "win-win". It can be easily installed on any computer running Windows / Linux / Mac and the C # programming language is more flexible and efficient in this case study than other programs.

Rebecca-Monica Pui, "Aurel Vlaicu" University of Arad, pui.rebecca007@gmail.com Prof. habil. Dorin Herlo, PhD, "Aurel Vlaicu" University of Arad, dorinherlo@gmail.com Assoc. Prof. Crina Bejan, PhD, "Aurel Vlaicu" University of Arad, ratiu_anina@yahoo.com



Improving Physical Resistance to Solar Panels Against Weather Effects

Daniel Durbacă, Daniel Haneş, Eduard Bumbu Scientific Advisor: Lect. Violeta Eugenia CHIŞ, PhD

Abstract: This paper describes a solution to protect solar panels from the destructive action of climatic factors such as hail and / or extreme positive temperatures. Taking into account the price of a solar panel, whether photovoltaic or for water heating, relative to the relatively small area (of the order of square meters), the time required to pay for itself, it is appropriate to protect them against the destructive action of the above factors. By carrying out this project we aim to create a device capable of automatically extending a protective material if the evolution of the weather requires it. Also, as previously presented, the material will not be permanently extended but only when meteorological warnings are issued regarding the possibility of hail formation, offering the possibility to control the system in a "manual" way via mobile phone connected to the internet, or also by means of a switch. We built this system to be able to be used to several applications, by using other sensors as future improvements.

Keywords: hail-protection, solar panel protection, asp.NET, API, green-energy, IoT.

About the project

Among the effects of the continuous change of climatic conditions that result in the creating of material damages are hail and extreme temperatures, whether positive or negative. They can cause compromise by destroying the solar panels and thus losing a significant amount paid for their purchase and installation. These panels don't come equipped from factory with a secure solution of protection against the above mentioned factors, although, in our opinion, due to the high purchase price, the long payback period of the investment and their rather small surface (nowadays they are protected against hail important areas of trees, such as fruit trees, vines, etc ...) it is necessary to equip them with such protection.

This system ensures the automatic coverage of the panel when at least one of the conditions is met: hail warning is issued, the temperature reaches 75 °C inside the vessel, actuation by the application on the phone or manual actuation by means of a switch. The water temperature measurement inside the panel was performed with the MAX6675 sensor, a sensor that allows the measurement of temperatures in the range 0-1024 °C. The communication between the sensor and the microcontroller is done through the SPI protocol.

In order to get the weather data and the weather alerts we used the Romania Meteorological Service's free API, and the communication between the user and the microcontroller is make with a cloud-host service via a phone application.

Daniel Durbacă, "Aurel Vlaicu" University of Arad, durbaca.daniel@gmail.com Daniel Haneş, "Aurel Vlaicu" University of Arad, danihanes@yahoo.com Eduard Bumbu, "Aurel Vlaicu" University of Arad, reduardbumbu@gmail.com Lect. Violeta Eugenia CHIŞ, PhD, "Aurel Vlaicu" University of Arad, viochis@yahoo.com



Exploring the Possibilities of Adaptive Learning Systems

Alexandr Parahonco Scientific Advisor: Assoc. Prof. Mircea Petic, PhD

Abstract: Digital systems for adapting the learning process have been developed and successfully applied abroad. The article discusses the concept of adaptive learning, analyzes two forms of implementing adaptive learning in the higher education systems of the United States and Brazil. Due to the development of our accurate model of adaptive learning (based on the analyzed systems by comparison method), the assessment of the relevance of the application of these systems in the Republic of Moldova is assessed. Practical solutions for adaptive learning within the framework of the national higher education system are proposed.

Keywords: Big Data, Data Mining, adaptive learning, adaptive platforms, adaptive test.

1. Introduction

The intensive development of the computer industry made a huge leap forward, which influenced the emergence of new technologies and the opportunities of their implementation. Along with medicine and engineering, education is one of the most demanded areas of human activity, the success of which lies in an individual approach of teaching and processing a large amount of data. However, with the help of Data Mining and Big Data methods, processing such a huge data stream has become possible. This, in turn, led to the rapid development of the adaptation of the educational process based on predicting the needs (capabilities) of the student and the construction of dynamic individual curricula within the framework of e-education and the emergence of specialized platforms for adaptive learning. Adaptive platforms include: 2U, Wiley, Canvas, Loud Cloud, Blackboard, Knewton, RealizeIT, Adaptcourseware, Anewspring, Geekie, Smart Sparrow [1]. In this article, we will consider the Knewton and Geekie platforms with their adaptive learning models.

It is very important to develop an accurate model of adaptive learning in connection with its privacy based on the available information, as well as the implementation of its evaluation and compatibility within the higher education system of the Republic of Moldova.

The purpose of the article is to study the possibility of implementation of the systems of adaptive education and assessment for higher education in the Republic of Moldova.

2. Proposed solution for the Republic of Moldova

For public institutions of higher education, the Moodle mixed learning system is best suited, which is free and convenient for creation of courses of any profile. The issue of adaptability of both training and testing on the Moodle educational platform has already been practically resolved by our compatriots, who were able to develop both the TestWid adaptive testing plugin [2] and the PADDIE (Professional Analysis Design Development Implementation and Evaluation) adaptive learning methodology within the framework adaptive learning methodology within the framework of an institutional project "15.817.06.27A Managing the formation of professional competencies under the university



teaching through organization of the adaptive educational process (PROFADAPT)" in the period 2015-2019. The PADDIE adaptive learning organization model is based on the ADDIE model and includes five stages of the formation of professional competencies in university research: analysis, design, development, implementation and evaluation [3].

According to the results of the PROFADAPT project, the PADDIE adaptive learning methodology proved to be effective, as did the TestWid adaptive testing plugin. The problem is that they require careful study to be used and implemented. Moreover, from the considered adaptive learning models, it is worth adopting several ideas, such as the constant collection and analysis of student data to display recommendations, etc.

3. Conclusions

As a result of the research, it became necessary to create an adaptive training system within the Moodle educational platform, taking into account the PADDIE methodology and the mandatory TestWid plugin, which leads us to the national model of adaptive learning in the Republic of Moldova: assessment of each student's step; continuous data collection; creation of a learning path within one course and its dynamic change; using Big Data and Data Mining; adaptive assessment (TestWid); Feedback; learning recommendations / filtering course content (more videos, exercises, lectures, etc.).

Acknowledgment

This article was written within the framework of the research project "20.80009.5007.22 Intelligent information systems for solving ill-structured problems, processing knowledge and big data "¹.

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Assoc. Prof. Mircea Petic, PhD, Institute of Mathematics and Computer Science, Republic of Moldova, mircea.petic@math.md

Alexandr Parahonco, Department of Information Technologies, Alecu Russo State University of Balti, alexandr.parahonco@usarb.md

¹ http://www.math.md/en/projects/20.80009.5007.22/



Domestic Fires: A Look into Causes, Effects and Prevention Methods

Bucur Radu-Vasile, Pavoni Shari Dario Kovacs Scientific Advisor: Prof. Valentina Emilia Bălaș, PhD

Abstract: Domestic fires are becoming more relevant in the current context, causing thousands of deaths a year worldwide. This paper aims to identify the causes of domestic fires, implement ideas to prevent them, address fire safety systems, and establish a personalized safety system that can monitor certain values of the factors that can cause the outbreak of a fire.

Keywords: domestic fires; causes; safety systems; monitoring.

1. Introduction

Most fires, over 60% worldwide, are domestic. In addition, most fire victims occur in the home environment. In 2004, more than 8,000 deaths from domestic fires were recorded in 27 EU countries. In the US, between 2013 and 2017 more than 25% of total fires occurred in homes, being the cause of 79% of the total deaths caused by fire and 73% of all injuries caused by fires. The objective we propose with this paper is to analyze the current solutions to avoid domestic fires and to offer a personally created solution.

