Analysis of common rail pressure signal of dual-fuel large industrial engine for identification of injection duration of pilot diesel injectors

In this paper, we address the problem of identification of injection duration of common rail (CR) diesel pilot injectors of dual-fuel engines. In these pilot injectors, the injected volume is small and the repeatability of injections and identification of drifts of injectors are important factors, which need to be taken into account in order to achieve good repeatability (shot-to-shot with every cylinder) and therefore a well-balanced engine and furthermore reduced overall wear. This information can then be used for calibration and diagnostics purposes to guarantee engine longevity facilitated by consistent operating conditions throughout the life of the unit. A diagnostics method based on analysis of CR pressure with experimental results is presented in this paper. Using the developed method, the relative duration of injection events can be identified for multiple injectors. We use the phenomenon of drop in rail pressure due to an injection event as a feature of the injection process. The method is based on filtered CR pressure data during and after the injection event. First, the pressure signal during injection is extracted after control of each injection event. After that, the signal is normalized and filtered. Then a derivative of the filtered signal is calculated. Change in the derivative of the filtered signal larger than a predefined threshold indicates an injection event that can be detected and its relative duration can be identified. We present the experimental results and demonstrate the efficacy of the proposed methods using two different types of pressure sensors. We are able to properly identify a change of ≥10 μs (2%, 500 μs) in injection time. This shows that the developed method detects drifts in injection duration and the magnitude of drift. This information can be used for adaptive control of injection duration, so that finally the injected fuel volume is the same as the original.

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Authors: Krogerus, T., Hyvönen, M., Huhtala, K.
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Scopus rating (2013): SJR 1.811 SNIP 2.595 CiteScore 4.31
Scopus rating (2012): SJR 1.852 SNIP 2.465 CiteScore 3.99
Scopus rating (2011): SJR 2.093 SNIP 2.427 CiteScore 4.1
Scopus rating (2010): SJR 1.984 SNIP 2.319
Scopus rating (2009): SJR 2.012 SNIP 2.277
Scopus rating (2008): SJR 1.635 SNIP 2.184
Scopus rating (2007): SJR 1.383 SNIP 1.86
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Scopus rating (2005): SJR 1.623 SNIP 1.73
Scopus rating (2004): SJR 1.273 SNIP 1.883
Scopus rating (2003): SJR 1.103 SNIP 1.481
Scopus rating (2002): SJR 1.13 SNIP 1.301
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Scopus rating (2000): SJR 1.047 SNIP 1.272
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ASJC Scopus subject areas: Mechanical Engineering, Signal Processing, Modelling and Simulation, Applied Mathematics
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Links:
Research output: Scientific › peer-review › Article
Situation Awareness Framework for Multi-machine Environments: An Application to Operator Assistive Collision Warning System

Mobile multi-machine environments consist of varying types of objects, either static or dynamic with the state known exactly or with some uncertainty. Sensors observe the environment from different positions and views, such as horizontally from the top of a mobile machine or vertically downward from an external observing machine. In this paper, we propose a simple grid-based framework for representing the information of varying types of objects in a 2-D environment and Bayesian methods for updating this information through observations and prediction models. This information about the current and near-future state of the environment is called situation awareness (SA). SA information can be utilized as the basis of the operator assistance system for enhancing the safety and efficiency of manual and semiautonomous multi-machine work environments. SA information can also be utilized in task planning of autonomous machines, via creating a dynamic costmap for path planning or entropy map for planning the optimal use of sensory systems. This paper aims at real-time mobile multi-machine environments; hence, the SA framework is kept simple for computational feasibility, but is also general enough to be applicable in other environments as well. Discussion on discretization errors and computational complexity are also covered.

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Scopus rating (2013): SJR 1.416 SNIP 3.628 CiteScore 4.99
Scopus rating (2012): SJR 1.703 SNIP 3.565 CiteScore 4.4
Scopus rating (2011): SJR 1.499 SNIP 4.401 CiteScore 5.11
Scopus rating (2010): SJR 1.648 SNIP 3.811
Scopus rating (2009): SJR 1.319 SNIP 3.449
Scopus rating (2008): SJR 1.551 SNIP 3.437
Scopus rating (2007): SJR 1.541 SNIP 4.05
Scopus rating (2005): SJR 1.253 SNIP 3.36
Scopus rating (2004): SJR 1.024 SNIP 2.665
Scopus rating (2003): SJR 1.139 SNIP 2.544
Scopus rating (2002): SJR 0.921 SNIP 2.565
Scopus rating (2001): SJR 0.396 SNIP 0.525

