Table of Contents

Scroll to the title and select a Blue link to open a paper. After viewing the paper, use the bookmarks to the left to return to the beginning of the Table of Contents.

Theme: AI and Agents

BIO - Bioinformatics Track

Track Co-Chairs:  
Paola Lecca, University of Trento, Italy  
Dan Tulpan, University of Guelph, Canada  
Juan Manuel Corchado, University of Salamanca, Spain

Track Editorial ..................................................................................................................................................... 1

An Insight into Biological Data Mining based on Rarity and Correlation as Constraints .................. 3  
Souad Bouasker, University of Tunis ElManar, Tunisia  
Sadok Ben Yahia, Tallinn University of Technology, Estonia  
Gayo Diallo, University of Bordeaux, France

Drug Target Discovery using Knowledge Graph Embeddings ................................................................. 11  
Sameh K. Mohamed, National University of Ireland Galway, Ireland  
Aayah Nouuu, University of Bristol, UK  
Vit Nováček, National University of Ireland Galway, Ireland

Ensemble Feature Selectin for Biomarker Discovery in Mass Spectrometry-based Metabolomics ........ 19  
AliAsghar ShahrajooiHaghighi, University of Louisville, USA  
Hichem Frigui, University of Louisville, USA  
Xiang Zhang, University of Louisville, USA  
Xiaoli Wei, University of Louisville, USA  
Biyun Shi, University of Louisville, USA  
Craig J. McClain, University of Louisville, USA

Molecule Specific Normalization for Protein and Metabolite Biomarker Discovery .......................... 25  
Ameni Trabelsi, University of Louisville, USA  
Biyun Shi, University of Louisville, USA  
Xiaoli Wei, University of Louisville, USA  
Hichem Frigui, University of Louisville, USA  
Xiang Zhang, University of Louisville, USA  
Craig McClain, University of Louisville, USA  
Aliasghar ShahrajooiHaghighi, University of Louisville, USA

Theme: Software Design and Development

BPMEA - Business Process Management & Enterprise Architecture Track

Track Co-Chairs:  
Marco Brambilla, Politecnico di Milano, Italy  
Davide Rossi, University of Bologna, Italy

A Hybrid Reliability Metric for SLA Predictive Monitoring ................................................................. 32  
Marco Comuzzi, Ulsan National Institute of Science and Technology, South Korea  
Alfonso E. Marquez-Chamorro, Universidad de Sevilla, Spain  
Manuel Resinas, Universidad de Sevilla, Spain
Controllability of Business Processes with Temporal Variables ................................................................. 40
Johann Eder, Alpen-Adria-Universität Klagenfurt, Austria
Marco Franceschetti, Alpen-Adria-Universität Klagenfurt, Austria
Julius Köpke, Alpen-Adria-Universität Klagenfurt, Austria

Object-Centric Behavioral Constraint Models: A Hybrid Model for Behavioral and Data Perspectives ........ 48
Guangming Li, Eindhoven University of Technology, The Netherlands
Renata Medeiros de Carvalho, Eindhoven University of Technology, The Netherlands
Wil M.P. van der Aalst, RWTH Aachen University, Germany

Optimizing Customer Journey using Process Mining and Sequence-Aware Recommendation .................. 57
Alessandro Terragni, Eindhoven University of Technology, The Netherlands
Marwan Hassani, Eindhoven University of Technology, The Netherlands

Static Analysis of BPMN-Based Process-Driven Applications ........................................................................ 66
Konrad Schneid, Münster University of Applied Sciences, Germany
Claus A. Usener, viadee Unternehmensberatung AG, Germany
Sebastian Thöne, Münster University of Applied Sciences, Germany
Herbert Kuchen, University of Münster, Germany
Christian Tophinke, Münster University of Applied Sciences, Germany

Towards a Metamodel for Supporting Decisions in Knowledge-Intensive Processes ............................... 75
Sheila Katherine Venero, University of Campinas, Brazil
Julio Cesar dos Reis, University of Campinas, Brazil
Leonardo Montecchi, University of Campinas, Brazil
Cecília Mary Fischer Rubira, University of Campinas, Brazil

VIEW: An Incremental Approach to Verify Evolving Workflows ............................................................... 85
Mohammad Javad Amiri, University of California, Santa Barbara, USA
Divyakant Agrawal, University of California, Santa Barbara, USA

Poster Papers

Configuring SQL-based Process Mining for Performance and Storage Optimisation ............................. 94
Stefan Schönig, University of Bayreuth, Germany
Claudio Di Ciccio, Vienna University of Economics and Business, Austria
Jan Mendling, Vienna University of Economics and Business, Austria

Formal Support of Process Chain Networks using Model-driven Engineering and Petri nets ................. 98
Elena Gómez-Martínez, Universidad Autónoma de Madrid, Spain
Francisco Pérez-Blanco, Universidad Rey Juan Carlos, Spain
Juan de Lara, Universidad Autonoma de Madrid, Spain
Juan Manuel Vara, Universidad Rey Juan Carlos, Spain
Esperanza Marcos, Universidad Rey Juan Carlos, Spain

On the Elicitation and Annotation of Business Activities based on Emails ...................................... 101
Diana Jlailaty, Paris Dauphine University, France
Daniela Grigori, Paris Dauphine University, France
Khalid Belhajjame, Paris Dauphine University, France
Theme: Distributed Systems

CC - Cloud Computing Track

Track Co-Chairs: Priya Chandran, NIT Calicut, India
SD Madhu Kumar, NIT Calicut, India

Track Editorial

A Programming Model and Middleware for High Throughput Serverless Computing Applications
Alfonso Pérez, Universitat Politècnica de València, Spain
Germán Moltó, Universitat Politècnica de València, Spain
Miguel Caballer, Universitat Politècnica de València, Spain
Amanda Calatrava, Universitat Politècnica de València, Spain