2. Current state of the issue approached

At present, technologies to prevent or stop fires are quite advanced, a good example would be WIFIRE technology, which uses artificial intelligence, data management, robotics and high-resolution mapping software. This technology, however, is not suitable for small homes. A good way to implement solutions for small homes is through the "Internet of Things", which should not only keep us informed, but can play an active role in maintaining security.

3. Case study

For our case study, we present a project that we personally carried out. It is a CO_2 and methane gas monitoring system with an ESP32 development board. Our project allows us to see live data about the current gas level in the surrounding air, on a display on the structure of the project as well as on a local web page. Furthermore, we have also implemented a notification system which allows for the user to receive warning notifications on their phone, should the gas level become too high and dangerous.

4. Conclusions

Although the project we present is not at the level of other professional solutions, its operation is still satisfactory and allows the detection and notification of CO_2 or methane gas leaks. Also, the budget of our project allows it to be a more economical alternative to its professional equivalents, being much more affordable from a financial point of view.

Bucur Radu-Vasile, "Aurel Vlaicu" University of Arad, radubucur27@gmail.com Pavoni Shari Dario Kovacs, "Aurel Vlaicu" University of Arad, sharidkpavoni@gmail.com Prof. Valentina Emilia Bălaş, PhD, "Aurel Vlaicu" University of Arad, balas@drbalas.ro



Intelligent Support System for The Study of Soybean Plant Phenology

Ion Ganea Scientific Advisor: Prof. Gheorghe Căpățână, PhD

Abstract: This paper exposes some informatic components created on the bases of an intelligent support system for the study of soybean phenology in Knop nutritive watery environments supplied with the following compounds: Reglalg, Biovit and the Heteroauxina phytohormone. Some of the results obtained are presented .

Keywords: Intelligent support system, phenology, soybean, Wolfram Mathematica.

The future of agriculture lies in the adaption to changes and development of its own strategies to climate change. This paper describes some informatic components created on the bases of the intelligent support system (ISS) for the phenological study of the soybean. Some results are also presented .

The main objective of the components, finished at this time, of the ISS, was the assistance of research to determine : (a) the influence phytohormones on plants and (b) their degrees of influence on (a).

Biological data and theoretical guidance on plant genetics in the research started, are provided by the associate professor, PhD, Ana Bîrsan, Head of the Department of Biology and Ecology, Faculty of Biology and Pedology, State University of Moldova.

The components of the ISS were carried out in Wolfram Mathematica and performs analysis of the soybean plant phenology filled with the compounds Reglalg and Bioval and the Heteroauxina phytohormone. Both newly defined functions and functions that are integrated in Wolfram Mathematica have been used:

standardError[val_] := StandardDeviation[val] / Sqrt[Length[val]]

relError[val_, val1_, val2_] := standardError[val] / Mean[{val1, val2}] * 100

coefficientOfVariation[val_] := StandardDeviation[val] / Mean[Length[val]] * 100

d[{val1_, val2_}] := (Mean[val2] - Mean[val1]) / StandardDeviation[val2]

 $s = Sqrt[((0.7 + 1.4)^{2} + ((-2.1) - (-1.4))^{2} + ((-2.8) - (-1.4))^{2})/2]$

er = s / Sqrt[2]

tc = (Mean[RadM] - Mean[RadH]) / er



Grid[

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{"Knop vs Knop+Heteroauxinä", MeanMH = Mean[{7.43, 8.83}], StandardDeviation[{Mean[RadM], Mean[RadH]}], standardError[{Mean[RadM], Mean[RadH]}], stErr / MeanMH * 100, 100 – (7.43 * 100 / 8.83), d[{RadM, RadH}], t},

("Knop vs Knop+Reglag", MeanMR = Mean[{7.43, 6.06}], StandardDeviation[{Mean[RadM], Mean[RadR]}], standardError[{Mean[RadM], Mean[RadR]}], stErr / MeanMR * 100, 100 – (7.43 * 100 / 6.06), d[{RadM, RadR}], t}, ("Knop vs Knop+Biovit", Mean[{7.43, 13.8}], StandardDeviation[{Mean[RadM], Mean[RadB]}],

standardError[{Mean[RadM], Mean[RadB]}], 100 – (7.43 * 100 / 13.08), d[{RadM, RadB}], t, lsd = TTest[{RadM, RadR}] - t}], Frame \rightarrow All, Background \rightarrow {{White}, {White}}, {None, {Green, Yellow}}], Dividers \rightarrow {2 \rightarrow True, 2 \rightarrow True}, Frame \rightarrow {{True}}, Frame \rightarrow {{True}}, FrameStyle \rightarrow Directive[Thickness[2], Blue] // N]

Comparație	Media	Abaterea Standard	Eroarea Standard	Eroarea relativă (%)	Diferența (%)	Efectul (d)	Testul T
Knop vs Knop+ Heteroauxină	8.13	0.989949	0.7	8.61009	15.855	0.560299	-1.06904
Knop vs Knop+Reglag	6.745	0.966379	0.683333	10.3781	-22.6073	-1.08612	-1.06904
Knop vs Knop+Biovit	10.615	4.52548	3.2	43.1957	19.9095	-1.06904	1.24567

The following results have been obtained during the indicators' variation:

- Variation of the main root length of the plants : When processed with Heteroauxin, the root length increased by 15.85 %; When processing with Reglalg the root length decreases by 22.60 %;
 When processing with Biovit, the root length increased by 85.73 %.
- 2. Variation of the length of the aerial part : When processing with Heteroauxin the length of the aerial part increased by 5. 41 %; When processing with Reglalg the length of the aerial part decreases by 10.01 %; When processing with Biovit, the length of the aerial part increased by 10 %.
- 3. Variation of root volume When processing with Heteroauxina the root volume decreases by 33 %; When processing with Reglalg the root volume increased by 11.33 %; When processing with Bioval the root volume increased by 9.02 %.
- 4. Variation of fresh root biomass
 When processed with Heteroauxin the fresh root biomass increased by 22.5%;
 When treated with Reglalg, the fresh root biomass increased by 16.21%;
 When processing with Biovit, the fresh root biomass decreases by 3.23%.

5. *Changes in fresh aerial part biomass* When processing with Heteroauxin the biomass of the fresh aerial part increased by 2 1.6 8 %;

When processing with Reglalg the biomass of the fresh aerial part increased by 4.76%;

When processing with Biovit, the biomass of the fresh aerial part increased by 23.08%.

Prof. Gheorghe Căpățână, PhD, Moldova State University, Chișinău, gh_capatana@yahoo.com

Ion Ganea, Moldova State University, Chişinău, iganea9@gmail.com



A Classification of Groups of Order pqr

Cristian-Aurel Rafiliu Scientific Advisor: Prof. Andrei Mărcuș, PhD

Abstract: We present a classification of group of order *pqr* by a split extension method. Our approach to this classification is modern, but intends to be as elementary as possible. We will find that the method quite strong and can lead to other group classifications.

Keywords: classification groups; split extensions

1. A classification of the groups of order pqr

We will present a classification of the groups of order pqr based on a cyclic split extension method employed in a paper by Adam Burley "*Classification of some groups* of order pqr". Burley present a classification of the groups of order pqr, when $q \nmid r - 1$. There are additional difficulties in case where $q \mid r - 1$. The idea is to choose two solvable groups X and Y of coprime orders and to construct the group G of order pqr. So, we can choose $X = C_p$ and Y a group of order qr (a group of squarefree order is solvable). In case $q \nmid r - 1$, Y is isomorphic to C_{qr} , but in case $q \mid r - 1$, Y can be another one group of order qr that is not isomorphic to C_{qr} . Burley use several results that don't help us in case $q \mid r - 1$, where Y may not be C_{qr} .