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Management of distributed knowledge encapsulated in embedded devices
Embedded electronic devices are now to be found everywhere. In general, they can be used to collect different sorts of data (e.g. on temperature, humidity, illumination and locations). In some specific domains, such as industrial automation, embedded devices are used for process control. The devices may have a programme that can respond immediately to environmental changes perceived through sensors. In the control of large sites, where there are many devices, higher
level decisions are made or processed in dedicated computers far away from the sources (devices) where the initial data are collected. This article shows how it is possible to manage portions of distributed knowledge, hosted in embedded devices, making it possible for each embedded device to hold and manage its piece of knowledge. In addition, presented approach allows keeping locus of control at the embedded device level, where the embedded device can make decisions knowing the status of the rest of the world, device contributions and their effects in the overall distributed system knowledge base.

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Authors: Ramis Ferrer, B., Iarovyi, S., Gonzalez, L., Lobov, A., Martinez Lastra, J. L.
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Scopus rating (2012): SJR 1.272 SNIP 1.565 CiteScore 1.93
Scopus rating (2011): SJR 1.154 SNIP 1.381 CiteScore 1.69
Scopus rating (2010): SJR 0.904 SNIP 1.1
Scopus rating (2009): SJR 0.792 SNIP 1.102
Scopus rating (2008): SJR 0.934 SNIP 1.317
Scopus rating (2007): SJR 0.889 SNIP 1.251
Scopus rating (2006): SJR 0.979 SNIP 1.395
Scopus rating (2005): SJR 0.722 SNIP 1.29
Scopus rating (2004): SJR 0.862 SNIP 1.348
Scopus rating (2003): SJR 0.84 SNIP 1.006
Scopus rating (2002): SJR 1.027 SNIP 1.174
Scopus rating (2001): SJR 0.757 SNIP 1.011
Scopus rating (2000): SJR 0.724 SNIP 1.158
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Research output: Scientific - peer-review Article

Binomial Gaussian mixture filter
In this work, we present a novel method for approximating a normal distribution with a weighted sum of normal distributions. The approximation is used for splitting normally distributed components in a Gaussian mixture filter, such that components have smaller covariances and cause smaller linearization errors when nonlinear measurements are used for the state update. Our splitting method uses weights from the binomial distribution as component weights. The method preserves the mean and covariance of the original normal distribution, and in addition, the resulting probability density and cumulative distribution functions converge to the original normal distribution when the number of components is increased. Furthermore, an algorithm is presented to do the splitting such as to keep the linearization error below a given threshold with a minimum number of components. The accuracy of the estimate provided by the proposed method is evaluated in
four simulated single-update cases and one time series tracking case. In these tests, it is found that the proposed method is more accurate than other Gaussian mixture filters found in the literature when the same number of components is used and that the proposed method is faster and more accurate than particle filters.

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*Organisations:* Department of Automation Science and Engineering, Department of Mathematics, Research group: MAT Positioning, Research group: Positioning, Wireless Communications and Positioning (WICO)

*Authors:* Raitoharju, M., Ali-Löytty, S., Piché, R.

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Scopus rating (2014): SJR 0.229 SNIP 0.54 CiteScore 0.7

Scopus rating (2013): SJR 0.267 SNIP 0.506 CiteScore 0.63

Scopus rating (2012): SJR 0.278 SNIP 0.582 CiteScore 0.72

Scopus rating (2011): SJR 0.371 SNIP 0.724 CiteScore 0.91

Scopus rating (2010): SJR 0.403 SNIP 0.982

Scopus rating (2009): SJR 0.474 SNIP 0.823

Scopus rating (2008): SJR 0.468 SNIP 0.897

Scopus rating (2007): SJR 0.386 SNIP 0.913

Scopus rating (2006): SJR 0.362 SNIP 0.92

Scopus rating (2005): SJR 0.519 SNIP 0.968

Scopus rating (2004): SJR 0.603 SNIP 1.155

Scopus rating (2003): SJR 0.63 SNIP 1.023

Scopus rating (2002): SJR 0.14 SNIP 0.329

Scopus rating (2001): SJR 0.118 SNIP 0.372

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*Research output:* Scientific - peer-review › Article

