



1. **Towards a Model-Driven Architecture Process for Developing Industry 4.0 Applications**  
Binder, C.; Neureiter, C.; Lastro, G. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 1-6, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.674; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Emerging technologies in the industrial area lead to continuously increased complexity concerning systems development. Varying approaches dealing with the same problem generate a number of heterogeneous solutions instead of concentrating on a mutual toolset in order to provide a common basis. Having recognized this problem, the German industry introduced the Reference Architecture Model for Industry 4.0 (RAMI 4.0), proposed in the standardized technical specification DIN SPEC 91345. Providing a three-dimensional model on how to structure industrial systems, the starting point for the discussion on how to deal with the upcoming complexity has been set. However, due to the current state of research, only the frame to work in has been specified. In this paper the idea of following an approach based on Model-Driven-Architecture (MDA) in order to develop future industrial systems is introduced. To achieve this, firstly the concepts of RAMI 4.0 are analyzed and a detailed description regarding their applicability for developing specific architectures is given. The approach itself and its application are demonstrated by a real-world case study, which is created with the help of the RAMI Toolbox. (21 refs.)

**Inspec controlled terms:** production engineering computing - standards

**Uncontrolled terms:** industrial systems - RAMI 4.0 - industry 4.0 applications - complexity concerning systems development - German industry - standardized technical specification DIN SPEC 91345 - three-dimensional model - model-driven architecture process - reference architecture model for industry 4.0 - RAMI toolbox

**Classification Code:** C7480 Production engineering computing - E0410D Industrial applications of IT - E1650 Standards and calibration

**Treatment:** Practical (PRA)

**Database:** Inspec

2. **Building Robust Designs for Best Process Scaling**  
Saied, R.M.; Zi Wen **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 87-91, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.690; **Publisher:** IACSIT Press, Singapore

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**Abstract:** The demand for Multi Giga Hertz high performance microprocessors continues to increase along with the need to support many modes of operations under multiple conditions.

The demand from mission critical servers and data farms require that these are robust, reliable and perform at peak performance under all conditions. The devices must be able to work at high speeds to meet the performance demands, quickly and reliably which causes increasing challenges in hardware designs to ensure the machine is both robust and reliable in diverse conditions. There are many aspects involved in performance verification of design such as process technology, voltage, temperature, library design, routing, and the system conditions. In order to model all of this correctly, design has to be verified under multiple PVT (Process, voltage and Temperature) conditions. We need to account for the variation that comes with different voltages and temperature conditions [1], for example how the device behaves at 0.55V vs. 1.1V. In this paper we show how some of these challenges can be addressed through Best Design techniques, Mode of work, and methodology changes to get the design that is robust across different PVTs and reduce process variation impact. (10 refs.)

**Inspec controlled terms:** integrated circuit design - microprocessor chips

**Uncontrolled terms:** process, voltage and temperature conditions - best process scaling - MultiGiga Hertz high performance microprocessors - robust designs - design techniques - process variation impact - multiple PVT - system conditions - library design - process technology - performance verification - hardware designs - performance demands - data farms - mission critical servers - voltage 1.1 V - voltage 0.55 V

**Classification Code:** B1265F Microprocessors and microcomputers - B1265A Digital circuit design, modelling and testing - C5130 Microprocessor chips

**IPC Code:** G06F15/76

**Treatment:** Practical (PRA)

**Database:** Inspec

### 3. Remotely Operated Robot with Live Camera Feed

Ovidiu, S.; Miclea, L. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 46-50, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.682; **Publisher:** IACSIT Press, Singapore

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**Abstract:** In recent years robots have begun to become an active presence in everyday life in various forms. Helpful robots that offer help and support to people with special needs or social robots that are able to interact with customers in stores. The basic challenges that lie in improving their utilization and development are that they do not interact with each other and cannot use the information from one to the other. This paper aims to present a method of how to create a low-cost Android operated robot in order to validate the proposed architecture for an Edge-Computing Cloud in which the robots can be interconnected in a digital society. (9 refs.)

**Inspec controlled terms:** cloud computing - control engineering computing - handicapped aids - mobile computing - mobile robots - smart phones - telerobotics

**Uncontrolled terms:** operated robot - live camera - recent years robots - active presence - helpful robots - social robots - basic challenges - lie - low-cost Android

**Classification Code:** B6430H Video recording - B6135 Optical, image and video signal

processing - C6130V Virtual reality - C7420 Control engineering computing - C5540B Interactive-input devices - C6190J Internet software - C6190V Mobile, ubiquitous and pervasive computing - C3390C Mobile robots - C3390T Telerobotics - C5260B Computer vision and image processing techniques

**IPC Code:** G05B15/00 - G05D1/00 - G06F3/00 - G06F9/44 - G06T - H04N5/76 - H04M1/725

**Treatment:** Practical (PRA)

**Database:** Inspec

#### 4. **An Application of Bilevel Optimization in Pricing and Leasing Strategy**

Thitiananpakorn, S.; Jarumaneeroj, P. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 12-17, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.676; **Publisher:** IACSIT Press, Singapore

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**Abstract:** This paper focuses on the finding of an optimal pricing and leasing strategy for both the third-party warehouse and customers, whose conflicts lie on their contradictory objective functions, via bilevel optimization approach. Bilevel optimization is a game-based approach where the third-party warehouse is a leader, who first decides the price of short and long-term rental contracts taking the behavioral reaction of other players, that is, customers and its competitor, into consideration. Once observed, customers then decide which contracts to be chosen so that their objectives are optimized. While complicated, under certain assumptions, we can show that closed-form solutions could be derived. Our experimental results indicate that competitor storage price significantly affects both third-party warehouse's profit and all of its customer's total costs. Besides, large customer tends to suffer more from high opportunity cost; but, the delivery cost charged by the third-party warehouse is crucial for small customer's rental decision. (9 refs.)