We present in the preliminary section the main theorem on classification and a result that helps us to verify in an easier way when two groups from the list are isomorphic. Then we introduce the noncyclic group of order qr and we prove two characterizations by the group of automorphisms of this group. Finally, we prove the theorem that completes the classification of groups pqr made by Burley in case $q \nmid r - 1$, and we explain how the characterization of groups of order pqr can be state.

2. Conclusions

We find by this method how many groups of order pqr are and how they can be constructed. We can also apply these ideas to classify other groups, by example the groups of order pqrs or many other groups for which we know their automorphisms groups.

Cristian-Aurel Rafiliu, Contact: rcmr0432@scs.ubbcluj.ro, cristian.rafiliu@stud.ubbcluj.ro Prof. Andrei Mărcuş, PhD, Contact: marcus@math.ubbcluj.ro, Babeş-Bolyai University, Departament of Mathematics, 1 Mihail Kogălniceanu Street, 400084, Cluj-Napoca, Romania



The Flow Rate of Blood

Harsh Shah, Simran Surve, Rutuja Kore, Arpita Patil Scientific Advisor: Dr.Avinash J. Kamble

Abstract: The aim of this paper is to explore the connection between mathematical concepts and biological phenomena. Mathematical biology is an interdisciplinary area that uses mathematical techniques and tools to model natural and biological processes. Calculus, broadly classified as differential & integrals calculus, plays a vital role in Mathematical biology to explore the biological phenomena. The flow rate of blood in a blood vessel by using Poiseuille's law are discussed by means of integral calculus. The measurement of blood flow rate provides vital and essential information for the diagnosis of various diseases due to any blood flow disorders. For a blood vessel, such as a vein or artery, the shape is considered as a hollow cylinder. Using law of laminar flow, the relationship between volume and distance is described and then integrated with respect to distance over a domain of [0, R] where R is the radius of the blood vessel.

Keywords: Flow rate, Laminar flow, Poiseuille's law.

1. Main text

Calculus is used in every branch of the statistics, engineering, business, medicine, and in other fields wherever a problem can be mathematically modelled and an optimal solution is desired. Integral calculus deals with total size or value, such as lengths, areas, and volumes. Integral calculus assigns numbers to function in a way that can describe area, volume and other concepts that arises by combining infinitesimal data. Many biological events, such as the flow rate of blood can be calculated with the help of integral calculus. As blood is made of plasma (liquid portion), red blood cells, white blood cells, platelets, antibodies and hormones. Firstly, we assume that the shape of the blood vessels is a perfectly cylindrical tube due to friction caused by the walls, the velocity of the blood is the greatest along the central axis. The velocity increases as the radius increases and eventually becomes zero, when it reaches the walls of vessels. The flow rate of blood in a blood vessel by using Poiseuille's law can be discussed with the concept of Integral calculus. Poiseuille's law states that the flow rate of a liquid flowing through a capillary is directly proportional to the pressure of the liquid and the fourth power of the radius of the capillary and is inversely proportional to the viscosity of the liquid and the length of the capillary.

2. Conclusions:

The measurement of blood flow rate provides vital and essential information for the diagnosis of various diseases due to any blood flow disorders. The flow rate measurement can be beneficial in developing new health equipment's in future in tune with mathematical idea such as Poiseuille's law.

Harsh Shah, Pillai Hoc College Of Engineering And Technology Rasayani Maharashtra India, Indai (9594754889) Simran Surve, Pillai Hoc College Of Engineering And Technology Rasayani Maharashtra India, Indai (7678023034) Rutuja Kore, Pillai Hoc College Of Engineering And Technology Rasayani Maharashtra India., korerutuja15@gmail.com Dr. Avinash J. Kamble, Pillai HOC college of engineering and Technology,rasayani-410207, Maharashtra, India (8108536986)



Benchmark Problems for the Constraints Satisfaction Problems Repository

Andrei Iovescu Scientific Advisor: Lect. Dr. Mădălina Erașcu

Abstract: With the advance of Cloud Computing and DevOps paradigms, companies move their applications in the Cloud. One problem which arises is the *provisioning of resources* (virtual machines). This paper solves this problem for Wordpress, which is widely used in creating websites, blogs and applications. It was formalized as a constrained optimization problem in constraint modelling language MiniZinc and tackled using the constrained programming solvers Chuffed, Gecode and OR-Tools. We provide scalability results based on the number of Wordpress instances deployed and number of virtual machines offers crawled from the well-known Cloud Providers. Our work shows the computational advantages of Chuffed.

Keywords: component-based applications; Cloud Computing; optimization; constraint optimization problem; Chuffed; OR-Tools

1. Introduction

With the advance of the Cloud Computing and DevOps paradigms, the problem of *resource provisioning* for *component-based applications* became stringent. It consists in the allocation of virtual machines (VMs) from various Cloud Providers to a set of applications such that the constraints determined by the interactions between components and by the component's hardware/software requirements are satisfied and the performance objectives are optimized (e.g. costs are minimized). The *problem* is similar to the bin packing problem. It can be formulated as a *constrained optimization problem* and solved with exact (linear and mathematical programming, SMT/OMT solving, constrained programming) and approximate approaches (e.g., metaheuristics, in particular evolutionary and swarm intelligence algorithms [1]). As the problem is NP-hard, for a long time it was approached using approximate methods. Lately [2] [3], it has been approached using SMT/OMT solvers (e.g. Z3 - https://github.com/Z3Prover/z3) and mathematical programming solvers (e.g. CPLEX - https://www.ibm.com/analytics/cplex-optimizer). The *contributions* of this paper are the following:

1. *formalization* of the Wordpress application (https://wordpress.com) in the constraint modelling language MiniZinc (https://www.minizinc.org) based on the formalization introduced in [2];

- 2. the *scalability study* for the constrained programming solvers like Chuffed (https://github.com/chuffed/chuffed), Gecode (https://www.gecode.org) and OR-Tools (https://developers.google.com/optimization).
 - Our work shows the computational advantages of Chuffed making it competing with state
 - of-the-art tools. The model and the results are available at

https://github.com/AndreiIovescu/Wordpress-Problem.



2. Conclusions

Our work shows that the constrained programming solvers are suitable to tackle real world problems from the Cloud Computing domain. We are in the process of submitting the problem to the CSPLib initiative (http://www.csplib.org), which hosts a library of test problems for constraint solvers.

As future work, we plan to improve the solvers scalability by using symmetry breaking constraints based on the observation that the application components and constraints determine a graph.

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Andrei Iovescu, Faculty of Mathematics and Informatics, West University of Timişoara, andrei.iovescu99@euvt.ro Lect. Mădălina Eraşcu, PhD, West University of Timişoara, madalina.erascu@e-uvt.ro



On a Characterization of Absolutely Correct Estimators

Eduard Ștefan Grigoriciuc Scientific Advisor: Prof. Gabriela Kohr, PhD

Abstract: In this paper we give a characterization result for the absolutely correct estimators of an unknown parameter. This result can be used in two ways: to prove that an estimator is absolutely correct, respectively to determine the form of an absolutely correct estimator for an unknown parameter. We present the main result together with some examples in which we can apply it. *Keywords*: estimation theory; correct estimator; absolutely correct estimator.

1. Introduction

Throughout this paper, we consider a characteristic X (relative to a population), whose density $f(x;\theta)$ depends on the parameter θ , which is to be estimated. If X is discrete, then f represents the probability distribution function, while if X is continuous, f is the probability density function. We also consider a random sample of size n, represented by the sample variables $X_1, ..., X_n$. Because the selection is repeated, we have that the variables X_i , with $i \in \{1,...,n\}$ are independent and identically distributed (i.i.d.) with X.