Minimizing Financial Cost of Scientific Workflows under Deadline Constraints in Multi-Cloud Environments
Tianyu Gao, Northwest University, China
Chase Q. Wu, New Jersey Institute of Technology, USA
Aiqin Hou, Northwest University, China
Yongqiang Wang, Northwest University, China
Ruxia Li, Northwest University, China
Mingrui Xu, Northwest University, China

Modelling Multi Level Consistency in Erasure Code based Storage Systems
Ojus Thomas Lee, College of Engineering Kidangoor, India
Vijay Sharma, National Institute of Technology Calicut, India
S. D Madhu Kumar, National Institute of Technology Calicut, India
Priya Chandran, National Institute of Technology Calicut, India

Oversubscribing Micro-Clouds with Energy-aware Containers Scheduling
Sérgio Mendes, Universidade de Lisboa, Portugal
José Simão, Instituto Superior de Engenharia de Lisboa, Portugal
Luís Veiga, Instituto Superior Técnico, Portugal

Secure Container Orchestration in the Cloud: Policies and Implementation
Gabriel P. Fernandez, Technische Universität Dresden, Germany
Andrey Brito, Universidade Federal de Campina Grande, Brazil

The Lord of the Shares: Combining Attribute-Based Encryption and Searchable Encryption for Flexible Data Sharing
Antonis Michalas, Tampere University of Technology, Finland

Poster Papers

Performance Overhead of Container Orchestration Frameworks for Management of Multi-Tenant Database Deployments
Eddy Truyen, KU Leuven, Belgium
Dimitri Van Landuyt, KU Leuven, Belgium
Bert Lagaisse, KU Leuven, Belgium
Wouter Joosen, KU Leuven, Belgium
Diabetes Care in Cloud – Research Challenges ............................................................................................................. 160
Merlin George, National Institute of Technology, India
Anu Mary Chacko, National Institute of Technology, India
Sudeep Koshy Kurien, Malabar Institute of Medical Science, India
Naseer Ali, Malabar Institute of Medical Science, India

Theme: Distributed Systems
CCNIV - Communication, Computing and Networking in Internet of Vehicles Track
Track Co-Chairs: Imen Jemili, University of Carthage, Tunisia
                    Mohamed Mosbah, Bordeaux INP, France
Track Editorial .................................................................................................................................................................. 163

An Application-Oriented Evaluation of LTE-V's Mode 4 for V2V Communication .................................................. 165
Philip Wendland, Technische Universität Ilmenau, Germany
Guenter Schaefer, Technische Universität Ilmenau, Germany
Reiner Thomä, Technische Universität Ilmenau, Germany

Secure Over-the-air Firmware Updating for Automotive Electronic Control Units ........................................ 174
Dimitris Bakoyiannis, Technological Educational Institute of Crete, Greece
Othon Tomoutzoglou, Technological Educational Institute of Crete, Greece
George Kornaros, Technological Educational Institute of Crete, Greece

Salman Memon, McGill University, Canada
Muthucumaru Maheswaran, McGill University, Canada

Poster Papers
Exploiting Automated Planning for Efficient Centralized Vehicle Routing and Mitigating Congestion in Urban Road Networks ................................................................................................................. 191
Lukáš Chrpa, Charles University and Czech Technical University in Prague, Czech Republic
Mauro Vallati, University of Huddersfield, UK
Simon Parkinson, University of Huddersfield, UK

Theme: AI and Agents
CIVIA - Computational Intelligence and Video & Image Analysis Track
Track Co-Chairs: Agostinho Rosa, University of Lisbon, Portugal
                    Yin-Fu Huang, National Yunlin University of Science and Technology, Taiwan
Track Editorial .................................................................................................................................................................. 195

2D Character Animating Networks: Bringing Static Characters to Move via Motion Transfer ................ 196
Zackary P.T. Sin, The Hong Kong Polytechnic University, China
Peter H.F. Ng, The Hong Kong Polytechnic University, China
Simon C.K. Shiu, The Hong Kong Polytechnic University, China
Fu-lai Chung, The Hong Kong Polytechnic University, China
Hong Va Leong, The Hong Kong Polytechnic University, China
An Effective Hybrid Imperialist Competitive Algorithm and Tabu Search for an Extended Flexible Job Shop Scheduling Problem
Willian Tessaro Lunardi, University of Luxembourg, Luxembourg
Holger Voos, University of Luxembourg, Luxembourg
Luiz Henrique Cherri, University of São Paulo, Brazil

Visual Content based Video Retrieval on Natural Language Queries
Ravi Bansal, Google, India
Sandip Chakraborty, Indian Institute of Technology Kharagpur, India

Theme: AI and Agents
COMBI - Advances in Computational Biomedical Imaging Track
Track Co-Chairs: Mohammed El Hassouni, Mohammed V University in Rabat, Morocco
Rachid Jennane, University of Orleans, France
Ayman El-Baz, University of Louisville, USA

BGrowth: An Efficient Approach for the Segmentation of Vertebral Compression Fractures in Magnet Resonance Imaging
Jonathan S. Ramos, University of São Paulo, Brazil
Carolina Y.V. Watanabe, Federal University of Rondônia, Brazil
Marcello H. Nogueira-Barbosa, University of São Paulo, Brazil
Agma J.M. Traina, University of São Paulo, Brazil

Theme: System Software and Security
CPS - Cyber-Physical Systems Track
Track Co-Chairs: Jingtong Hu, University of Pittsburgh, USA
Jason Xue, City University of Hong Kong, Hong Kong
Qi Zhu, Northwestern University, USA

Track Editorial

AdaptC: Programming Adaptation Policies for WSN Applications
Shashank Gaur, Polytechnic Institute of Porto, Portugal
Luis Almeida, University of Porto, Portugal
Eduardo Tovar, Polytechnic Institute of Porto, Portugal

Energy Optimization of Branch-Aware Data Variable Allocation on Hybrid SRAM+NVM SPM for CPS
Yixin Li, University of Electronic Science and Technology of China, China
Jinyu Zhan, University of Electronic Science and Technology of China, China
Wei Jiang, University of Electronic Science and Technology of China, China
Jiayu Yu, University of Electronic Science and Technology of China, China