**Inspec controlled terms:** contracts - costing - game theory - materials handling equipment - optimisation - pricing - profitability - rental - service industries

**Uncontrolled terms:** leasing strategy - optimal pricing - third-party warehouse - contradictory objective functions - bilevel optimization approach - game-based approach - long-term rental contracts - competitor storage price - customer

**Classification Code:** C1180 Optimisation techniques - C1290D Systems theory applications in economics and business - E0120K Financial management - E0210G Optimisation - E1850 Materials handling equipment

**Treatment:** Economic (ECO); Theoretical or Mathematical (THR)

**Database:** Inspec

#### 5. **An Efficient Approach for Content-Based Image Retrieval Using Cuckoo Search Optimization**

Kaur, P.; Singh, R.K. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 77-81, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.688; **Publisher:** IACSIT

Press, Singapore

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**Abstract:** The CBIR is a process that retrieves images on the basis of shape, texture and color, etc that is basically features. It works by retrieving images related to Query Image (QI) from big databases. In existing CBIR systems retrieval efficiency is confined by extracting limited feature sets. Different optimization algorithms like Particle swarm optimization, Genetic algorithm, etc have been used for optimization purpose which are very old algorithms. There are number of other algorithms that have been proposed after it that gives better optimized results. Afterwards there is need of classifier to retrieve exact set of the images that will increase the performance of the proposed system and meets the user's requirement. So, in this paper we have proposed a new approach in which firstly image content is improved using Clahe then features are extracted using independent component analysis and select the relevant features that reduces the semantic gap by learning discriminative features directly from the images. Afterwards trained distinct medical image selected features from dataset are optimized using Cuckoo search to improve the accuracy and precision values. The proposed system performance is improved using Support vector machine classifier which meets the user expectation and increase the efficiency of the system. The proposed system is tested in MATLAB in terms of recall, Precision, etc various parameter. The DICOM dataset is used for testing purpose. (18 refs.)

**Inspec controlled terms:** content-based retrieval - feature extraction - genetic algorithms - image retrieval - image texture - independent component analysis - learning (artificial intelligence) - neural nets - particle swarm optimisation - pattern classification - search problems - support vector machines - visual databases

**Uncontrolled terms:** feature extraction - DICOM dataset - MATLAB - support vector machine classifier - independent component analysis - Big databases - query image - medical image - learning discriminative features - image content - genetic algorithm - particle swarm optimization - CBIR systems retrieval efficiency - cuckoo search optimization - content-based image retrieval

**Classification Code:** B6135 Optical, image and video signal processing - B0240Z Other topics in statistics - B0260 Optimisation techniques - C5260B Computer vision and image processing techniques - C5290 Neural computing techniques - C6130 Data handling techniques - C6160S Spatial and pictorial databases - C6170K Knowledge engineering techniques - C1140Z Other topics in statistics - C7250R Information retrieval techniques - C1180 Optimisation techniques

**IPC Code:** G06F7/00 - G06F15/18 - G06F17/30 - G06T - G06T7/40 - G06N5/04 - H04N21/232

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

6. **Animation in Robotics with LabVIEW Instrumentation**

Olaru, A.D.; Olaru, S.A.; Mihai, N.F.; Smidova, N.M. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 34-40, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.680; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Animation in Robotics is one of the most important problem to be solved because with animation will be possible to obtain the best results to control the working space of robots in a space application, to control the Forward and Inverse Kinematics (FK, IK) algorithms, to control the singularity points in applications with one or multiple robots, in different cases: parallel, serial or complex robotic disposeure. In the paper are shown the state of art in this field, the general algorithm used for animation and some usual cases for some type of robots like: Gun, Scara, Portal, Arm, Leg, serial, parallel or complex multi robots applications. The paper shown also the constraints for parallel robot structures and how could be animate this types of robots or the human robots like multi robot application. For all these cases were designed some LabVIEW virtual instruments (VI) what work on-line and by using the remote control or the external files or the front panel buttons, we can do some moving in the space of all robot's bodies to validate de FK and IK, to construct the parallel robot structure. The used algorithms, the cases that were studied, the applied methods and cases of animation open the way to optimal solve the complex problems in robotics. (38 refs.)