Definition: An estimator $\theta^* = \theta^*(X_1, ..., X_n)$ is called a correct estimator for the parameter θ if the conditions (2) and (3) are met.

Definition: An estimator $\theta^* = \theta^*(X_1, ..., X_n)$ is called an absolutely correct estimator for the parameter θ if the conditions (1) and (3) are met.

In the main section we give a necessary condition for the absolute correctness of an estimator. In many problems it is useful to use this result of characterization instead of verifying the absolute correctness using the standard definition of absolutely correct estimator (the conditions given by (1) and (3)).

Also, in this paper we present some examples in which we can apply the main result of the paper. We discuss about some absolutely correct estimators for the Binomial distribution, Poisson distribution, Normal distribution, Gamma distribution and also for some particular cases when X is a continuous random variable.

2. Equations and formulae

$M(\theta^*) = \theta$			(1)
$M(\boldsymbol{\theta}^{*}) \rightarrow \boldsymbol{\theta},$	when	$n \rightarrow \infty$	(2)
$Var(\theta^*) \rightarrow 0,$	when	$n \rightarrow \infty$	(3)

where M(X) denotes the expected value of a random variable X and Var(X) denotes the variance of a random variable X.

3. Conclusions

The result presented in this paper can be used in two ways: to prove that an estimator θ^* is an absolutely correct estimator for the parameter θ , respectively to generate an absolutely correct estimator for a parameter θ .

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Eduard Ștefan Grigoriciuc, PhD Student, Faculty of Mathematics and Computer Science, "Babeş-Bolyai" University, Cluj-Napoca, Romania, email: eduard.grigoriciuc@ubbcluj.ro Gabriela Kohr, Proffesor PhD, Faculty of Mathematics and Computer Science, "Babeş-Bolyai" University, ClujNapoca, Romania, email: gkohr@math.ubbcluj.ro



The Irreducibility of the Polynomial $X^n - a$ over the Field Extension $\mathbb{Q}(\omega_n)$

Paul Răzvan Țapoș Scientific Advisor: Prof. dr. Andrei Mărcuș

Abstract: We discuss the irreducibility of the polynomial $X^n - a \in \mathbb{Q}[X]$ over the field extension $\mathbb{Q}(\omega_n)$, where ω_n denotes a primitive n^{th} root of unity, by studying the relationship between the irreducibility over \mathbb{Q} and over $\mathbb{Q}(\omega_n)$.

Keywords: irreducible polynomial; minimal polynomial; field extension.

1. Introduction

In [3] we give an elementary study of the irreducibility over \mathbb{Q} of $X^n - a \in \mathbb{Q}[X]$, using the circulant determinant. The criterion proved there assumes that the polynomial is irreducible over \mathbb{Q} if and only if it is irreducible over $\mathbb{Q}(\omega_n)$. This does not happen for all polynomials $X^n - a$, in the sense that there exist irreducible polynomials over \mathbb{Q} which are reducible over $\mathbb{Q}(\omega_n)$ (the subfield of \mathbb{C} , generated by ω_n). Here we give a condition for $X^n - a \in \mathbb{Q}[X]$ to be irreducible both over \mathbb{Q} and over $\mathbb{Q}(\omega_n)$. We also classify some reducible polynomials over $\mathbb{Q}(\omega_4)$ and $\mathbb{Q}(\omega_6)$, which are irreducible over \mathbb{Q} , and provide several examples.

2. Main tools and results

The main result of this paper states that if $(n, \varphi(n)) = 1$, then $X^n - a$ is irreducible over \mathbb{Q} if and only if it is irreducible over $\mathbb{Q}(\omega_n)$, where $\varphi(n)$ denotes Euler's totient function. The proof of this theorem is based on the fact that if $\alpha \in \mathbb{C}$ is a root of an irreducible and monic polynomial $f \in K[X]$, where *K* is a field, then *f* is the polynomial of minimal degree that has α as a root. Moreover, the degree of the field extension $K \leq K(\alpha)$ is equal to the degree of *f*. Taking into account that the degree of the field extension $\mathbb{Q} \leq \mathbb{Q}(\omega_n)$ is equal to $\varphi(n)$, we succeed in proving that if $X^n - a$ is irreducible over \mathbb{Q} , then it is also irreducible over $\mathbb{Q}(\omega_n)$. If *p* is a prime number, then $\varphi(p) = p - 1$, hence the condition above occurs.

It is known (see [1]) that $X^n - a$ is irreducible over a field K if and only if $a \notin K^p$ for all primes p dividing n and $a \notin -4K^4$ whenever $4 \mid n$. It is not easy to verify the conditions in arbitrary fields. Here we use this result in order to classify all reducible polynomials over $\mathbb{Q}(\omega_4)$, which is precisely $\mathbb{Q}(i)$, and over $\mathbb{Q}(\omega_6)$, which is precisely $\mathbb{Q}(i\sqrt{3})$. Finally, we give several examples of irreducible polynomials over $\mathbb{Q}(\omega_n)$.



3. Conclusions

This paper can be regarded as an extension of the paper [3] and it is useful in studying the irreducibility of $X^n - a \in \mathbb{Q}[X]$ over \mathbb{Q} with elementary methods. We found that there exist

a large class of polynomials $X^n - a$ which are both irreducible over \mathbb{Q} and over $\mathbb{Q}(\omega_n)$, in the case that $(n, \varphi(n)) = 1$. Our aim is to characterize the equivalence between the irreducibility over these two fields, in future work.

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Paul Răzvan Țapoș, Babeș-Bolyai University, Faculty of Mathematics and Computer Science, 1 Mihail Kogălniceanu St., RO-400084 Cluj-Napoca, paul.tapos@stud.ubbcluj.ro Andrei Mărcuș, Babeș-Bolyai University, Department of Mathematics, 1 Mihail Kogălniceanu St., RO-400084 Cluj-Napoca, marcus@math.ubbcluj.ro



interArad, a Platform for Socializing in Arad

Roberta Barba, Adrian Boroş, Andrei Bota Scientific Advisor: Lecturer Violeta Eugenia Chiş, PhD.

Abstract: IntraArad is a socialization platform that aims to create a socialization space for those living in Arad. This site has multiple modes of communication that leave users with a feeling that makes them feel more connected to each other.

Keywords: Social Network; communication; website .

1. Introduction

IntraArad is a social networking platform that is for the city of Arad. This platform has information about what is happening in each neighborhood, being separated from each other to be easier to access and use. Users can post information about what is happening in that neighborhood or even throughout the city. The social platform will have everything that a (user accounts, communication mode being similar to messenger, a feed, etc.) social platform has plus other facilities that allow users to be more connected such as chats with strangers from Arad and much more . The site was created out of the current need for personal connection with loved ones, and this social platform allows them to communicate information about what is happening in their area as if they were there.

The site uses several technologies that have been used such as Php, MySQL and others, but uses efficient data processing methods and security systems that prevent cyber attacks. One of the most effective methods of logging in and maintaining it are Tokens. These Tokens are used to stop searching the database and allow logging off of all devices used by the user if he wishes, and can be used in many ways.

2. Conclusions

In conclusion, InterArad is a site that connects the population of Arad, allowing them to talk and meet people they would never know, plus the current situation has helped them get rid of the feeling of isolation.

Roberta Barba, student at "Aurel Vlaicu" University of Arad, barba.roberta2015@gmail.com Adrian Boroș, student at "Aurel Vlaicu" University of Arad, borosadrianemail@gmail.com Andrei Bota, student at "Aurel Vlaicu" University of Arad, bota_andrei@yahoo.com Lect. Violeta Eugenia Chiș, PhD. Lecturer at "Aurel Vlaicu" University of Arad, viochis@yahoo.com



Bitcoin vs. Stablecoins. What Does the Future Hold for Cryptocurrencies?