Optimizing Fragmentation and Segment Cleaning for CPS based Storage Devices
Qi Li, Chongqing University, China
Aosong Deng, Chongqing University, China
Congming Gao, Chongqing University, China
Yu Liang, City University of Hong Kong, China
Liang Shi, East China Normal University, China
Edwin H.-M. Sha, East China Normal University, China
United SSD Block Cleaning via Constrained Victim Block Selection ................................................. 250
Yajuan Du, Wuhan University of Technology, China
Wei Liu, Wuhan University of Technology, China
Yu Zhu, Huazhong University of Science and Technology, China
Meng Zhang, Huazhong University of Science and Technology, China

Poster Papers

Emerging COTS Architecture Support for Real-Time TSN Ethernet ...................................................... 258
James Coleman, Intel Corporation, USA
Sara Almalih, Intel Corporation, USA
Alexander Slota, Intel Corporation, USA
Yann-Hang Lee, Arizona State University, USA

Theme: Distributed Systems

DADS - Dependable, Adaptive, and Secure Distributed Systems Track

Track Co-Chairs: Karl M. Goeschka, UAS Technikum Vienna, Austria
Rui Oliveira, Universidade do Minho, Portugal
Peter Pietzuch, Imperial College London, UK
Giovanni Russello, University of Auckland, New Zealand

Track Editorial ................................................................................................................................................. 266

A Library for Services Transparent Replication .......................................................................................... 268
Paola Martins Pereira, Universidade Federal do Rio Grande, Brazil
Fernando Luís Dotti, Pontificia Universidade Católica do Rio Grande do Sul, Brazil
Cristina Meinhardt, Universidade Federal de Santa Catarina, Brazil
Odorico Machado Mendizabal, Universidade Federal do Rio Grande, Brazil

Adaptive Information Dissemination in the Bitcoin Network ........................................................................ 276
João Marçal, Instituto Superior Técnico, Universidade de Lisboa, Portugal
Luís Rodrigues, Instituto Superior Técnico, Universidade de Lisboa, Portugal
Miguel Matos, Instituto Superior Técnico, Universidade de Lisboa, Portugal

Don't Hesitate to Share! A Novel IoT Data Protection Scheme based on BGN Cryptosystem ................. 284
Subir Halder, University of Padua, Italy
Mauro Conti, University of Padua, Italy

Failure Prediction in the Internet of Things due to Memory Exhaustion .................................................. 292
Mohammad Rafiuzzaman, The University of British Columbia, Canada
Julien Gascon-Samson, The University of British Columbia, Canada
Karthik Pattabiraman, The University of British Columbia, Canada
Sathish Gopalakrishnan, The University of British Columbia, Canada

Scalable Lightning Factories for Bitcoin ....................................................................................................... 302
Alejandro Ranchal Pedrosa, Sorbonne University, France
Maria Potop-Butucaru, Sorbonne University, France
Sara Tucci-Piergiovanni, CEA LIST, France

Planning Workflow Executions when using Spot Instances in the Cloud .................................................. 310
Richard Gil Martinez, Universidade de Lisboa, Portugal
Antónia Lopes, Universidade de Lisboa, Portugal
Luís Rodrigues, Universidade de Lisboa, Portugal
Quantitative Comparison of Unsupervised Anomaly Detection Algorithms for Intrusion Detection ..... 318
Filipe Falcão, Universidade Federal de Alagoas, Brazil
Tommaso Zoppi, University of Florence, Italy
Caio Barbosa Viera Silva, Universidade Federal de Alagoas, Brazil
Anderson Santos, Universidade Federal de Alagoas, Brazil
Balduino Fonseca, Universidade Federal de Alagoas, Brazil
Andrea Ceccarelli, University of Florence, Italy
Andrea Bondavalli, University of Florence, Italy

Securely deploying Distributed Computation Systems on Peer-to-Peer Networks ........................................ 328
Kobe Vrancken, KU Leuven, Belgium
Frank Piessens, KU Leuven, Belgium
Raoul Strackx, KU Leuven, Belgium

Poster Papers

Distributed Storage System based on Permissioned Blockchain ................................................................. 338
Racin Nygaard, University of Stavanger, Norway
Hein Meling, University of Stavanger, Norway
Leander Jehl, University of Stavanger, Norway

Is it Safe to Dockerize my Database Benchmark? ........................................................................................ 341
Martin Grambow, Technische Universität Berlin, Germany
Jonathan Hasenburg, Technische Universität Berlin, Germany
Tobias Pfandzelter, Technische Universität Berlin, Germany
David Bermbach, Technische Universität Berlin, Germany

Theme: Distributed Systems

DAPP - Decentralized Applications with Blockchain, DLT and Crypto-Currencies Track
Track Co-Chairs: Jean-Marc Seigneur, University of Geneva, Switzerland and Reputaction, France

Track Editorial .................................................................................................................................................. 345

Analysis of Architectural Variants for Auditable Blockchain-based Private Data Sharing ......................... 346
Vincent Reniers, KU Leuven, Belgium
Dimitri Van Landuyt, KU Leuven, Belgium
Paolo Viviani, Noesis Solutions NV, University of Torino, Italy
Bert Lagaisse, KU Leuven, Belgium
Riccardo Lombardi, Noesis Solutions NV, Belgium
Wouter Joosen, KU Leuven, Belgium

Building Private Blockchains over Public Blockchains (PoP): An Attribute-Based Access Control Approach ............................................................................................................. 355
Dijiang Huang, Arizona State University, USA
Chun-Jen Chung, Arizona State University, USA
Qiuxiang Dong, Arizona State University, USA
Jim Luo, U.S. Naval Research Lab, USA
Myong Kang, U.S. Naval Research Lab, USA
DECOUPLES: A Decentralized, Unlinkable and Privacy-preserving Traceability System for the Supply Chain

Mourad El Maouchi, Delft University of Technology, The Netherlands
Oğuzhan Ersoy, Delft University of Technology, The Netherlands
Zekeriya Erkin, Delft University of Technology, The Netherlands