**Inspec controlled terms:** control engineering computing - mobile robots - multi-robot systems - virtual instrumentation

**Uncontrolled terms:** animation open - remote control - LabVIEW virtual instruments - multirobot application - human robots - parallel robot structure - complex robotic disposeure - serial disposeure - multiple robots - space application - working space - robotics

**Classification Code:** B7210B Computerised instrumentation - C3390 Robotics - C3120C Spatial variables control - C7420 Control engineering computing - C7410H Computerised instrumentation - C3390C Mobile robots - E2230 Robot and manipulator mechanics

**IPC Code:** G05B15/00 - G05D1/00 - G05D3/00

**Treatment:** Practical (PRA)

**Database:** Inspec

7. **Continuously variable transmission vehicle modeling and control algorithm considering fuel efficiency and driveline efficiency**

Beomjoon Pyun; Chulwoo Moon; Changhyun Jeong; Dohyun Jung **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 128-34, June 2019; ISSN: 2010-3697; DOI: 10.7763/IJMO.2019.V9.697; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

Korea Automotive Technol. Inst., Korea, Republic of

**Abstract:** From the perspective of vehicle driving, the relation between driveline efficiency and fuel efficiency is a trade-off. Moreover, there are differences in each driver's preference in the ranges of driveline efficiency and fuel efficiency. For these reasons, the optimization between driveline efficiency and fuel efficiency is applied considering personal driving characteristics. Study using a Continuously Variable Transmission (CVT) control algorithm has advantageous because continuous gears have a lot of freedom for control. Therefore, the Target Probability, which is related to the driving characteristics, is applied to the CVT gear shifting control

algorithm based on a CVT vehicle model and verified. (9 refs.)

**Inspec controlled terms:** fuel economy - gears - power transmission (mechanical) - variable speed gear - vehicle dynamics

**Uncontrolled terms:** CVT gear shifting control algorithm - target probability - continuously variable transmission vehicle modeling - driveline efficiency - fuel efficiency - variable transmission vehicle modeling - continuously variable transmission control algorithm

**Classification Code:** C3360 Transportation system control - E2330 Mechanical drives and transmissions - E2220 Vehicle mechanics - E1550 Control technology and theory - E3650 Transportation industry

**IPC Code:** B60K - F16H - F16H9/00 - F16H15/00 - F16H15/04 - G05D1/00

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

8. **Opponent Modelling with Eligibility Trace for Multi-agent Reinforcement Learning**

Hao Chen; Jian Huang; Jianxing Gong **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 140-5, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.699; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

Coll. of Artificial Intell., Nat. Univ. of Defense Technol., Changsha, China

**Abstract:** Markov games and reinforcement learning algorithms are applied successfully in multi-agent learning systems such as Minimax-Q. Because of the interdependence between agents, it's time consuming to find the optimal policy when agents learning concurrently. Some algorithms accelerate convergences through spatial or action generalization, which requires domain-dependent prior knowledge. In order to improve learning efficiency directly, the opponent modelling Q( $\lambda$ ) algorithm is proposed which combines fictitious play in game theory and eligibility trace in reinforcement learning. A series of empirical evaluations were conducted in the classical soccer domain. Compared with several other algorithms, it is proved that the algorithm contributed in this paper significantly enhances the learning performance of multi-agent systems. (12 refs.)

**Inspec controlled terms:** game theory - learning (artificial intelligence) - Markov processes - multi-agent systems

**Uncontrolled terms:** eligibility trace - multiagent reinforcement learning - markov games - reinforcement learning algorithms - multiagent learning systems - optimal policy - spatial action generalization - multiagent systems - learning performance - classical soccer domain - game theory - opponent modelling - learning efficiency - domain-dependent prior knowledge

**Classification Code:** C6170K Knowledge engineering techniques - C1140E Game theory - C1140J Markov processes - C1180 Optimisation techniques

**IPC Code:** G06F15/18 - G06N5/04

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

9. **Deep Exercise Recommendation Model**

Tuanji Gong; Xuanxia Yao **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 18-23, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.677; **Publisher:** IACSIT Press, Singapore

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**Abstract:** In online education scenario, recommending exercises for students is an attractive research topic. In this paper, we propose a new hybrid recommendation model that combines deep collaborative filtering (DeepCF) component with wide linear component. The former incorporates stacked denoising auto-encoder(SDAE) into matrix factorization and the latter is general linear component. In DeepCF component, we employ SDAE to learn low dimension latent feature of a student's feature and an item's feature and use matrix factorization method to predict the rating that a student rates an item. In wide linear model, we incorporate some meta properties of an item, such as difficulty, type and knowledge components(KCs). The two components are combined by linear approach. We use negative sampling method to generate the training dataset. An item is corrupted by Gaussian noise and is feed into the SDAE net ,which consists of encoder and decoder with multiple layers. We use tightly couple model to combine SDAE model and collaborative filter model. Experimental results show that the proposed model achieves a 10% relative improvement in AUC metric compared to the traditional collaborative filter method. (19 refs.)