Andreea Bianca Sabău, Josef Höniges Scientific Advisor: Assoc. Prof. Crina Anina Bejan, PhD

Abstract: Bitcoin is one of the most popular digital currencies worldwide, whose price is volatile in nature, making traders anticipate the right moment to exchange. After the burst of the Bitcoin price bubble at the end of 2017, developers have created some alternatives to the decentralized and distributed features of Bitcoin. Decentralized finance, the emergence of autonomous organizations, central bank digital currencies and "stablecoins" are just few of the blockchain applications that have started to gain some momentum in the last couple of years. Stablecoins are digital currencies designed to minimize price volatility, as these types of currency are "pegged" to the value of any fiat currency, trade commodity, other cryptocurrencies, or any other commodity. This paper's primary objective is to analyze the current market trends, focusing mainly on Bitcoin, as the cryptocurrency "par excellence" and stablecoins, as they may represent a future alternative to the problem of price volatility posed by most conventional cryptocurrencies. What are the advantages of using stablecoins? Are stablecoins really stable? These are just some of the questions we are trying to answer. Then, using some cryptocurrency technical analysis techniques, like the stock to flow model (S2FX) we have managed to propose some predictions regarding not just price fluctuations, but also concerning future developments in the area of cryptocurrencies, blockchain technology and alternatives to traditional financial instruments.

Keywords: Bitcoin; stablecoins; blockchain; price volatility; cryptocurrency; stock to flow

1. Introduction

Cryptocurrencies have usually been observed as having significant fluctuations in their prices, and Bitcoin is no exception. Following the end of the so called "crypto winter", in which it bottomed out at slightly above US\$3,000, Bitcoin has swung back in a major way in 2020. From the turn of the year to the second week of February, Bitcoin prices have gone up from slightly over US\$7,000 to the low US\$10,000s. An increase of almost 40% in six weeks is something unheard of, for any type of asset class, except, of course, for bitcoin, which many believe could be the best performing asset of the last decade, despite, or better put, in spite of its ups and downs.

If we take a closer look at the price fluctuations of this year only, we may observe some truly significant patterns related to a variety of factors and taking into account today's economic and geopolitical climate. Most importantly, we must acknowledge the major impact that the covid-19 pandemic has had on the development of the price index, due to economic and political uncertainties and the ever-changing policies of governance. When the covid-19 pandemic started to spread in March, Bitcoin price went from a little over US\$9,000 to just under US\$5,000 in matter of days. So in just 5 days the price dropped by a staggering amount f over 40%. In the second half of the year, there has been a steady increase in price, continuing at an arguably accelerated rate, reaching a price of over

US\$16,000 by midNovember. Some models even predict that the price of one Bitcoin could be as high as 100k by the end of 2021.

This price volatility has its disadvantages, as well as some perks. Investors can capitalize on the high level of global uncertainty and the complicated geopolitical developments for financial speculation. This is not without risk, of course. But with great risk comes great reward. Investors may benefit from such considerable volatility, which is not entirely unpredictable. They may use the market to their advantage, optimizing their investments.

Due to the volatility however, ordinary people might be discouraged to use cryptocurrencies like Bitcoin as units of account and store of value. Traditional investors also struggle to fully comprehend the complexity of such a new field, with its new class of assets. As an answer to these problems, there has emerged a new breed of cryptocurrencies called "stablecoins". In order to mitigate price volatility, stablecoins use a sustained peg (or tether), linked to a conventional financial instrument, like the US dollar, or any other asset like gold, oil, or even a peg between other cryptocurrencies. In other words, stablecoins can be: fiatcollateralized, crypto-collateralized, commodity-collateralized, or non-collateralized (stablecoin that is not backed by any assets but use algorithms to adjust the supply or demand).

So why are stablecoins becoming so popular? While all other cryptocurrencies are characterized by significant increases or decreases in prices, stablecoins remain stable. The adoption of these types of currencies by the mainstream can be linked to two major factors: firstly, they stabilize the crypto market which can be quite volatile. As they don't have a fixed schedule, or limited supply, stablecoins are distributed based on market conditions and economic factors. These stablecoins are backed with any collateral to safeguard investors. Secondly, the influx of venture capital proves that these types of investors can make profits, using new types of business models.

Like blockchain technology, stablecoins are also in the early stage of its growth, although there are many real-life applications for this currency. Stablescoins can be used either as a day-to-day currency, streamlining P2P payments, as affordable and fast remittances for migrant workers, as protection from local currency crashes, or for improved cryptocurrency exchanges.

2. Conclusions

Stud Cath-IT

Stablecoins play an important role in bridging the still significant gap between crypto enthusiasts and the much larger non-expert population. Even though Bitcoin is still the cryptocurrency that drives headlines and makes waves in the marketplace, and that continues to drive individual and institution interest into the cryptoasset sector, reduced price volatility, the ability to exchange or redeem these cryptoassets for the underlying asset, and recent OCC clarification on the regulatory treatment of these assets highlight the practicality of these instruments. Our prediction is that in the future stablecoins will take over, as mass adoption will come in the near future, with crypto insurance coming to the forefront.

Andreea Bianca Sabău, IASTE, "Aurel Vlaicu" University of Arad, email: sabauabi@gmail.com Josef Höniges, IASTE, "Aurel Vlaicu" University of Arad, email: new.combe@yahoo.de Crina Anina Bejan, "Aurel Vlaicu" University of Arad, Faculty of Exact Science, ratiu_anina@yahoo.com



Bayesian networks applied in physical phenomena

Bogdan-George Gros Scientific Advisor: Assoc. Prof. Crina Anina Bejan, PhD

Abstract: This project's main purpose is finding whether Bayesian networks, used in many fields and fulfilling different tasks could be used in explaining undocumented or poorly understood physical phenomenon. One of such phenomena is sonoluminescence which in essence can be explained as short bursts of light being emitted from bubbles imploding in some sort liquid being excited by sound and can observed in nature being used by Pistol shrimp to hunt prey. Many theories exist that try to explain this phenomenon and although one was accepted the exact definition still remains unclear. As such I decided that instead of a man trying to explain it, training a Bayesian network to best replicate a phenomenon and in turn try to explain it would be much more efficient. Although this seems like a unique idea, a handful of such AI exist to this day studying diseases and their cures, the properties of the universe and many more but these AI require computing power that not many possess, that is why I decided to build a relatively light AI that can be used by many and can be scalable, the more power it gets the faster and more precise the response. As for the future prospects, these types of AI will help research in many fields as we continue to stretch the limits of what we know about the world around us.

Keywords: bayesian networks; machine learning; sonoluminescence; bayes' theorem;

1. Introduction

In the past years AI have been the hottest trend gaining ground in all forms of fields from physics, and medicine to philosophy and art, such technologies have integrated so well in our lives that we don't even notice them. As reminded above, AI trying to obtain information about certain topics in science is nothing new, many powerful AI are running non-stop to try to explain various phenomenon, and although our own Bayesian network seems nothing new, a light AI using mostly the same technology as various web sites for recommending products can show surprising results.

2. Bayes' Theorem

The main pillar of this project is Bayes' theorem which is used for prediction and learning. In essence Bayes' theorem in probability theory describes the probability of an event occurring, this probability relying on prior knowledge related to the event.

3. Programming

This project was written in C Sharp and Infer.net for laying the groundwork for my app and allowing me to build from there without staying and lamenting of formula and their implementation in code.

4. Conclusions

This experiment it is pretty straight forward, the network trains on data set and then gives us the numbers it thinks will create a successful experiment based on the given data.