**CytoSpectre: A tool for spectral analysis of oriented structures on cellular and subcellular levels**

*Background:* Orientation and the degree of isotropy are important in many biological systems such as the sarcomeres of cardiomyocytes and other fibrillar structures of the cytoskeleton. Image based analysis of such structures is often limited to qualitative evaluation by human experts, hampering the throughput, repeatability and reliability of the analyses. Software
tools are not readily available for this purpose and the existing methods typically rely at least partly on manual operation. Results: We developed CytoSpectre, an automated tool based on spectral analysis, allowing the quantification of orientation and also size distributions of structures in microscopy images. CytoSpectre utilizes the Fourier transform to estimate the power spectrum of an image and based on the spectrum, computes parameter values describing, among others, the mean orientation, isotropy and size of target structures. The analysis can be further tuned to focus on targets of particular size at cellular or subcellular scales. The software can be operated via a graphical user interface without any programming expertise. We analyzed the performance of CytoSpectre by extensive simulations using artificial images, by benchmarking against FibrilTool and by comparisons with manual measurements performed for real images by a panel of human experts. The software was found to be tolerant against noise and blurring and superior to FibrilTool when analyzing realistic targets with degraded image quality. The analysis of real images indicated general good agreement between computational and manual results while also revealing notable expert-to-expert variation. Moreover, the experiment showed that CytoSpectre can handle images obtained of different cell types using different microscopy techniques. Finally, we studied the effect of mechanical stretching on cardiomyocytes to demonstrate the software in an actual experiment and observed changes in cellular orientation in response to stretching.

Conclusions: CytoSpectre, a versatile, easy-to-use software tool for spectral analysis of microscopy images was developed. The tool is compatible with most 2D images and can be used to analyze targets at different scales. We expect the tool to be useful in diverse applications dealing with structures whose orientation and size distributions are of interest. While designed for the biological field, the software could also be useful in non-biological applications.
Automatic image-based detection and inspection of paper fibres for grasping
An automatic computer vision algorithm that detects individual paper fibres from an image, assesses the possibility of grasping the detected fibres with microgrippers and detects the suitable grasping points is presented. The goal of the algorithm is to enable automatic fibre manipulation for mechanical characterisation, which has traditionally been slow manual work. The algorithm classifies the objects in images based on their morphology, and detects the proper grasp points from the individual fibres by applying given geometrical constraints. The authors test the ability of the algorithm to detect the individual fibres with 35 images containing more than 500 fibres in total, and also compare the graspability analysis and the calculated grasp points with the results of an experienced human operator with 15 images that contain a total of almost 200 fibres. The detection results are outstanding, with fewer than 1% of fibres missed. The graspability analysis gives sensitivity of 0.83 and specificity of 0.92, and the average distance between the grasp points of the human and the algorithm is 220 μm. Also, the choices made by the algorithm are much more consistent than the human choices.

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- Scopus rating (2013): SJR 0.331 SNIP 1.54 CiteScore 1.51
- Scopus rating (2012): SJR 0.295 SNIP 1.326 CiteScore 1.39
- Scopus rating (2011): SJR 0.239 SNIP 0.899 CiteScore 1.24
- Scopus rating (2010): SJR 0.371 SNIP 1.421
- Scopus rating (2009): SJR 0.208 SNIP 1.24
- Scopus rating (2008): SJR 0.162 SNIP 0.179
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Source: WOS
Source-ID: 000363375000001
Research output: Scientific - peer-review › Article
Context-aware knowledge-based middleware for selective information delivery in data-intensive monitoring systems

Multiple embedded devices in modern control and monitoring systems are able to sense different aspects of the current context such as environmental conditions, current processes in the system and user state. The number of captured situations in the environment and quantity and variety of devices in the system produce considerable amounts of data, which should be processed, understood and followed by corresponding actions. However, fully delivered to the user regardless of their role in the system and needs, data flows cause cognitive overload and thus may compromise the safety of the system depending on the timely response of the operators. This paper addresses the problem of selective information delivery with respect to the user's role in the system, his needs and responsibilities, by proposing context-aware information management middleware. The system utilizes Semantic Web technologies by capturing relevant information in the knowledge model of the system, which decouples data from the application logics. A clear division of data and application logics enables context-awareness and facilitates the reconfiguration process, when new information should be added into the system. The chosen approach is justified with an analysis of main trends in context-aware solutions. The engineering principles of the knowledge model are described and illustrated with simple scenarios from the building automation domain. The prototype developed proves the feasibility of the approach via performance evaluation and demonstrates the reconfiguration capabilities of information flows in the system. Further work assumes the extension of the knowledge model and integration of the system with adaptive human–machine interfaces for multi-role and multi-user environments.