**Inspec controlled terms:** collaborative filtering - computer aided instruction - learning (artificial intelligence) - matrix decomposition - recommender systems - sampling methods

**Uncontrolled terms:** negative sampling method - SDAE net - deep exercise recommendation model - online education scenario - deep collaborative filtering component - matrix factorization - general linear component - DeepCF component - low dimension latent feature - student rates - items feature - matrix factorization method - knowledge components - Gaussian noise - stacked denoising auto-encoder

**Classification Code:** C7810C Computer-aided instruction - C1110 Algebra - C1140Z Other topics in statistics - C7250N Search engines - C7250R Information retrieval techniques - C6170K Knowledge engineering techniques - C7210N Information networks

**IPC Code:** G06F15/18 - G06F17/30 - G09B5/00 - G06N5/04 - H04N21/466

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

10. **Construction Modeling and Schedule Optimization for Deep Foundation Pit of Metro Station Based on Time-Space Effect and Risk Control**

Guangming Yu; Xiankun Zeng; Yongjun Qin; Yongning Li; Yingnian Yu; Xianguo Meng **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 113-20, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.695; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Metro stations are often built in the main urban area of the cities, its surrounding buildings are dense, the sources of risk are numerous. The construction of the metro station foundation pit is bound to have a certain impact on the adjacent buildings around. Therefore, it is necessary to scientifically follow the time-space effect of the construction of the foundation pit of the metro station, control the additional stress caused by the construction of the foundation pit of the metro station to the surrounding soil and buildings in the whole process and control the construction process of the foundation pit of the metro station scientifically. In order to ensure that the metro station foundation pit construction around the adjacent buildings do not cause harmful effects. Combined with a deep foundation pit engineering example of a metro station in a city, the change of stratum stress in the process of excavation and support of deep foundation pit are simulating by using the 3D finite element software MIDAS GTS NX (New eXperience of Geo-Technical analysis System). On this basis, the construction schedule of the deep foundation pit is optimized by using the Critical Chain Method, the scientific and advanced management mode of the deep foundation pit construction of the metro station based on the risk control and time-space effect is obtained, so as to evaluate the time-space effect and the control effect of the deep foundation pit construction. The integration of mechanical modeling, mechanical analysis, risk management and schedule optimization is realized. (15 refs.)

**Inspec controlled terms:** finite element analysis - foundations - geotechnical engineering - risk management - soil - stress analysis

**Uncontrolled terms:** metro station foundation pit construction - time-space effect - risk control - deep foundation pit construction - deep foundation pit engineering example - adjacent buildings

**Classification Code:** E2110D Geotechnical structures - E3030 Construction industry - E0210L Numerical analysis

**IPC Code:** E02D

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

#### 11. **Bi-objective Optimization of Logistic Networks with Full-Connectivity Structure Using NSGA-II**

Ignaciuk, P.; Wiecek, L. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 55-61, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.684; **Publisher:** IACSIT Press, Singapore

#### **Author affiliation:**

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**Abstract:** This paper addresses the resource control issue in goods distribution networks. Two types of actors-suppliers and warehouses-are linked without topological restrictions. The interconnection structure in the discussed class of logistic networks forms a mesh-type topology. During the distribution process, the warehouses face external demands, not known a priori. The



flow of goods in the system is governed according to the networked order-up-to (NOUT) inventory management policy implemented in a centralized manner. The balance between the customer service level and the holding cost poses a bi-objective optimization challenge. The novelty of this paper is an application of the nondominated sorting genetic algorithm II to adjust the NOUT policy to the logistic problem under consideration. Numerical studies performed for various topologies and distribution structures have asserted the efficiency of the discussed method. (23 refs.)

**Inspec controlled terms:** customer services - genetic algorithms - goods distribution - inventory management - logistics - warehousing

**Uncontrolled terms:** nondominated sorting genetic algorithm II - NOUT policy - logistic problem - distribution structures - bi-objective optimization challenge - customer service level - inventory management policy - distribution process - mesh-type topology - interconnection structure - topological restrictions - warehouses - actors-suppliers - goods distribution networks - resource control issue - NSGA-II - full-connectivity structure - logistic networks

**Classification Code:** E1010 Production management - E1830 Goods distribution - E0120R Customer services - E0210G Optimisation

**IPC Code:** B65G1/00

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

## 12. Design of a kinematic and emotional assessment module for the tele-rehabilitation platform

Rybarczyk, Y.; Leconte, L.; Peacuterez Medina, J.L.; Jimenes Vargas, K.; AcostaVargas, P.; Esparza, D. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 92-6, April 2019; ISSN: 2010-3697; DOI: 10.7763/IJMO.2019.V9.691; **Publisher:** IACSIT Press, Singapore

### **Author affiliation:**

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**Abstract:** Tele-rehabilitation is becoming extremely popular in the health scenario. Although this new medical approach has several advantages over traditional therapy, it is important to identify its limitations and risks in the recovery process. This study focuses on the modeling and implementation of a module to assess in real time the quality of movement and the emotional state of patients when they execute the rehabilitation exercises provided by a web-based platform. An algorithm based on dynamic time warping is proposed and tested to assess the movement kinematic. Furthermore, pain is discriminated through a support vector machine classifier. Both methods allow a high identification of gestures and emotions, respectively. These results are discussed in terms of the most suitable solutions to develop an efficient telerehabilitation system. (16 refs.)