Bogdan-George Gros, IASTE, "Aurel Vlaicu" University of Arad, email: gros.bogdan@yahoo.com Crina Anina Bejan, "Aurel Vlaicu"University of Arad, Faculty of Exact Science, ratiu_anina@yahoo.com



CryptoCircle eXchange

Miruna Maura Trocan, Alexandru Nicolăiță Scientific Advisor: Assoc. Prof. Crina Anina Bejan, PhD

Abstract: The emergence of the Blockchain technology has opened new doors for innovation in many industries, because of the key features it provides: transparency, traceability, speed and enhanced security. In recent years, many alternatives build on Ethereum, Corda, EOS, Cosmos, IBM Blockchain and other platforms that support the development of blockchain-based applications have provided improved alternative services that innovate all economy sectors. User funds and data has been stolen from existing exchanges and the transaction speed is slow. This paper proposes a new exchange build on top of Ethereum Blockchain that is currently undergoing ICO, comes with a different approach by offering solutions to problems found in existing exchanges. Powered by a superior algorithm provided by GoLang programming language, CryptoCircle eXchange offers high performance trading with over 10 million transactions per second. A few key features provided by this exchange are: a bot powered by artificial intelligence, auto-trading, copy trading, professional charts with technical analysis, anti-market manipulation and trading alerts. All these features are wrapped up in a secure, user-friendly and responsive interface and also in a specially designed mobile app.

Keywords: Blockchain, Cryptocurrency exchange, Ethereum Blockchain

1. Introduction

Projects built on the blockchain usually come with an ecosystem that is powered by a token. Unlike tokens, cryptocurrencies are standalone and independent coins that operate on their own platform. There are many problems found in existing cryptocurrency exchanges. The biggest problem regarding existing cryptocurrency exchanges is the lack of security. Aside from the lack of know-how, high volatility and unstable market, there is also the big problem of scammers and hackers. Only in 2020, there are at least 75 cryptocurrency exchanges that have shut down due to hacks, scams or simply vanished into thin air. Another known issue is: high transaction fees, liquidity and poor customer support.

In this work we propose a project entitled CryptoCircle eXchange which offers a new solution for cryptocurrency exchanges. The main focus will be providing a 24/7 live customer support who will provide professional assistance to those who contact them. Aside from this, the exchange will provide multiple tools for its users to assist them in the trading process, improved security and transaction speed of over 10 million transactions/second. CryptoCircle eXchange is developed using the GoLang (Google Language) programming language. Using the GoLang machine language has many benefits over Ruby, Java, C# or C++ and it provides a cleaner coding environment. CryptoCircle eXchange comes with an ecosystem that is backed by the CCX utility token.

2. Conclusion and future works

The increasing number of projects and applications build on the blockchain has left many cryptocurrency exchanges unprepared for the challenges and threats that came with it. CryptoCircle eXchange has come with many solutions and innovations to solve many of the existing treats, however the market is in constant change leaving the door opened for future research regarding security, artificial intelligence and traceability (especially with security tokens) on the blockchain.

Miruna Maura Trocan, SPM, "Aurel Vlaicu" University of Arad, email: trocan.maura@gmail.com Alexandru Nicolăiță, SPM, "Aurel Vlaicu" University of Arad, email: nicolaitaalexandru@gmail.com Crina Anina Bejan, "Aurel Vlaicu" University of Arad, Faculty of Exact Science, ratiu_anina@yahoo.com



Reactive Programming in iOS Development

Sorin Miroiu Scientific Advisor: Prof. Dominic Bucerzan, PhD

Abstract: The aim of this paper is to show and explain the reactive programming in developing iOS mobile applications, in regards to adopting the SOLID principles. We also do not use any sort of interface builder tools, such as Xibs or Storyboards, since they are buggy and are known to crash the application, but we code everything in regards to user interface views. The current design patterns used and presented in this paper are MVVM and Coordinator, in regards to the Rx-Swift reactive framework. The study results in the performance analysis of this programming paradigm using the Swift programming language.

Keywords: Swift; Rx-Swift; Reactive programming.

The aim of this paper is to show and explain the reactive programming in developing iOS mobile applications, in regards to adopting the SOLID principles. We also do not use any sort of interface builder tools, such as Xibs or Storyboards, since they are buggy and are known to crash the application, but we code everything in regards to user interface views. The current design patterns used and presented in this paper are MVVM and Coordinator, in regards to the Rx-Swift reactive framework. The study results in the performance analysis of this programming paradigm using the Swift programming language.

Most software solutions or products, tend to be overly abstracted which makes the life of every programmer a bit more difficult, in regards to understanding the code and improving certain parts of it without breaking anything else. Since this reactive programming is an event driven paradigm, there must be a shift in the mind of the developer and in its approach of thinking and coding. Because you can subscribe an observer listen to its changes, it opens up a new wide way of reading, writing and using the results in the code, in a modern aspect by using callbacks (or closures as it is mostly regarded to in Apple's documentation).

Sorin Miroiu, "Aurel Vlaicu" University of Arad, sorinmiroiu.sm@gmail.com Prof. Dominic Bucerzan, PhD, "Aurel Vlaicu" University of Arad, dominic@bbcomputer.ro



Use of Web Scraped Data in Android Applications

Claudia Elisabeta Vidican Scientific Advisor: Assoc. Prof. Crina Anina Bejan

Abstract: In order for an application to be successful, developers have to make use of expansive sets of data that can be studied in order to recover precious information that the developers or users can take advantage of. Through the use of statistics and data analysis, the interpretation of such information forms the basis of data science. In order to demonstrate this concept, this paper will make use of an android application which uses a suite of scraped data that was analyzed to return useful information.

Key words: data science, android, Python

Specifically, this paper will present a Shoe Comparer app, where a user can input their shoe size. Based on this data, a user can compare a manufacturer and a shoe type that they already know to another manufacturer in order to get, if necessary, a transformation that gives the shoe size for the second manufacturer.

The main issues treated in this paper are:

- Presentation of the problem
- Presentation of the solution
- Using scraped data in applications
- · Technologies used to scrap data
- Methodology used for converted data

Presentation of the problem: it is often a problem for an online shopper for shoes that they will look at a product and they will have difficulty discerning if the product will fit them or the shoe size might be too small or too big. This puts the user at doubt of buying a product because manufacturers will use different interpretations of a size system for their product.

Presentation of the solution: the application makes use of a converter on top of which a comparer is built. Making use of a given size, the user can 'test' one manufacturer they already know against one they might want to buy from. The average for a set of data is calculated and the application will return, if possible, the most likely size for the second manufacturer.

Using scraped data in applications: data such as shoe type, name, size in EU system and centimeters is extracted from epantofi.ro. Each product page is accessed individually to extract this data. The processed data will be shown later in the android application.

Technologies used to scrap data: using Python's Selenium module, pages are navigated automatically and information is extracted. This information is processed further into a SQlite database, from which information can be analyzed.

Methodology used for converted data: data is grouped based on manufacturer, shoe type and shoe size. This data forms an average that is tested against a product the user knows. If the average is within the other product's centimeters margin, then the application returns a match. *Keywords*: web scraping, android apps, data analysis

Claudia Elisabeta Vidican, "Aurel Vlaicu" University of Arad, claudiavidicanro@hotmail.com Crina Anina Bejan, "Aurel Vlaicu" University of Arad, F. of Exact Science, ratiu_anina@yahoo.com



A Study about COVID-19 with Mathematical Models

Maria Popa Scientific Advisor: Lect. Monica Bota, PhD

Abstract: COVID-19 is an interesting topic that influences people all over the world. This paper presents the latest results on the spread of COVID-19 in different countries. The study uses well known mathematical models from population dynamics.