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Organisations: Department of Automation Science and Engineering, Research area: Manufacturing and Automation, Research group: Factory automation systems technology
Authors: Evchina, Y., Puttonen, J., Dvoryanchikova, A., Martinez Lastra, J. L.
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Scopus rating (2014): SJR 1.201 SNIP 2.629 CiteScore 3.56
Scopus rating (2013): SJR 1.074 SNIP 2.394 CiteScore 3.19
Scopus rating (2012): SJR 1.086 SNIP 2.51 CiteScore 3
Scopus rating (2011): SJR 0.916 SNIP 2.334 CiteScore 2.81
Scopus rating (2010): SJR 0.795 SNIP 2.146
Scopus rating (2009): SJR 0.64 SNIP 1.651
Scopus rating (2008): SJR 0.661 SNIP 1.769
Scopus rating (2007): SJR 0.599 SNIP 1.665
Scopus rating (2006): SJR 0.493 SNIP 1.767
Scopus rating (2005): SJR 0.333 SNIP 1.291
Scopus rating (2004): SJR 0.251 SNIP 0.898
Scopus rating (2003): SJR 0.36 SNIP 0.859
Scopus rating (2002): SJR 0.386 SNIP 0.696
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Research output: Scientific › peer-review › Article
A knowledge-based solution for automatic mapping in component based automation systems

Due to the current business requirements, the manufacturing industry is striving to reduce design, development and commissioning time of production systems to manufacture new products in a timely manner. The use of new technologies such as virtual engineering, automatic code generation and knowledge-based approaches is being extensively researched. This paper presents a framework that utilizes a knowledge-based approach to automate the component mapping in the code generation process. The raw data is taken from simulation models of manufacturing systems developed in 3D based virtual engineering tools. Moreover, a prototype implementation is presented and the results are discussed.

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Organisations: Department of Automation Science and Engineering, Faculty of Engineering Sciences, Research area: Manufacturing and Automation, Research group: Factory automation systems technology
Authors: Ferrer, B. R., Ahmad, B., Lobov, A., Vera, D., Martinez Lastra, J. L. M., Harrison, R.
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Research output: Scientific - peer-review › Conference contribution

From artificial cognitive systems and open architectures to cognitive manufacturing systems

Considering constantly increasing demand for shift from mass production to mass customization and the need to maintain high level of automation despite permanent changes in manufacturing technologies and tools new approaches and solutions have to be provided in manufacturing. Cyber-Physical Systems and Industrial Internet of Things are enabling smart manufacturing to tackle the challenge of data processing, integration and interpretation, but beyond uniformed data collection and visualization. The cognitive approach is argued to introduce brain and biologically-inspired algorithms capable to better adapt industrial systems for unforeseen conditions. Such approach should provide flexible and robust solution for manufacturing systems, enabling new level of adaptability and re-configurability in the system by self-X capabilities. In this paper contemporary solutions applicable for introduction of cognitive capabilities in manufacturing systems are studied and the architecture for cognitive manufacturing system employing benefits of Industrial Internet and Cognitive Control is proposed.

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DOIs:
Knowledge-driven finite-state machines. Study case in monitoring industrial equipment

Traditionally state machines are implemented by coding the desired behavior of a given system. This work proposes the use of ontological models to describe and perform computations on state machines by using SPARQL queries. This approach represents a paradigm shift relating to the customary manner in which state machines are stored and computed. The main contribution of the work is an ontological model to represent state machines and a set of generic queries that can be used in any knowledge-driven state machine to compute valuable information. The approach was tested in a study case where the state machines of industrial robots in a manufacturing line were modeled as ontological models and used for monitoring the behavior of these devices on real time.

Representation of manufacturing equipment and services for OKD-MES: From service descriptions to ontology

Demand for efficiency in the domain of manufacturing increases driven by competition for resources and customers. Adaptation of the modern concepts which have proven their benefits in other domains to the automation of manufacturing systems provides a field for innovation. Recent developments in Cyber-Physical Systems, Service-oriented Architecture and Knowledge-Driven Approach suggest an ecosystem for contemporary factory. Such set of concepts is applied in the eScop project for implementation of Open Knowledge-Driven Manufacturing Execution System (OKD-MES). The Knowledge-Driven approach introduces new possibilities for efficient operation of the system, but also requires significant effort to describe knowledge about the system. Significant part of this knowledge may be provided by the equipment in the factory shop floor. The approach which facilitates the process of population of knowledge base using the data from manufacturing equipment in automated manner should lower the cost and the organizational threshold for introduction of OKD-MES to the industry. This paper evaluates the possibilities for extraction of required semantic data from the descriptions provided by the smart service-oriented manufacturing equipment.
Towards processing and reasoning streams of events in knowledge-driven manufacturing execution systems