**Inspec controlled terms:** medical computing - patient rehabilitation - patient treatment - support vector machines - telemedicine

**Uncontrolled terms:** movement kinematic - dynamic time warping - web-based platform - recovery process - traditional therapy - medical approach - health scenario - tele-rehabilitation platform - emotional assessment module - kinematic assessment module - support vector machine classifier

**Classification Code:** A8770G Patient care and treatment - B7520 Patient care and treatment - B7550 Biomedical communication - C7330 Biology and medical computing - C6170K Knowledge engineering techniques

**IPC Code:** G06F15/18 - G06F19/00 - G06N5/04

**Treatment:** Practical (PRA)

**Database:** Inspec

### 13. Electrical Behavior of Connectors under Different Atmospheres

El Abdi, R.; Labbeacute, J.; Le Strat, F. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 51-4, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.683; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Connector was composed of a female and male part which induced vibrations from the vehicle might lead to relative movements between these two parts. A relative movement of the contact zone between these two parts can lead to an irreversible mechanical degradation and an electrical perturbation by the formation of a third-body layer at the contact zone. This was the fretting corrosion phenomenon in electrical contact, which depends of the contact materials used, the atmosphere in which the connectors were used, and mechanical parameters (contact force, material hardness ...). For economic reasons, the tin was used for coating to protect the substrate made of copper. In the air, the oxygen reacts with soft tin and forms a hard and brittle layer of tin oxides at the surface, which become remains under vibration stresses. Our study is about the measurement of electrical behavior of metallic connectors in two atmospheres: air and nitrogen as an inert gas. When a connector is tested in air atmosphere, a typical increase of the contact voltage amplitude was obtained. On the other hand, a nitrogen gas atmosphere leads to the contact voltage decrease. The change of the contact voltage highlights the ejection and the production of remains which were not so well understand. The study of the contact voltage provides new information about the degradation, to understand the fretting-corrosion phenomena. (15 refs.)

**Inspec controlled terms:** brittleness - contact resistance - copper - corrosion - electric connectors - electrical contacts - hardness - oxidation - tin - vibrations

**Uncontrolled terms:** fretting-corrosion phenomena - contact voltage - nitrogen gas atmosphere - metallic connectors - tin oxides - material hardness - contact force - electrical contact - fretting corrosion - third-body layer - electrical perturbation - irreversible mechanical degradation - vibrations - Cu - Sn

**Classification Code:** A8160B Surface treatment and degradation of metals and alloys - A6220M Fatigue, brittleness, fracture, and cracks - A6855 Thin film growth, structure, and epitaxy - A8140N Fatigue, embrittlement, and fracture - B2180E Connectors

**IPC Code:** C23F - C23G - H01R

**Treatment:** Practical (PRA); Experimental (EXP)

**Database:** Inspec

14. **A comparative study of recent swarm intelligence approaches on global optimization**  
Alharbi, S.T. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 62-6, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.685; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

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**Abstract:** This paper presents a comparative study of three Swarm Intelligence approaches which are: Bat Algorithm (BA), Firefly Algorithm (FA) and Artificial Bee Colony (ABC) Algorithm applied to a set of standard benchmark functions. The results of this study were analyzed and compared on the basis of mean value of obtained objective values. All of these approaches were investigated taking into consideration several dimensionalities which are 10, 20,30, 50 and 100. Statistical results indicated that ABC significantly surpassed BA and FA on the majority of the experimental instances and FA was able to significantly archive better objective values than BA in most of the test cases. The paper finally concludes with some future work directions. (29 refs.)

**Inspec controlled terms:** evolutionary computation - particle swarm optimisation - search problems - swarm intelligence

**Uncontrolled terms:** FA - swarm intelligence approaches - global optimization - bat algorithm - artificial bee colony algorithm - ABC - standard benchmark functions - mean value - obtained objective values - firefly algorithm

**Classification Code:** C1230 Artificial intelligence - C1180 Optimisation techniques

**Treatment:** Theoretical or Mathematical (THR)

**Database:** Inspec

15. **A linear programming approach to land allocation in vegetable production: a case study from Croatia**  
Grubiscaronicacut, M.; Kolarec, B.; Mamicacut, M. **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 160-5, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.703; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

Univ. of Zagreb, Zagreb, Croatia

**Abstract:** We set up a linear programming problem of agricultural land allocation in vegetable production on a case study of a family farm in Croatia. It was solved by Excels' tool Solver. We discuss on setting up the problem, the solution and the obtained sensitivity report. Further, we set up and solve a dynamical optimization problem to determine the optimal production for the second year respecting crop rotation rules. (9 refs.)

**Inspec controlled terms:** agriculture - crops - linear programming

**Uncontrolled terms:** agricultural land allocation - vegetable production - Croatia - dynamical optimization problem - linear programming approach - crop rotation rule - Excel tool Solver

**Classification Code:** E3010 Agriculture - E0210G Optimisation - E1780 Products and commodities

**IPC Code:** A01

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

16. **Improving the Quality of Personnel Scheduling by Incorporating Fairness**

Alp, G.; Alkaya, A.F. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 97-101, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.692; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

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**Abstract:** This paper deals with a real world personnel scheduling problem of a company that has large number of employees. In this problem, once given the number of workers needed for each day and shift, and the constraints emerging from the company and official regulations, the objective is to assign the shifts to workers in a fair manner. To solve this problem, we defined two sub problems, where the first one is the tour scheduling problem, and the second one is the employee assignment problem. We built the integer linear models of these problems by incorporating the constraints and implemented the models in a solver. Application results show that our results are much better in terms of schedule quality and fairness when it is compared with actual schedule. To our best, this is the first study that takes fairness into account. (13 refs.)