Keywords: Differential equations; Malthus model; Logistic equation; Mathematical models; COVID-19

Main results

The novel of coronavirus, also known as COVID-19 became an interesting topic for scientists, researchers and mathematicians. Everyone tries to find a way to estimate the number of cases and to find a solution for reducing the spread of the virus. Much attention has been drawn to mathematical modelling. The aim of this study is to present the latest results about mathematical models used on the COVID-19 spread in different countries. Several recent studies [1-3] concentrated on the logistic equation. In [1] the authors studied the spread of the virus in Russia. A logistic equation was developed with the parameters calculated using the results of the pandemic in China. The results were closed to the real data. Other recent studies [2-3] have shown that simplest logistic model leads to good results when applying it to the most European countries.

Conclusions

Summarizing the results, we would like to emphasize, that the logistic model with all its simplicity describes properly the COVID-19 epidemy in many countries. The papers, that were the starting point of this work applied the classical logistic model. The obtained results were closed to the real data. Future work will include applying these models on Romania. We also like to build new models on COVID-19 cases in Romania and to compare the results with the recent studies.

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Lect. Monica Bota, PhD, Babeş Bolyai University, Faculty of Mathematics and Computer Science, bmonica@math.ubbcluj.ro



Digital electronic Money Box

Cristin Burduja Scientific Advisor: Assoc. Prof. Maria Beldiga, PhD

Abstract: With the advent of new metal coins the circulation of coins has taken on a new scale. Thus, the need for devices that will allow the counting and storage of coins from: Republic of Moldova, Romania, Europe, etc., called electronic money boxes has appeared. At the moment the existing electronic money boxes allow the counting and storage of the coins, but do not allow the setting of any currency.

Keywords: coin; storage; device; counting;

The researches were oriented towards the development of a technology for the recognition of coins through an infrared sensor. This sensor allows analysis and calculation for each individual currency.

First, the desired coins are calibrated, so their number and true value are chosen.

- The functional is based on a phototransistor and a diode. The diode is parallel to the phototransistor and when the coin passes through them, the microprocessor observes the difference between the signal and compares it with the value previously set, if the value is equivalent to the approximate value of the value set in memory, the value with which it was calibrated is saved.
- The statistics of each type of coins entered. All the settings of the money box are saved in the independent memory, so they will be saved even after disconnecting from the electric current.
- Ultra energy saving regime, the money box can consume about 0.07mA/h on standby.
- Any number of coins of different size can be calibrated.
- At the moment, the money box is calibrated for coins from the Republic of Moldova.

Using better quality components and developing a more sophisticated mechanism can raise the money processing capacity. Also, the project can be developed by adding system functionalities based on the weight of the coins. In amount we will receive a universal, very accurate and fast electronic counting device.

Cristin Burduja, Universitatea de Stat din Moldova, cristin.burduja@gmail.com Maria Beldiga PhD, Facultatea Fizică și Inginerie,Universitatea de Stat din Moldova, maria.beldiga@gmail.com



Automatic Detection Methods of Retina Disease Regions

Mircea Weingart Scientific Advisor: Prof. Popescu Dan, PhD

Abstract: Automatic localization of retina disease regions is the subject of this article with the purpose of support for the automation of retina treatment.

Keywords: retinatreatment; automational gorithms; detection of retinadisease regions

1.Introduction

Retina treatment methods use newer technologies, including Automatic image processing for the detection of disease regions. Here we introduce in the paper some of such techniques.

Figures with eye fundus are provider with retina disease regions.

Detection methods used for the automation of disease retina regions treatment. Results from software experiments.

Here are described the methods of eye fundus image processing used for the detection disease retina regions. Software based results are presented.

2. Conclusions

In this section is shown possible usage of the proposed automation of retina ndisease regions detection for a better treatment of retina.

Mircea Weingart, University Politehnica, Automation and Computer Science Faculty, Bucharest, a mirceagabr@gmail.com

Prof. Popescu Dan, PhD, University Politehnica of București, Romania, Faculty of Automatic Controls and Computers, dan-popescu@upb.ro



Stud Stud

NO.	AUTHOR NAME	AFFILIATION AND CONTACT		
1.	Andrei Stan	"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Mathematics and Computer Science, stan.andrey@yahoo.com		
2.	Rebecca-Monica Pui	"Aurel Vlaicu" University of Arad, pui.rebecca007@gmail.com		
3.	Eduard-Richard Bumbu	"Aurel Vlaicu" University of Arad, reduardbumbu@gmail.com		
4.	Daniel Durbaca	"Aurel Vlaicu" University of Arad durbaca.daniel@gmail.com		
5.	Daniel Hanes	"Aurel Vlaicu" University of Arad danihanes@yahoo.com		
6.	Alexandr Parahonco	Alecu Russo State University of Balti, alexandr.parahonco@usarb.md		
7.	Radu-Vasile Bucur	"Aurel Vlaicu" University of Arad, radubucur27@gmail.com		
8.	Pavoni Shari Dario Kovacs	"Aurel Vlaicu" University of Arad, sharidkpavoni@gmail.com		
9.	Ion Ganea	Moldova State University, Chișinău, iganea9@gmail.com		
10.	Cristian-Aurel Rafiliu	"Babeș-Bolyai" University, Departament of Mathematics, Cluj-Napoca		
		rcmr0432@scs.ubbcluj.ro, cristian.rafiliu@stud.ubbcluj.ro		
11.	Harsh Shah	Pillai Hoc College of Engineering and Technology Rasayani Maharashtra India (9594754889), harshshah9594@gmail.com		
12.	Simran Surve	Pillai Hoc College of Engineering and Technology Rasayani Maharashtra India (7678023034), simransurve1426@gmail.com		
13.	Rutuja Kore	Pillai Hoc College of Engineering and Technology Rasayani Maharashtra India., korerutuja15@gmail.com		
14.	Andrei Iovescu	Faculty of Mathematics and Informatics, West University of Timişoara, andrei.iovescu99@euvt.ro		
15.	Eduard Stefan Grigoriciuc	Facultatea de Matematica si Informatica - Univ. Babes- Bolyai, Cluj-Napoca		
		grigoriciuceduard96@yahoo.com		
16.	Paul Răzvan Țapoș	Babeş-Bolyai University, Faculty of Mathematics and Computer Science, 1 Mihail Kogălniceanu St., RO-400084 Cluj-Napoca, paul.tapos@stud.ubbcluj.ro		



NO.	AUTHOR NAME	AFFILIATION AND CONTACT
17.	Roberta Barba	"Aurel Vlaicu" University of Arad, barba.roberta2015@gmail.com
18.	Adrian Boroș	"Aurel Vlaicu" University of Arad, borosadrianemail@gmail.com
19.	Andrei Bota	"Aurel Vlaicu" University of Arad, bota_andrei@yahoo.com
20.	Andreea Bianca Sabău	"Aurel Vlaicu" University of Arad, email: sabauabi@gmail.com
21.	Josef Höniges	"Aurel Vlaicu" University of Arad, email: new.combe@yahoo.de
22.	Bogdan-George Gros	"Aurel Vlaicu" University of Arad gros.bogdan@yahoo.com
23.	Miruna Maura Trocan	"Aurel Vlaicu" University of Arad, trocan.maura@gmail.com
24.	Alexandru Nicolăiță	"Aurel Vlaicu" University of Arad, nicolaitaalexandru@gmail.com
25.	Sorin Miroiu	"Aurel Vlaicu" University of Arad sorinmiroiu.sm@gmail.com
26.	Claudia Elisabeta Vidican	"Aurel Vlaicu" University of Arad, claudiavidicanro@hotmail.com
27.	Maria Popa	"Babeş Bolyai" University, Faculty of Mathematics and Computer Science, maria.popasb@gmail.com
28.	Cristin Burduja	Universitatea de Stat din Moldova, cristin.burduja@gmail.com
29.	Mircea Weingart	University Politehnica, Automation and Computer Science Faculty, Bucharest, Romania mirceagabr@gmail.com