Hybrid Mining: Exploiting Blockchain's Computational Power for Distributed Problem Solving

Krishnendu Chatterjee, Institute of Science and Technology Austria, Austria
Amir Kafshdar Goharshady, Institute of Science and Technology Austria, Austria
Arash Pourdamghani, Sharif University of Technology, Iran

MUSCLE: Authenticated External Data Retrieval from Multiple Sources for Smart Contracts

Bjorn van der Laan, Delft University of Technology, The Netherlands
Oğuzhan Ersoy, Delft University of Technology, The Netherlands
Zekeriya Erkin, Delft University of Technology, The Netherlands

Smart Contracts in View of the Civil Code

Monika di Angelo, Technische Universität Wien, Austria
Alfred Soare, Technische Universität Wien, Austria
Gernot Salzer, Technische Universität Wien, Austria

The Treewidth of Smart Contracts

Krishnendu Chatterjee, Institute of Science and Technology Austria, Austria
Amir Kafshdar Goharshady, Institute of Science and Technology Austria, Austria
Ehsan Kafshdar Goharshady, Ferdowsi University of Mashhad, Iran

TickEth, a Ticketing System built on Ethereum

Pietro Corsi, Università di Genova, Italy
Giovanni Lagorio, Università di Genova, Italy
Marina Ribaudo, Università di Genova, Italy

Poster Papers

Process Traceability in Distributed Manufacturing using Blockchains

Sebastian Geiger, Siemens Corporate Technology, USA
Daniel Schall, Siemens Corporate Technology, USA
Sebastian Meixner, Siemens Corporate Technology, USA
Andreas Egger, Siemens Corporate Technology, USA
Theme: Information Systems

DBDM - Databases and Big Data Management Track

Track Co-Chairs:  Ramzi A. Haraty, Lebanese American University, Lebanon
Apostolos N. Papadopoulos, Aristotle University, Greece
Junping Sun, Nova Southeastern University, USA

Track Editorial

A Noise Tolerant and Schema-agnostic Blocking Technique for Entity Resolution
Tiago Brasileiro Araújo, Federal University of Campina Grande, Brazil
Carlos Eduardo Santos Pires, Federal University of Campina Grande, Brazil
Demetrio Gomes Mestre, State University of Paraíba, Brazil
Thiago Pereira da Nóbrega, State University of Paraíba, Brazil
Dimas Cassimiro do Nascimento Filho, Federal Rural University of Pernambuco, Brazil
Kostas Stefanidis, University of Tampere, Finland

Authorization-Aware Optimization for Multi-Provider Queries
Ekaterina B. Dimitrova, University of Pittsburgh, USA
Panos K. Chrysanthis, University of Pittsburgh, USA
Adam J. Lee, University of Pittsburgh, USA

Efficient Spatio-temporal RDF Query Processing in Large Dynamic Knowledge Bases
Akrivi Vlachou, University of Piraeus, Greece
Christos Doulkeridis, University of Piraeus, Greece
Apostolos Glenis, University of Piraeus, Greece
Georgios M. Santipantakis, University of Piraeus, Greece
George A. Vouros, University of Piraeus, Greece

MapReduce Algorithms for the K Group Nearest-Neighbor Query
Panagiotis Moutafis, University of Thessaly, Greece
Francisco García-García, University of Almeria, Spain
George Mavrommatis, University of Thessaly, Greece
Michael Vassilakopoulos, University of Thessaly, Greece
Antonio Corral, University of Almeria, Spain
Luis Iribarne, University of Almeria, Spain

Toward RDB to NoSQL: Transforming Data with Metamorfose Framework
Evandro Miguel Kuszera, Technological Federal University of Paraná, Brazil
Leticia M. Peres, Federal University of Paraná, Brazil
Marcos Didonet Del Fabro, Federal University of Paraná, Brazil

Poster Papers

A Scalable and Persistent Key-Value Store using Non-Volatile Memory
Doyoung Kim, Yonsei University, South Korea
Won Gi Choi, Yonsei University, South Korea
Hanseung Sung, Yonsei University, South Korea
Sanghyun Park, Yonsei University, South Korea
The SimilarQL Framework: Similarity Queries in Plain SQL ................................................................. 468
Caetano Traina Jr., University of São Paulo, Brazil
Andre Moriyama, University of São Paulo, Brazil
Guilherme Rocha, University of São Paulo, Brazil
Robson Cordeiro, University of São Paulo, Brazil
Cristina D.A. Ciferri, University of São Paulo, Brazil
Agma Traina, University of São Paulo, Brazil

Theme: Information Systems

DLHWB - Digital Life for Human Well-being Track

Track Co-Chairs: Sara Comai, Politecnico di Milano, Italy
Luc De Witte, The University of Sheffield, UK
Fabio Salice, Politecnico di Milano, Italy

Track Editorial ................................................................................................................................................. 472

Anatome: Anatomy Teaching and Learning Designed for All ............................................................... 474
Márcia Valéria Rodrigues Ferreira, Centro Federal de Educação Tecnológica de Minas Gerais, Brazil
Laura Sánchez García, Universidade Federal do Paraná, Brazil
André Luiz Pires Guedes, Universidade Federal do Paraná, Brazil
Djanira Aparecida da Luz Veronez, Universidade Federal do Paraná, Brazil
Celia Regina Alves de Araújo Sandrini, Instituto Federal do Paraná, Brazil
Carlos Eduardo de Araujo, Instituto Federal do Paraná, Brazil

Web-based Authoring of Multimedia Intervention Programs for Mobile Devices: A Case Study on Elderly Digital Literacy .............................................................................................................. 484
Bruna C.R. Cunha, Federal Institute of São Paulo, Brazil
Kamila R.H. Rodrigues, University of São Paulo, Brazil
Isabela Zaine, University of São Paulo, Brazil
Leonardo F. Scalco, University of São Paulo, Brazil
Caio C. Viel, University of São Paulo, Brazil
Maria da Graça C. Pimentel, University of São Paulo, Brazil