**Inspec controlled terms:** human resource management - integer programming - linear programming - personnel - scheduling

**Uncontrolled terms:** integer linear models - schedule quality - personnel scheduling problem - official regulations - fair manner - tour scheduling problem - employee assignment problem

**Classification Code:** C1290F Systems theory applications in industry - C1180 Optimisation techniques - C1290D Systems theory applications in economics and business - E0120M Human resource management - E0210G Optimisation - E1540 Systems theory applications

**Treatment:** Theoretical or Mathematical (THR)

**Database:** Inspec

17. **Feature weighting using a clustering approach**

Dousthagh, M.; Nazari, M.; Mosavi, A.; Shamshirband, S.; Chronopoulos, A.T. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 67-71, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.686; **Publisher:** IACSIT Press, Singapore

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**Abstract:** In recent decades, the volume and size of data has significantly increased with the growth of technology. Extracting knowledge and useful patterns in high-dimensional data are challenging. In fact, unrelated features and dimensions reduce the efficiency and increase the complexity of machine learning algorithms. However, the methods used for selecting features and weighting features are a common solution for these problems. In this study, a feature weighting approach is presented based on density-based clustering. This method has been implemented in two steps. In the first step, the features were divided into clusters using density-based clustering. In the second step, the features with a higher degree of importance were selected in accordance to the target class of each cluster. In order to evaluate the efficiency, various standard datasets were classified by the feature selection and their degree of importance. The results indicated that the simplicity and suitability of the method in the high-dimensional dataset are the main advantages of the proposed method. (19 refs.)

**Inspec controlled terms:** data mining - learning (artificial intelligence) - pattern classification - pattern clustering

**Uncontrolled terms:** high-dimensional dataset - clustering approach - useful patterns - high-dimensional data - unrelated features - machine learning algorithms - weighting features - feature weighting approach - density-based clustering - feature selection

**Classification Code:** C6170K Knowledge engineering techniques - C6130 Data handling techniques

**IPC Code:** G06F7/00 - G06F15/18 - G06N5/04

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

18. **Direct Modeling of Inductor Saturation Behavior in a SPICE-Like Transient Analysis**  
Winkler, P.; Guumlntner, W. **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 122-7, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.696; **Publisher:** IACSIT Press, Singapore

**Author affiliation:**

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**Abstract:** In this paper we demonstrate how the saturation behavior of an inductor can be directly inserted as a software function into the mathematical description of a circuit and included in a SPICE-like numerical simulation. Within the numerical computation of the circuit the inductance value changes in dependence on the actual inductor current, following the real life behavior of the choke. The shown procedure leads to more exact and realistic simulation results than assuming the inductance to be a constant value, which is the common way in SPICE-programs. Based on an example choke we show how any saturation curve, derived from measurement data or core manufacturer information, can be inserted in a computational model

of the inductance. This is a significant advantage over the possibilities to model inductor saturation, which different SPICE programs are offering, what is also shown in the paper. On the application of a boost converter the impact of the consideration of the saturation on the simulation result is presented and compared to a simulation with a constant inductor. (9 refs.)

**Inspec controlled terms:** inductors - numerical analysis - transient analysis

**Uncontrolled terms:** direct modeling - inductor saturation behavior - SPICE-like transient analysis - software function - mathematical description - SPICE-like numerical simulation - numerical computation - inductance value changes - actual inductor - life behavior - exact simulation results - realistic simulation results - SPICE-programs - saturation curve - core manufacturer information - computational model - model inductor saturation - different SPICE programs - constant inductor

**Classification Code:** B2140 Inductors and transformers - B0290Z Other numerical methods

**IPC Code:** H01F27/00

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

#### 19. **API Testing for Payment Service Directive2 and Open Banking**

Coste, R.; Miclea, L. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1, 7-11, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.675; **Publisher:** IACSIT Press, Singapore

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**Abstract:** In this paper a solution is described for API Testing of the Payment Service Directive 2 [abbreviation PSD2] which was adopted within EU legislations. The directive PSD2 is a general requirement from European Banking Authority for the banking industry in European Union to provide programming interfaces APIs. The solution proposed is targeting types of software testing in order to validate the Payment Service Directive within a digital banking system. It comes with great opportunities in technology to develop and test applications which need to be regulated by the PSD2. Therefore in this paper an approach will be described and especially results for API testing run against a 3rd party provider [abbreviation TPP] are available. The paper is focusing on customer benefit and cost-efficient adaptation for the PSD2. (11 refs.)

**Inspec controlled terms:** application program interfaces - bank data processing - legislation - program testing

**Uncontrolled terms:** directive PSD2 - banking industry - programming interfaces APIs - software testing - digital banking system - API testing - Payment Service Directive2 - open banking - European banking authority - EU legislations - 3rd party provider - TPP

**Classification Code:** C7120 Financial computing - C0230B Legal aspects of computing - C6150E General utility programs - C6150G Diagnostic, testing, debugging and evaluating systems

**IPC Code:** G06F9/00 - G06F11/36 - G06Q30/00 - G06Q40/00 - G06Q40/02

**Treatment:** Practical (PRA)

**Database:** Inspec

20. **Differential Evolution Based Model Selection Approach for Machine Learning**

Yi-Chuan Chiu; Hsin-Hung Lin; Yung-Tsan Jou **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 135-9, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.698; **Publisher:** IACSIT Press, Singapore

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**Abstract:** As the application of big data becomes more and more popular, machine learning algorithms are changing with each passing day, and the models produced by machine learning are increasingly diversified. The focus of big data applications has gradually shifted to the prediction and inference of models. How to choose the most suitable model for enterprise application scenarios among many machine learning models has become a topic of research that has attracted much attention. Ensemble methods have been proposed to discover best model by multiple training phase. Studies of finding best combination within multiple modes are still few. Configuring different machine learning models with appropriate parameters and looking for parameters is an NP-hard problem, which requires an optimization algorithm. This study proposes to apply differential evolution algorithm to integrate multiple trained machine learning models into an appropriate model. In this paper, the regression model is taken as an example and the differential evolution algorithm is compared with the particles swarm optimization algorithm. The results show that the differential evolution algorithm has better performance. (16 refs.)