The incessant need of the industry to optimize processes due to market demands derived in a huge investment on information communication technologies implementation during last decades, in the industrial automation domain. This caused the implementation of paradigms as service-oriented or event-driven architectures in factories, used for wide data integration. Moreover, the use of knowledge representation, within ontologies, permitted the description of system status in knowledge bases, which can be queried and updated at runtime. Due to the massive occurrence of events at any location of the enterprise, complex event processing (CEP) technologies can be used for anticipating facts that can compromise the production at shop floors. In fact, recent implementations on processing and reasoning streams of events in the Semantic Web can be applied also in the industrial automation domain because they combine CEP and SPARQL, which are technologies nowadays used by factory systems. This article describes how these technologies can support the study of the ontological system models evolution through time and an approach to bring predictability to current knowledge-based systems.

Modeling and Experimental Characterization of Pressure Drop in Gravity-Driven Microfluidic Systems

Passive pumping using gravity-driven flow is a fascinating approach for microfluidic systems. When designing a passive pumping system, generated flow rates should be known precisely. While reported models used to estimate the flow rates do not usually consider capillary forces, this paper shows that their exclusion is unrealistic in typical gravity-driven systems. Therefore, we propose a new analytical model to estimate the generated flow rates. An extensive set of measurements is used to verify that the proposed model provides a remarkably more precise approximation of the real flow rates compared to the previous models. It is suggested that the developed model should be used when designing a gravity-driven pumping system.
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Organisations: Department of Electronics and Communications Engineering, Department of Automation Science and Engineering, Integrated Technologies for Tissue Engineering Research (ITTE)
Authors: Mäki, A., Hemmilä, S., Hirvonen, J., Narra Girish, N., Kreutzer, J., Hyttinen, J., Kallio, P.
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Scopus rating (2013): SJR 0.678 SNIP 1.295 CiteScore 1.21
Scopus rating (2012): SJR 0.586 SNIP 1.271 CiteScore 0.95
Scopus rating (2011): SJR 0.553 SNIP 1.088 CiteScore 0.89
Scopus rating (2010): SJR 0.538 SNIP 1.127
Scopus rating (2009): SJR 0.543 SNIP 1.048
Scopus rating (2008): SJR 0.656 SNIP 1.386
Scopus rating (2007): SJR 0.656 SNIP 1.054
Scopus rating (2006): SJR 0.893 SNIP 1.304
Scopus rating (2005): SJR 1.105 SNIP 1.421
Scopus rating (2004): SJR 1.086 SNIP 1.543
Scopus rating (2003): SJR 1.183 SNIP 1.427
Scopus rating (2002): SJR 0.983 SNIP 1.569
Scopus rating (2001): SJR 1.204 SNIP 1.523
Scopus rating (2000): SJR 1.436 SNIP 1.586
Scopus rating (1999): SJR 1.069 SNIP 1.22
Original language: English
ASJC Scopus subject areas: Control and Systems Engineering, Biomedical Engineering
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Contribution: organisation=elt,FACT1=0.3<br/>Contribution: organisation=ase,FACT2=0.7<br/>Portfolio EDEND: 2014-12-29<br/>Publisher name: American Society of Mechanical Engineers
Source: researchoutputwizard
Source-ID: 23
Research output: Scientific - peer-review › Article

A lumped element model was used to predict the measurement results of an inductively coupled resonance sensor. Errors related to the inductive coupling and the reader coil self-resonance were studied. The model was compared with measurements made with a physical circuit.

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Architecture for Open, Knowledge-Driven Manufacturing Execution System

General information
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Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Research area: Manufacturing and Automation, Research group: Factory automation systems technology
Authors: Iarovyi, S., Xu, X., Lobov, A., Lastra, J. L. M., Strzelczak, S.
Number of pages: 9
Pages: 519-527
Publication date: 2015

Host publication information
Title of host publication: Advances in Production Management Systems: Innovative Production Management Towards Sustainable Growth
Publisher: Springer
ISBN (Print): 978-3-319-22759-7
DOI: 10.1007/978-3-319-22759-7_60
Source: Bibtex
Source-ID: urn:147f1b11ee705e9a04fc52893d63bac
Research output: Scientific - peer-review › Conference contribution