Theme: Information Systems

DM - Data Mining Track

Track Co-Chairs: Hasan Jamil, University of Idaho, USA
Rosa Meo, Università degli Studi di Torino, Italy

Track Editorial ................................................................................................................................................. 492

An Anomaly Detection Technique for Business Processes based on Extended Dynamic Bayesian Networks ................................................................................................................................. 494
Stephen Pauwels, University of Antwerp, Belgium
Toon Calders, University of Antwerp, Belgium

Dirichlet Process Mixture Models made Scalable and Effective by means of Massive Distribution .... 502
Khadidja Meguelati, INRIA, France
Bénédicte Fontez, Montpellier SupAgro, France
Nadine Hilgert, INRA, France
Florent Masseglia, INRIA, France
Explaining Black Box Models by means of Local Rules .......................................................... 510
Eliana Pastor, Politecnico di Torino, Italy
Elena Baralis, Politecnico di Torino, Italy

Graph-based Selective Outlier Ensembles ............................................................................. 518
Hamed Sarvari, George Mason University, USA
Carlotta Domeniconi, George Mason University, USA
Giovanni Stilo, Sapienza Università di Roma, Italy

High-Performance Probabilistic Record Linkage via Multi-Dimensional Homomorphisms .......... 526
Ari Rasch, University of Münster, Germany
Richard Schulze, University of Münster, Germany
Waldemar Gorus, University of Münster, Germany
Jan Hiller, Krebsregister NRW, Germany
Sebastian Bartholomäus, Krebsregister NRW, Germany
Sergei Gorlatch, University of Münster, Germany

Pairwise Normalization in SimRank Variants: Problem, Solution, and Evaluation ....................... 534
Masoud Reyhani Hamedani, Hanyang University, South Korea
Sang-Wook Kim, Hanyang University, South Korea

Poster Papers

K-mixed Prototypes: A Clustering Algorithm for Relational Data with Mixed Attribute Types .......... 542
Rahmah Brnawy, Taibah University, Saudi Arabia
Nematollaah Shiri, Concordia University, Canada

Mining Product Opinions with Most Frequent Clusters of Aspect Terms ........................................ 546
Chukwuma Ejieh, IBM, Canada
C.I. Ezeife, University of Windsor, Canada
Ritu Chaturvedi, University of Guelph, Canada

Student Research Abstract

Student Research Abstract: Cryptocurrency World Identification and Public Concerns Detection via Social Media ................................................................................................................................. 550
Shaista Bibi, COMSATS University Islamabad, Pakistan

Student Research Abstract: Fuzzy-Rule based Approach for Feature Selection in Text Classification ..... 553
Bushra Zaheer Abbasi, COMSATS University Islamabad, Pakistan
**Theme: Information Systems**

**DS - Data Streams Track**

**Track Co-Chairs:**
- Albert Bifet, LTCI, Telecom ParisTech, France
- Andre Carvalho, ICMC, USP, Brazil
- Carlos Ferreira, INESC Porto, University of Porto, Portugal
- Joao Gama, INESC Porto, University of Porto, Portugal

**Track Editorial** ................................................................................................................................................556

**DataSeg: Dynamic Streaming Sensor Data Segmentation for Activity Recognition** ......................... 557
Hela Sfar, Télécom SudParis, France
Amel Bouzeghoub, Télécom SudParis, France

**Exploiting Entity Information for Stream Classification over a Stream of Reviews** ...................... 564
Christian Beyer, Otto-von-Guericke-University Magdeburg, Germany
Vishnu Unnikrishnan, Otto-von-Guericke-University Magdeburg, Germany
Uli Niemann, Otto-von-Guericke-University Magdeburg, Germany
Pawel Matuszyk, Otto-von-Guericke-University Magdeburg, Germany
Eirini Ntoutsi, Leibniz University Hannover, Germany
Myra Spiliopoulou, Otto-von-Guericke-University Magdeburg, Germany

**Learning Regularized Hoeffding Trees from Data Streams** ................................................................. 574
Jean Paul Barddal, Pontifícia Universidade Católica do Paraná, Brazil
Fabricio Enembreck, Pontifícia Universidade Católica do Paraná, Brazil

**Quotient Hash Tables – Efficiently Detecting Duplicates in Streaming Data** ............................... 582
Rémi Géraud, École normale supérieure, CNRS, PSL, France
Marius Lombard-Platet, École normale supérieure, CNRS, PSL, France
David Naccache, École normale supérieure, CNRS, PSL, France

**Poster Papers**

**Decision Tree-based Feature Ranking in Concept Drifting Data Streams** ........................................ 590
Jean Antonio Pereira Karax, Pontifícia Universidade Católica do Paraná, Brazil
Andreia Malucelli, Pontifícia Universidade Católica do Paraná, Brazil
Jean Paul Barddal, Pontifícia Universidade Católica do Paraná, Brazil

**Streaming Piecewise Linear Approximation for Efficient Data Management in Edge Computing** ....593
Romaric Duvignau, Chalmers University of Technology, Sweden
Vincenzo Gulisano, Chalmers University of Technology, Sweden
Marina Papatriantafilou, Chalmers University of Technology, Sweden
Vladimir Savic, Qamcom R&T, Sweden
**Theme: System Software and Security**

**EMBS - Embedded Systems Track**

**Track Co-Chairs:** Marco Di Natale, Scuola Superiore S. Anna, Italy  
Li-Pin Chang, National Chiao Tung University, Taiwan

---

**Track Editorial**

---

**A New Sequential-Write-Constrained Cache Management to Mitigate Write Amplification for SMR Drives**

Shuo-Han Chen, Academia Sinica, Taiwan  
Yong-Ching Lin, National Tsing Hua University, Taiwan  
Yuan-Hao Chang, Academia Sinica, Taiwan  
Ming-Chang Yang, The Chinese University of Hong Kong, China  
Tseng-Yi Chen, Yuan Ze University, Taiwan  
Hsin-Wen Wei, Tamkang University, Taiwan  
Wei-Kuan Shih, National Tsing Hua University, Taiwan