**Inspec controlled terms:** Big Data - evolutionary computation - learning (artificial intelligence) - particle swarm optimisation - regression analysis

**Uncontrolled terms:** multiple trained machine learning models - regression model - differential evolution algorithm - particles swarm optimization algorithm - model selection approach - machine learning algorithms - big data applications - enterprise application scenarios - multiple training phase - multiple modes - NP-hard problem

**Classification Code:** C6170K Knowledge engineering techniques - C1140Z Other topics in statistics - C1180 Optimisation techniques - C6130 Data handling techniques

**IPC Code:** G06F7/00 - G06F15/18 - G06F17/30 - G06N5/04

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

21. **Online Appearance-Motion Coupling for Multi-Person Tracking in Videos**

Cuan, B.; Idrissi, K.; Garcia, C. **Source:** *International Journal of Modeling and Optimization*, v 9, n 2, 29-33, April 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.687; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Multi-person tracking in videos is a promising but challenging visual task. Recent progress in this field has introduced deep convolutional features as appearance models, which achieve robust tracking results when coupled with proper motion models. However, model failures that often cause severe tracking problems have not been well discussed and addressed in previous work. In this paper, we propose a solution using online detection of such failures and accordingly adjusting the coupling between appearance and motion models. The strategy is to let the functional models take over when certain models face data association ambiguity and simultaneously suppress the influence of inappropriate observations during the model update. Experimental results have proven the benefit of our proposed improvement. (9 refs.)

**Inspec controlled terms:** face recognition - feature extraction - filtering theory - object detection - object tracking - sensor fusion - target tracking - tracking - video signal processing

**Uncontrolled terms:** online appearance-motion coupling - multiperson tracking - promising but challenging visual task - deep convolutional features - appearance models - robust tracking results - proper motion models - model failures - severe tracking problems - online detection - functional models - model update

**Classification Code:** B6135 Optical, image and video signal processing - B6135E Image recognition - B6140B Filtering methods in signal processing - C5260B Computer vision and image processing techniques - C5260D Video signal processing

**IPC Code:** G06K9/00 - G06T

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

## 22. **Multivariate Scenario Generation -An Arima and Copula Approach**

Mishra, S.; Wuumlrsig, C.; Bordin, C.; Palu, I. **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 146-9, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.700; **Publisher:** IACSIT Press, Singapore

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**Abstract:** In mathematical optimization uncertainty is expressed through scenarios. auto-regressive integrated moving average (ARIMA) is one of the known practice to generate scenarios. This paper is about scenario generation using multivariate data: electrical power demand, wind power generation and energy market price. An ARIMA model along with Copula is implemented for scenario generation. The results are presented and discussed. (12 refs.)

**Inspec controlled terms:** autoregressive moving average processes - power markets - pricing

**Uncontrolled terms:** multivariate scenario generation -an - mathematical optimization uncertainty - auto-regressive integrated moving average - known practice - multivariate data - electrical power demand - wind power generation - ARIMA model - Copula



**Classification Code:** B0240Z Other topics in statistics - B0260 Optimisation techniques - B8110B Power system management, operation and economics - C1140Z Other topics in statistics

**Treatment:** Economic (ECO); Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

23. **Numerical Analysis of Rail Wear Behavior in Railway Systems**

Biao Li; Fei Shen; Lichun Bai; Kho, K.; Kun Zhou **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 166-70, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.704; **Publisher:** IACSIT Press, Singapore

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**Abstract:** Wear of rails is one of the most crucial problems in railway systems. Understanding rail wear behavior is essential in determining the optimal maintenance schedules. This work numerically studied the rail wear behavior for curved tracks. A railway vehicle/track multibody dynamics model is established based on the commercial software Universal Mechanism, in which car body, wheelset and suspension subsystem of the train are included in the model. Archard's wear model is used to describe the wear evolution at the contact patch. The effects of train velocity, track radius and track super-elevation on the rail wear behaviors are studied. It was found that fast wear of the outer rail occurs at high train velocity, whereas the inner rail wear rate is increased when the train velocity decreases. The rail wear is sensitive to the track curvature. Larger track curvature leads to faster wear of the outer rail, and thus shorter grinding intervals are required. Moreover, for the outer rail, slower wear of outer rail is achieved when the super-elevation equilibrium velocity approximates the train velocity. Careful selection of super-elevation is important in reducing rail wear. (13 refs.)