Motion Model for Positioning with Graph-Based Indoor Map
This article presents a training-free probabilistic pedestrian motion model that uses indoor map information represented as a set of links that are connected by nodes. This kind of structure can be modelled as a graph. In the proposed model, as a position estimate reaches a link end, the choice probabilities of the next link are proportional to the total link lengths (TLL), the total lengths of the subgraphs accessible by choosing the considered link alternative. The TLLs can be computed off-line using only the graph, and they can be updated if training data are available. A particle filter in which all the particles move on the links following the TLL-based motion model is formulated. The TLL-based motion model has advantageous theoretical properties compared to the conventional models. Furthermore, the real-data WLAN positioning tests show that the positioning accuracy of the algorithm is similar or in many cases better than that of the conventional algorithms. The TLL-based model is found to be advantageous especially if position measurements are used infrequently, with 10-second or more time intervals.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Nurminen, H., Koivisto, M., Ali-Löytty, S., Piche, R.
Number of pages: 10
Pages: 646-655
Publication date: 2015

Host publication information
Publisher: IEEE
ISBN (Electronic): 978-1-4673-8054-6
Electronic versions:
Ontology-Based Backend Engine for Manufacturing and Logistics Systems

Parameters affecting the energy performance of the transport sector in smart cities

The energy requirements of cities' inhabitants have grown during the last decade. Recent studies justify the necessity of reducing the energy consumption/emissions in cities. The present paper gives an overview of the factors affecting the energy consumption of the citizens based on studies conducted in cities across the globe. The studies cover all the factors that affect citizens' mobility choice that at the end, affects in the same way their final energy consumption. The results of the review are being used to support authorities in mobility decisions in order to achieve a sustainable transport sector in smart cities.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Automation Science and Engineering
Authors: Xu, X.
Number of pages: 14
Pages: 259-272
Publication date: 2015

Host publication information
Title of host publication: Open Knowledge Driven Manufacturing and Logistics - the eScop Approach
Publisher: Warsaw University of Technology Publishing House
Editors: Strzelczak, S., Balda, P., Garetti, M., Lobov, A.
ISBN (Print): 978-83-7814-440-3
Keywords: Folder - eScopBook
Research output: Scientific - peer-review › Chapter

Parameters affecting the energy performance of the transport sector in smart cities
The energy requirements of cities' inhabitants have grown during the last decade. Recent studies justify the necessity of reducing the energy consumption/emissions in cities. The present paper gives an overview of the factors affecting the energy consumption of the citizens based on studies conducted in cities across the globe. The studies cover all the factors that affect citizens' mobility choice that at the end, affects in the same way their final energy consumption. The results of the review are being used to support authorities in mobility decisions in order to achieve a sustainable transport sector in smart cities.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Department of Mechanical Engineering and Industrial Systems, Research group: Factory automation systems technology
Authors: Mantilla R., M. F., Nieto Lee, A., Lastra, J. L. M.
Number of pages: 6
Pages: 83-88
Publication date: 2015

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Publisher: SCITEPRESS
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Keywords: Affecting parameters, Energy, Mobility, Transport
ASJC Scopus subject areas: Computer Networks and Communications, Information Systems
Links: http://www.scopus.com/inward/record.url?scp=84938780476&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
AUX=ase,"Mantilla R., M. Fernanda"
Source: Scopus
Source-ID: 84938780476
Semantic-Driven CEP for Delivery of Information Streams in Data-Intensive Monitoring Systems

Modern control and monitoring systems incorporate large number of heterogeneous devices and are operated by many users with different roles and responsibilities. The information generated by these devices, although preprocessed and filtered, is usually delivered to users regardless of their actual information needs, thus overwhelming cognitive capacities and potentially affecting safety of the system. This paper addresses the problem of personalized information delivery and presents hybrid system capable to deliver information tailored to user needs based on his/her role and responsibilities. The system utilizes Semantic Web technologies (specifically OWL-DL ontologies and SPARQL queries) for configuration purposes and Complex Event Processing (CEP) for run-time analyzing. The combination of mentioned technologies brings two major advantages: (1) the behavior of the system could be easily changed by configuring only underlying ontology; (2) utilization of CEP at run-time makes system event-driven and reactive to frequent changes in the environment. It is expected that proposed approach is able to make monitoring systems personal oriented and thus safer during the operation. The paper presents implemented software tools and illustrates approach with scenarios from building automation domain. Current implementation of the proposed approach suggests feasibility of the solution and prompts directions for future research.