---

**A Time-predictable Branch Predictor**

Martin Schoeberl, Technical University of Denmark, Denmark  
Benjamin Rouxel, INRIA Rennes, France  
Isabelle Puaut, INRIA Rennes, France

---

**Energy-Demand Estimation of Embedded Devices using Deep Artificial Neural Networks**

Timo Hönig, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany  
Benedict Herzog, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany  
Wolfgang Schröder-Preikschat, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

---

**On Assessing the Viability of Probabilistic Scheduling with Dependent Tasks**

Jaume Abella, Barcelona Supercomputing Center, Spain  
Enrico Mezzetti, Barcelona Supercomputing Center, Spain  
Francisco J. Cazorla, Barcelona Supercomputing Center, Spain

---

**Refresh Optimised Embedded-DRAM Caches based on Zero Data Detection**

Sheel Sindhu Manohar, Indian Institute of Technology Guwahati, India  
Hemangee K. Kapoor, Indian Institute of Technology Guwahati, India

---

**Poster Papers**

**Impact of Source Scheduling on End-to-End Latencies in a QoS-aware Avionics Network**

Oana Hotescu, Université de Toulouse, France  
Katia Jaffrès-Runser, Université de Toulouse, France  
Jean-Luc Scharbarg, Université de Toulouse, France  
Christian Fraboul, Université de Toulouse, France

---

**Graphical Program Transformations for Embedded Systems**

Robert Stewart, Herriot-Watt University, UK  
Bernard Berthomieu, Université de Toulouse, France  
Paulo Garcia, Carleton University, Canada  
Idris Ibrahim, Heriot-Watt University, UK  
Greg Michaelson, Heriot-Watt University, UK  
Andrew Wallace, Heriot-Watt University, UK
Theme: Information Systems

GIA - GeoInformation Analytics Track

Track Co-Chairs: Maguelonne Teisseire, UMR TETIS, France
Christian Sallaberry, University of Pau and Pays de l’Adour, France
Eric Kergosien, University of Lille, France
Cyril de Runz, University of Reims, France
Thomas Guyet, AGROCAMPUS-OUEST/IRISA, France

Track Editorial ................................................................. 650

A Graph based Approach for Functional Urban Areas Delineation ........................................... 652
Noudéhouénou L.J. Houssou, University of La Rochelle, France
Jean-Loup Guillaume, University of La Rochelle, France
Armelle Prigent, University of La Rochelle, France

A Transfer Learning Paradigm for Spatial Networks ................................................................. 659
Chidubem Iddianozie, University College Dublin, Ireland
Gavin McArdle, University College Dublin, Ireland

Algorithms for Mountain Peaks Discovery: A Comparison ..................................................... 667
Rocio Nahime Torres, Politecnico di Milano, Italy
Federico Milani, Politecnico di Milano, Italy
Piero Fraternali, Politecnico di Milano, Italy

From Spatio-Temporal Data to Chronological Networks: An Application to Wildfire Analysis .......... 675
Didier A. Vega-Oliveros, University of São Paulo, Brazil
Moshé Cotacallapa, National Institute for Space Research, Brazil
Leonardo N. Ferreira, National Institute for Space Research, Brazil
Marcos G. Quiles, Federal University of São Paulo, Brazil
Liang Zhao, University of São Paulo, Brazil
Elbert E.N. Macau, Federal University of São Paulo, Brazil
Manoel F. Cardoso, National Institute for Space Research, Brazil

Poster Papers

Similarity-based Visual Exploration of Very Large Georeferenced Multidimensional Datasets ........... 683
Roger Peralta-Aranibar, Universidad Católica San Pablo, Peru
Cicero A.L. Pahins, Universidade Federal do Rio Grande do Sul, Brazil
Joao L.D. Comba, Universidade Federal do Rio Grande do Sul, Brazil
Erick Gomez-Nieto, Universidad Católica San Pablo, Peru

The Role of Geographic Knowledge in Sub-City Level Geolocation ........................................... 687
Laura Di Rocco, Università di Genova, Italy
Davide Buscaldi, LIPN, Université Paris 13, France
Michela Bertolotto, University College Dublin, Ireland
Barbara Catania, Università di Genova, Italy
Giovanna Guerrini, Università di Genova, Italy
Theme: AI and Agents

HCI - Smart Human Computer Interaction Track

Track Co-Chairs: Anand Paul, Kyungpook National University, South Korea
Soon Ki Jung, Kyungpook National University, South Korea
Awais Ahmad, University of Milan, Italy
Ganesh Kumar P., Anna University, India

Track Editorial ................................................................. 690

Detecting Stress from Mouse-Gaze Attraction ................................................................. 692
Jun Wang, The Hong Kong Polytechnic University, China
Eugene Yujun Fu, The Hong Kong Polytechnic University, China
Grace Ngai, The Hong Kong Polytechnic University, China
Hong Va Leong, The Hong Kong Polytechnic University, China
Michael Xuelin Huang, Max Planck Institute for Informatics, Germany

Effects of Virtual-Avatar Motion-Synchrony Levels on Full-Body Interaction ................. 701
Changyeol Choi, Hanyang University, South Korea
Joohee Jun, Hanyang University, South Korea
Jiwoong Heo, Hanyang University, South Korea
Kwanguk Kim, Hanyang University, South Korea

Smart Contract’s Interface for User Centric Business Model in Blockchain .................... 709
Malik Junaid Jami Gul, Kyungpook National University, South Korea
Anand Paul, Kyungpook National University, South Korea
Awais Ahmad, Bahira University, Pakistan
Murad Khan, Sarhad University of Science and Information Technology, Pakistan
Gwanggil Jeon, Incheon National University, South Korea

Stylus Knife: Improve Cutting Skill for Paper-cutting by Implementing Pressure Control .......... 714
Takafumi Higashi, Japan Advanced Institute of Science and Technology, Japan
Hideaki Kanai, Japan Advanced Institute of Science and Technology, Japan

Student Research Abstract

Student Research Abstract: Towards Textualising Analytic Provenance for Visual Analytics using
Natural Language Generation ......................................................................................... 722
Waqas Khawaja, National University of Ireland Galway, Ireland