**Inspec controlled terms:** grinding - maintenance engineering - mechanical contact - numerical analysis - rails - railway engineering - railways - vehicle dynamics - wear - wheels

**Uncontrolled terms:** rail wear behavior - railway systems - archard - wear evolution - train velocity - fast wear - outer rail - inner rail wear rate - faster wear - slower wear

**Classification Code:** E3650E Railway industry - E1020 Maintenance and reliability - E2140 Tribology (mechanical engineering) - E2210 Mechanical components - E2220 Vehicle mechanics

**IPC Code:** B24B1/00 - B60B - B61 - B61F - E01B - E01B5/02

**Treatment:** Theoretical or Mathematical (THR); Experimental (EXP)

**Database:** Inspec

24. **Microsoft Kinect Sensor Used to Capture Data for Robotics Applications**

Staretu, I.; Moldovan, C. **Source:** *International Journal of Modeling and Optimization*, v 9, n 1,

41-5, Feb. 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.681; **Publisher:** IACSIT Press, Singapore

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Transilvania Univ. of Brasov, Brasov, Romania

**Abstract:** The process of capturing digital images has greatly evolved since the initial appearance of photography in general. In recent years, this evolution has been greatly accelerated by the development of high resolution and specialized digital capture sensors which, in turn, has opened the door for research to develop new products and algorithms allowing imaging to be used as input for controlling different other devices or robots. Still, for there to be a real mapping between a digital image and physical word a lot of research has been done in the field of algorithms and sensors, which have lately resulted in the emergence of affordable and specialized devices on the market like Microsoft Kinect or Motion Leap. Initially, the Microsoft Kinect device was exclusively used for the gaming industry, but later captured the attention of the research community, who quickly noticed that the sensor could be used as a very affordable alternative in the three-dimensional mapping process of space. Soon, an SDK was developed by PrimeSense (OpenNI), which allowed the sensor to be used for any other purpose, not just in the field of games. One of these opportunities is the use of the sensor in the field of image analysis for which a product to capture the movement of a human was developed and is presented in this paper along with a proposal to use the capture mechanism to command and control an industrial robotic arm. (14 refs.)

**Inspec controlled terms:** computer games - image colour analysis - image sensors - industrial robots - object tracking

**Uncontrolled terms:** Microsoft Kinect sensor used - capture data - robotics applications - digital image - digital capture sensors - different other devices - physical word - affordable devices - specialized devices - Motion Leap - Microsoft Kinect device - gaming industry - research community - affordable alternative - three-dimensional mapping process - image analysis - capture mechanism - industrial robotic arm

**Classification Code:** B6135 Optical, image and video signal processing - B7230G Image sensors - C5260B Computer vision and image processing techniques - C7830D Computer games - E1550A Robotics

**IPC Code:** A63F13/00 - G06T - H01L27/146 - H04N5/30

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

25. **Acute Leukemia (ALL and AML) Classification Using Learning Vector Quantization (LVQ.1) With Blood Cell Imagery Extraction**

Asadi, F.; Chiung-An Chen; Ting-Wei Liu; Syafria, F. **Source:** *International Journal of Modeling and Optimization*, v 9, n 3, 171-6, June 2019; **ISSN:** 2010-3697; **DOI:** 10.7763/IJMO.2019.V9.705; **Publisher:** IACSIT Press, Singapore

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**Abstract:** The biggest cancer disease invading children based on the health ministry 2015 is blood cancer or leukemia. One of the type leukemias is acute leukemia which consists of acute

lymphoblastic leukemia (ALL) and acute myelogenous leukemia (AML). Acute leukemia can be diagnosed according to the calculation of a complete blood in the bone marrow, but the calculation process still has several problems, such as when leukemia blood cells are manually counted by microscope, it needs more power, takes too much time, and costs very expensive. This disease can be identified and classified by combining neural network and imaging processing techniques. Learning Vector Quantization (LVQ.1) is used as the neural network approach by extracting leukemia cells of ALL and AML. The image extraction used in this study is to use the color extraction of Hue saturation value color space and the texture feature of Gray level co-occurrence matrix. The experimental results show that the highest accuracy achieved by the proposed algorithm in identifying ALL is about 93.33% trained with 80% training data and tested with 20% testing data. On average, the proposed work yields about 70.31% accuracy to identify both blood cell types. In this sense, the proposed algorithm can classify ALL and AML well. (7 refs.)

**Inspec controlled terms:** biomedical optical imaging - blood - bone - cancer - cellular biophysics - diseases - feature extraction - image classification - image colour analysis - image texture - learning (artificial intelligence) - medical image processing - neural nets - vector quantisation

**Uncontrolled terms:** acute leukemia - complete blood - leukemia blood cells - Learning Vector Quantization - leukemia cells - blood cell types - AML - learning Vector Quantization - blood cell imagery extraction - biggest cancer disease - blood cancer - type leukemias - acute myelogenous leukemia

**Classification Code:** A8770E Patient diagnostic methods and instrumentation - A8760F Optical and laser radiation (medical uses) - B6135 Optical, image and video signal processing - B7510 Biomedical measurement and imaging - C5260B Computer vision and image processing techniques - C6170K Knowledge engineering techniques - C7330 Biology and medical computing

**IPC Code:** G01N33/48 - G06F15/18 - G06F19/00 - G06T - G06T7/40 - G06N5/04

**Treatment:** Practical (PRA); Theoretical or Mathematical (THR)

**Database:** Inspec

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