Anomaly detection for communication network monitoring applications

Functioning mobile telecommunication networks are taken for granted in present-day society. The network operator’s objective is to optimise the network’s capabilities in order to provide fluent connections for subscribers. Network management is based on the huge amounts of data that are recorded from all parts of the network. The data is used to monitor performance, to detect problems and also to provide novel knowledge to be used in future planning. Anomalous events in the network provide a valuable source of information for network management. This thesis presents an interpretation of anomalies and the basic theory of how to detect them when the probability distribution is known. However, since in real life applications the probability distribution is not known, the main focus is on methods that are based on distances. This thesis proposes procedures for anomaly detection and for summarising the information obtained about the anomalies. The procedures utilise clustering in both the anomaly detection and the further analysis of the anomalies. Scaling of variables affects the distances and the results of clustering. Therefore, methods to incorporate expert knowledge by application specific scaling of variables are presented. The proposed procedures are exemplified in three use cases. The cases present practical problems from distinct parts of the network; the radio interface between the mobile device and the network, the system logs from the operator’s servers, and the traffic through the cells. Each case presents unique characteristics and challenges. The problems are solved utilising the proposed procedures. Two novel anomaly detection methods developed in this thesis are applied in the second case, where anomaly detection is applied to server logs. All use cases use real data from commercial networks where the ground truth does not exist. Therefore, precise comparisons of the methods are impossible. The results have been verified with network experts and found to be informative and useful.
A framework for fast low-power multi-sensor 3D scene capture and reconstruction

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Signal Processing, Research group: 3D MEDIA, Signal Processing Research Community (SPRC)
Authors: Chuchvara, A., Georgiev, M., Gotchev, A.
Number of pages: 13
Pages: 40-53
Publication date: 2014

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DOIs:
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Links:
http://urn.fi/URN:NBN:fi:tty-201606174278

Bibliographical note
Contribution: organisation=sgn,FACT1=1<br/>Portfolio EDEND: 2014-12-10<br/>Publisher name: Springer

Detection of Prostate Cancer by an Electronic Nose; A Proof of Principle Study

General information
State: Published
Ecosystemic relational capital: framework and process for measuring it

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics
Authors: Still, K., Huhtamäki, J., Russell, M. G.
Number of pages: 10
Pages: 1-10
Publication date: 2014

Host publication information
Title of host publication: Triple Helix XII International Conference, THC 2014. The Triple Helix and Innovation-Based Economic Growth: New Frontiers and Solutions, September 11-13, 2014, Tomsk, Russia
Publisher: Triple Helix Association
Editors: Etzkowitz, H., Uvarov, A. F., Galazhinsky, E. V.
Insights for orchestrating innovation ecosystems: the case of EIT ICT Labs and data-driven network visualisations

This paper explores opportunities for supporting the orchestration of innovation ecosystems, hence contributing to a fundamental capability in the networked world. We present analysis, evaluation and interpretation toward the objective of decision support and insights for transforming innovation ecosystems with a case study of EIT ICT Labs, a major initiative intended to turn Europe into a global leader in ICT innovation. Towards this, we use a data-driven, relationship-based and network centric approach to operationalize the "Innovation Ecosystems Transformation Framework". Our results indicate that with coordinated and continuously improved use of visual and quantitative social network analysis, special characteristics, significant actors and connections in the innovation ecosystem can be revealed to develop new insights. We conclude that the IETF transformation framework can be used to develop shared vision and to support the orchestration of innovation ecosystem transformations.
Modeling Drug Delivery in Gravity-Driven Microfluidic System

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Integrated Technologies for Tissue Engineering Research (ITTE)
Authors: Mäki, A., Kreutzer, J., Kallio, P.
Number of pages: 8
Pages: 1-8
Publication date: 2014

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Publisher: American Society of Mechanical Engineers
ISBN (Print): 978-0-7918-4627-8
DOIs:
10.1115/ICNMM2014-21183

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Source: researchoutputwizard
Source-ID: 1551
Research output: Scientific - peer-review › Article

New Insights for Relational Capital

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics
Authors: Still, K., Huhtamäki, J., Russell, M.
Number of pages: 10
Pages: 384-392
Publication date: 2014

Host publication information
Title of host publication: 11th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning, ICICKM 2014, November 6-7, 2014, Sydney, Australia
Place of publication: Reading, UK
Publisher: Academic Conferences and Publishing International Limited
ISBN (Print): 978-1-910309-71-1