Student Research Abstract: Human-enabled Sustainable Management of Mobile Cloud
on 5G Network .............................................................................................................. 726
Sadia Din, Kyungpook National University, South Korea
**Theme: Information Systems**

**HI - Health Informatics Track**

**Track Co-Chairs:** Anu Mary Chako, National Institute of Technology Calicut, India  
Gopakumar G, National Institute of Technology Calicut, India

---

**Track Editorial**

---

**A Two-Step Approach to Predictive Modeling of Individual-based Environmental Health Risks**

Wan D. Bae, Hanyang University, South Korea  
Matthew Horak, Hanyang University, South Korea  
Shayma Alkobaisi, United Arab Emirates University, UAE  
Sehjeong Kim, United Arab Emirates University, UAE  
Sada Narayanappa, Lockheed Martin, USA  
Choon-Sik Park, Soonchunhyang University Bucheon Hospital, South Korea  
Da Jeong Bae, Soonchunhyang University Bucheon Hospital, South Korea

---

**Applying Situation-Awareness for Recommending Phonological Processes in the Children's Speech**

Maria Helena Franciscatto, Federal University of Santa Maria, Brazil  
João Carlos Damasceno Lima, Federal University of Santa Maria, Brazil  
Celio Trois, Federal University of Santa Maria, Brazil  
Vinicius Maran, Federal University of Santa Maria, Brazil  
Marcia Keske Soares, Federal University of Santa Maria, Brazil  
Cristiano Cortez da Rocha, Penguin Formula, Portugal

---

**Graph Sparsification with Parallelization to Optimize the Identification of Causal Genes and Dysregulated Pathways**

Jeethu V. Devasia, National Institute of Technology Calicut, India  
Priya Chandran, National Institute of Technology Calicut, India  
Anjana Soman, National Institute of Technology Calicut, India  
Aiswarya Elezabeth Mathew, National Institute of Technology Calicut, India  
Jaya Jharwal, National Institute of Technology Calicut, India

---

**Leveraging the Link Quality Awareness for Body Node Coordinator (BNC) Placement in WBANs**

Rim Negra, University of Manouba, Tunisia  
Imen Jemili, University of Manouba, Tunisia  
Akka Zemmari, Université de Bordeaux, France  
Mohamed Mosbah, Université de Bordeaux, France  
Abdelfettah Belghith, King Saud University Saudi Arabia, Saudi Arabia  
Nesrine Ouled Abdallah, Université de Bordeaux, France

---

**Resolving Data Interoperability in Ubiquitous Health Profile using Semi-Structured Storage and Processing**

Fahad Ahmed Satti, Kyung Hee University, South Korea  
Wajahat Ali Khan, Kyung Hee University, South Korea  
Ganghun Lee, Kyung Hee University, South Korea  
Asad Masood Khattak, Zayed University, UAE  
Sungyoung Lee, Kyung Hee University, South Korea
Poster Papers

**An Iterative Oversampling Approach for Ordinal Classification** ............................................................... 771
Francisco Marques, Universidade de Coimbra, Portugal
Hugo Duarte, IPO-Porto Research Centre, Portugal
João Santos, IPO-Porto Research Centre, Portugal
Inês Domingues, IPO-Porto Research Centre and University of Coimbra, Portugal
José P. Amorim, IPO-Porto Research Centre and University of Coimbra, Portugal
Pedro H. Abreu, University of Coimbra, Portugal

**IPBN: Alerts Management in Intravenous Electromedical Devices using Bayesian Networks** .............. 775
Fabrício Ferreira, Federal University of Pelotas, Brazil
Adenauer Yamin, Federal University of Pelotas, Brazil
Ana Pernas, Federal University of Pelotas, Brazil
Luciano Agostini, Federal University of Pelotas, Brazil
Alexandre de Souza, Federal Institute of Education, Science and Technology of Rio Grande do Sul, Brazil
Jorge Barbosa, University of Vale do Rio dos Sinos, Brazil

**Student Research Abstract**

**Student Research Abstract: Mortality Prediction using Medical Notes** ..................................................... 778
Mahnaz Koupae, University of California Santa Barbara, USA

**Video-Based Decision Support for Behavioral Veterinarians: A Case Study of Canine ADHD** ............ 782
Asaf Fux, University of Haifa, Israel

Theme: Information Systems

IAR - Information Access and Retrieval Track

**Track Co-Chairs:** Gloria Bordogna, Consiglio Nazionale delle Ricerche – CNR IREA, Italy
Gabriella Pasi, Università degli Studi di Milano Bicocca -DISCo, Italy

**Track Editorial** ................................................................................................................................................. 786

**aMV-LSTM: An Attention-based Model with Multiple Positional Text Matching** ................................ 788
Thiziri Belkacem, Paul Sabatier University, France
Taoufiq Dkaki, Jean Jaures University, France
Jose G. Moreno, Paul Sabatier University, France
Mohand Boughanem, Paul Sabatier University, France

**Ask Toscanini! – Architecting a Search Engine for Music Scores beyond Metadata** ....................... 796
Arman Bahraini, Virginia Polytechnic Institute and State University, USA
Eli Tilevich, Virginia Polytechnic Institute and State University, USA

**Automatically Assessing the Quality of Wikipedia Contents** .............................................................. 804
Elias Bassani, Università degli Studi di Milano-Bicocca and Consorzio C2T, Italy
Marco Viviani, Università degli Studi di Milano-Bicocca, Italy

**Hybrid Molecule-based Information Retrieval** ....................................................................................... 808
Nathalie Charbel, University of Pau and Pays de l'Adour, France
Christian Sallaberry, University of Pau and Pays de l'Adour, France
Sebastien Laborie, University of Pau and Pays de l'Adour, France
Richard Chbeir, University of Pau and Pays de l'Adour, France
The Importance of being Dissimilar in Recommendation
Vito Walter Anelli, Politecnico di Bari, Italy
Tommaso Di Noia, Politecnico di Bari, Italy
Eugenio Di Sciascio, Politecnico di Bari, Italy
Azzurra Ragone, Independent Researcher, Italy
Joseph Trotta, Politecnico di Bari, Italy