LIST OF SCIENTIFIC ADVISORS

NO.	SCIENTIFIC ADVISOR NAME	AFFILIATION		
1.	Prof. Radu Precup, PhD.	"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Mathematics and Computer Science, r.precup@math.ubbcluj.ro		
2.	Assoc. Prof. Mircea Petic, PhD	Institute of Mathematics and Computer Science, Republic of Moldova, mircea.petic@math.md		
3.	Prof. Gheorghe Căpățână, PhD.	Moldova State University, Chişinău gh capatana@vahoo.com		
4.	Prof. Andrei Mărcuș, PhD	Babeş-Bolyai University, Departament of Mathematics, Cluj-Napoca,		
5.	Dr. Avinash J. Kamble	Pillai HOC college of engineering and Technolgy, rasayani-410207, Maharashtra, India (8108536986)		
6.	Lect. Mădălina Erașcu, PhD	West University of Timișoara, madalina.erascu@e-uvt.ro		
7.	Prof. Gabriela Kohr, PhD.	"Babeş-Bolyai" University of Cluj-Napoca, Faculty of Mathematics and Computer Science, gkohr@math.ubbcluj.ro		
8.	Assoc. Prof. Maria Beldiga, PhD	Moldova State University, Chișinău, Republic of Moldova, maria.beldiga@gmail.com		
9.	Lect. Violeta Eugenia Chiș, PhD.	"Aurel Vlaicu" University of Arad, Romania viochis@yahoo.com		
10.	Prof. Valentina Emilia Bălaș, PhD.	"Aurel Vlaicu" University of Arad, Romania, balas@drbalas.ro		
11.	Prof. Dominic Bucerzan, PhD.	"Aurel Vlaicu" University of Arad, Romania, dominic@bbcomputer.ro		
12.	Lect. Monica Bota, PhD	"Babeş Bolyai" University, Faculty of Mathematics and Computer Science, bmonica@math.ubbcluj.ro		
13.	Prof. habil. Dorin Herlo, PhD	"Aurel Vlaicu" University of Arad, dorinherlo@gmail.com		
14.	Prof. Dan Popescu, PhD.	University Politehnica of București, Romania, Faculty of Automatic Controls and Computers, dan-popescu@upb.ro		
15.	Assoc. Prof. Crina Anina Bejan, PhD	"Aurel Vlaicu" University of Arad, Romania, ratiu_anina@yahoo.com		



Conference Agenda

"Aurel Vlaicu" University, Faculty of Exact Sciences Str. Elena Drăgoi, nr. 2, 310330 Arad, Complex M Zoom Platform

Thursday, 26.11.2020			
UTC -Time	RO -Time		
06:00 - 07:00	08:00 - 9:00	Registration	
07:10-07:25	09:10 - 09:25	StudMath-IT 2020 Opening Ceremony	
07:30 - 09:45	09:30 - 11:45	Plenary Presentation	
09:45 – 10:10	11:45 - 12:10	Coffee Break	
10:15 - 12:45	12:15 - 14:45	Parallel Sessions – Papers Presentation	
10:15 - 12:45	12:15 - 14:45	Parallel Sessions – Papers Presentation	
10:15 - 12:45	12:15 - 14:25	Parallel Sessions – Papers Presentation	
Friday, 27.11.2020			
		Workshop on "Scientific Writing"	
07:00 - 09:00	09:00 - 11:00	Limited number of participants.	
		Please contact the organizers	



StudMath-IT 2020 Student Conference Detailed Program

Thursday, 26.11.2020

"Aurel Vlaicu" University, Faculty of Exact Sciences

Str. Elena Drăgoi, nr. 2, 310330 Arad, Complex M

Zoom Platform

UTC -Time	RO - Time	Thursday, 26.11.2020
06:00 - 07:00	08:00 - 9:00	Registration
07:10-07:25	09:10 - 09:25	StudMath-IT 2020 Opening Ceremony
07:30 - 09:45	09:30 - 11:45	Plenary Presentation
07.00		Codes in Traditional Community Communication
07:30	09:30	Prof. Gabriela Cristescu, PhD
00.20	10.00	Coding Theory in post-quantumcryptography
08:30	10:00	Lect. Vlad Dragoi, PhD
00.20	10:30	Physics Approach to the Mathematical Concept of Symmetry
08:30		Prof. habil. Adrian Palcu, PhD
		Quantum AI from the Ground Up
09:00	11:00	Prof. Valeriu Beiu, PhD
09:45 - 10:10	11:45 - 12:10	Coffee Break

UTC 10:15 – 13:10	RO 12:15 - 15:10	Parallel Sessions – Papers Presentation Chair Prof. Dominic Bucerzan, PhD and Assoc. Prof. Crina Anina Bejan, PhD
10.15	12.15	Bayesian Networks Applied in Physical Phenomena
10.15	12.15	Bogdan-George Gros
10.40	12.40	Comparison Between "Proexplorer" and Other Educational Software
10.40	12.40	Rebecca-Monica Pui
11.05	13:05	Reactive Programming in iOS Development
11.05		Sorin Miroiu
11.30	13:30	CryptoCircle eXchange
11.50		Miruna Maura Trocan, Alexandru Nicolăiță
11.55	13:55	Exploring the Possibilities of Adaptive Learning Systems
11.55		Alexandr Parahonco and Mircea Petic
12.20	14.20	Bitcoin vs. Stablecoins. What does the future hold for cryptocurrencies?
12.20	14.20	Andreea Bianca Sabău and Josef Höniges
12.45	14.45	Use of Web Scraped Data in Android Applications
12:45	14:45	Claudia Elisabeta Vidican



UTC 10:15 – 13:10	RO 12:15 - 15:10	Parallel Sessions – Papers Presentation Chair Lect Simon Cowell PhD and Lect Claudia Luminita Mibit PhD
		Leet. Shiftin Cowen, I nD and Leet. Claudia Luminita Minit, I nD
10:15	12:15	Nonlinear Systems and Nash Type Equilibria
10110	12.10	Andrei Stan
10.40	12.40	A Classification of Groups of Order pqr
10:40	12:40	Cristian-Aurel Rafiliu
11.05	13:05	The Flow Rate of Blood
11:05		Harsh Shah, Simran Surve, Rutuja Kore and Arpita Patil
11.30	13:30	On a Characterization of Absolutely Correct Estimators
11:50		Eduard Stefan Grigoriciuc
	13:55	The Irreducibility of the Polynomial \$X^n-a\$ over the Field Extension
11:55		<pre>\$\mathbb{Q}(\omega_n)\$</pre>
		Paul Razvan Tapos
12.20	14:20	A Study about COVID-19 with Mathematical Models
12:20		Maria Popa
		Benchmark Problems for the Constraints Satisfaction Problems
12:45	14:45	Repository
		Andrei Iovescu

UTC 10:15 – 13:10	RO 12:15 - 15:10	Parallel Sessions – Papers Presentation Chair Prof. Mariana Nagy, PhD and Assoc. Prof. Maria Beldiga, PhD
10.15	12.15	Improving Physical Resistance to Solar Panels Against Weather Effects
10.15	12.13	Eduard-Richard Bumbu, Daniel Durbaca and Daniel Hanes
10.40	12:40	Domestic Fires: A look into Causes, Effects and Prevention Methods
10.40		Shari Dario Kovacs Pavoni and Radu-Vasile Bucur
11.05	13:05	Intelligent Support System for The Study of Soybean Plant Phenology
11.05		Ion Ganea
11.20	13:30	Digital Electronic Money Box
11:50		Cristin Burduja
11.55	5 12.55	Automatic Detection of Retina Disease Regions
11:55	15:55	Mircea Weingart
12.20	14.20	interArad - A Social Platform
12:20	14:20	Barba Roberta, Boroș Adrian and Bota Andrei



StudMath-IT 2020 - Extended Abstracts Volume

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