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Contribution: organisation=mat,FAC1=1<br/>Portfolio EDEND: 2014-12-31<br/>Publisher name: Academic Conferences and Publishing International Limited
Perustelta seuraavan sukupolven metsävarajärjestelmälle - Forest Big Data -hanke

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Automation Science and Engineering
Authors: Hämäläinen, J., Holopainen, M., Hynynen, J., Jyrkilä, J., Rajala, P. T., Ritala, R., Räsänen, T., Visala, A.
Number of pages: 7
Pages: 235-241
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Peer-reviewed: No

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Issue number: 4
ISSN (Print): 1455-2515
Original language: Finnish

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Analysing 3G radio network performance with fuzzy methods

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering
Authors: Kumpulainen, P., Särkioja, M., Kylväjä, M., Hätönen, K.
Number of pages: 10
Pages: 49-58
Publication date: 2013
Peer-reviewed: Yes

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Journal: Neurocomputing
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Scopus rating (2016): SJR 0.968 SNIP 1.589 CiteScore 3.61
Scopus rating (2015): SJR 1.024 SNIP 1.767 CiteScore 3.18
Scopus rating (2014): SJR 0.942 SNIP 1.793 CiteScore 2.99
Scopus rating (2013): SJR 0.878 SNIP 2.006 CiteScore 2.95
Scopus rating (2012): SJR 0.874 SNIP 1.557 CiteScore 2.57
Scopus rating (2011): SJR 0.966 SNIP 1.84 CiteScore 2.6
Scopus rating (2010): SJR 0.696 SNIP 1.288
Scopus rating (2009): SJR 0.507 SNIP 1.334
Scopus rating (2008): SJR 0.538 SNIP 0.885
Scopus rating (2007): SJR 0.515 SNIP 0.844
Scopus rating (2006): SJR 0.491 SNIP 1.044
Scopus rating (2005): SJR 0.444 SNIP 0.999
Scopus rating (2004): SJR 0.357 SNIP 0.678
Scopus rating (2003): SJR 0.369 SNIP 0.574
Scopus rating (2002): SJR 0.404 SNIP 0.532
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Bayesian analysis of GUHA hypotheses

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Automation Science and Engineering, Department of Mathematics, Research group: Positioning, Research Community on Data-to-Decision (D2D), Wireless Communications and Positioning (WICO)
Authors: Piche, R., Järvenpää, M., Turunen, E., Simunek, M.
Number of pages: 28
Pages: 47-73
Publication date: 2013
Peer-reviewed: Yes

Publication information
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Volume: 42
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Ratings:
Scopus rating (2016): CiteScore 1.68 SJR 0.563 SNIP 1.314
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Scopus rating (2014): SJR 0.392 SNIP 1.445 CiteScore 1.49
Scopus rating (2013): SJR 0.363 SNIP 0.917 CiteScore 1.13
Scopus rating (2012): SJR 0.551 SNIP 1.717 CiteScore 1.58
Scopus rating (2011): SJR 0.446 SNIP 1.391 CiteScore 1.25
Scopus rating (2010): SJR 0.465 SNIP 1.796
Scopus rating (2009): SJR 0.427 SNIP 1.396
Scopus rating (2008): SJR 0.683 SNIP 1.901
Scopus rating (2007): SJR 0.572 SNIP 1.406
Scopus rating (2006): SJR 0.53 SNIP 1.83
Scopus rating (2005): SJR 0.454 SNIP 2.026
Scopus rating (2004): SJR 0.62 SNIP 2.303
Scopus rating (2003): SJR 0.68 SNIP 1.764
Scopus rating (2002): SJR 0.346 SNIP 1.176
Scopus rating (2001): SJR 0.969 SNIP 2.192
Scopus rating (2000): SJR 0.679 SNIP 2.17
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Bibliographical note
Capacitive facial activity measurement
A wide range of applications can benefit from the measurement of facial activity. The current study presents a method that can be used to detect and classify the movements of different parts of the face and the expressions the movements form. The method is based on capacitive measurement of facial movements. It uses principal component analysis on the measured data to identify active areas of the face in offline analysis, and hierarchical clustering as a basis for classifying the movements offline and in real-time. Experiments involving a set of voluntary facial movements were carried out with 10 participants. The results show that the principal component analysis of the measured data could be applied with almost perfect performance to offline mapping of the vertical location of the facial activity of movements such as raising and lowering eyebrows, opening mouth, raising mouth corners, and lowering mouth corners. The presented classification method also performed very well in classifying the same movements both with the offline and the real-time implementations.