Theme: System Software and Security

IoT - Internet of Things Track

Track Co-Chairs:
Gail-Joon Ahn, Arizona State University, USA
Seong-Je Cho, Dankook University, South Korea
Jun Zheng, New Mexico Institute of Mining and Technology, USA

Track Editorial

An Architecture and its Tools for Integrating IoT and BPMN in Agriculture Scenarios
Jordano R. Celestrini, Federal University of Espirito Santo, Brazil
Renato N. Rocha, Federal University of Espirito Santo, Brazil
Estêvão B. Saleme, Federal University of Espirito Santo, Brazil
Celso A.S. Santos, Federal University of Espirito Santo, Brazil
José G. Pereira Filho, Federal University of Espirito Santo, Brazil
Rodrigo V. Andreão, Federal Institute of Espirito Santo, Brazil

CyprIoT: Framework for Modelling and Controlling Network-Based IoT Applications
Imad Berrouyne, IMT Atlantique and University of Quebec at Rimouski, France
Mehdi Adda, University of Quebec at Rimouski, Canada
Jean-Marie Mottu, IMT Atlantique, France
Jean-Claude Royer, IMT Atlantique, France
Massimo Tisi, IMT Atlantique, France

Ensemble Trees Learning based Improved Predictive Maintenance using IIoT for Turbofan Engines
Sourajit Behera, Indian Institute of Technology Patna, India
Anurag Choubey, Indian Institute of Technology Patna, India
Chandresh S. Kanani, Indian Institute of Technology Patna, India
Yashwant Singh Patel, Indian Institute of Technology Patna, India
Rajiv Misra, Indian Institute of Technology Patna, India
Alberto Sillitti, Innopolis University, Russia

iCORE: Continuous and Proactive Extrospection on Multi-core IoT Devices
Penghui Zhang, Arizona State University, USA
Haehyun Cho, Arizona State University, USA
Ziming Zhao, Arizona State University, USA
Adam Doupé, Arizona State University, USA
Gail-Joon Ahn, Arizona State University, USA

Privacy-Preserving Delegable Authentication in the Internet of Things
Clémentine Gritti, Norwegian University of Science and Technology, Norway
Melek Önen, EURECOM, France
Refik Molva, EURECOM, France

Separate Session Key Generation Approach for Network and Application flows in LoRaWAN
Suman Bala, Orange, France
Dominique Barthel, Orange, France
Säid Gharout, Orange, France
**Toward a Lightweight Ontology for Privacy Protection in IoT** ................................................................. 880
Mayke Ferreira Arruda, Universidade Federal de Goiás, Brazil
Renato Freitas Bulcão-Neto, Universidade Federal de Goiás, Brazil

**Poster Papers**

**Hygieia: Data Quality Assessment for Smart Sensor Network** ............................................................... 889
Gabriel R. Caldas de Aquino, Universidade Federal do Rio de Janeiro, Brazil
Claudio M. de Farias, Universidade Federal do Rio de Janeiro, Brazil
Luci Pirmez, Universidade Federal do Rio de Janeiro, Brazil

**PEDAL: Power-Delay Product Objective Function for Internet of Things Applications** ....................... 892
Bardia Safaei, Sharif University of Technology, Iran
Ali Asghar Mohammad Salehi, Sharif University of Technology, Iran
Maryam Shirbeigi, Sharif University of Technology, Iran
Amir Mahdi Hosseini Monazzah, Institute for Research in Fundamental Sciences, Iran
Alireza Ejlali, Sharif University of Technology, Iran

**Theme: AI and Agents**

**IRMAS - Intelligent Robotics and Multi-Agent Systems Track**

**Track Co-Chairs:** Rui P. Rocha, ISR – University of Coimbra, Portugal
Daniel Kudenko, University of York, UK

**Track Editorial** ................................................................................................................................................. 896

**Communication-based Cooperative Tasks: How the Language Expressiveness affects Reinforcement Learning** ................................................................................................................................. 898
Jacopo Talamini, Università degli studi di Trieste, Italy
Eric Medvet, Università degli studi di Trieste, Italy
Alberto Bartoli, Università degli studi di Trieste, Italy

**Correlation Clustering based Coalition Formation for Multi-Robot Task Allocation** ......................... 906
Ayan Dutta, University of North Florida, USA
Vladimir Ufimtsev, East Central University, USA
Asai Asaithambi, University of North Florida, USA

**Distributed Adaptive-Neighborhood Control for Stochastic Reachability in Multi-Agent Systems** ...... 914
Anna Lukina, Technische Universität Wien, Austria
Ashish Tiwari, SRI International, USA
Scott A. Smolka, Stony Brook University, USA, USA
Radu Grosu, Technische Universität Wien, Austria

**Hierarchical Multi-Agent Deep Reinforcement Learning to Develop Long-Term Coordination** ........ 922
Marie Ossenkopf, Universität Kassel, Germany
Mackenzie Jorgensen, Villanova University, USA
Kurt Geihs, Universität Kassel, Germany
Subspace Clustering for Situation Assessment in Aquatic Drones ................................................................. 930
Alberto Castellini, Verona University, Italy
Francesco Masillo, Verona University, Italy
Manuele Bicego, Verona University, Italy
Domenico Bloisi, Verona University, Italy
Jason Blum, Verona University, Italy
Alessandro Farinelli, Verona University, Italy
Sergio Peigner, Université de Lyon, France

Support Vector Regression based Sensor Localization using UAV ................................................................. 938
Rolif Lima, Tata Consultancy Services, India
Kaushik Das, Tata Consultancy Services, India
Debasish Ghose, Indian Institute of Science Bangalore, India

Trail Formation using Large Swarms of Minimal Robots .............................................................................. 946
Pere Molins, University of Bristol, UK
Sabine Hauert, University of Bristol, UK

Poster Papers

RoboPlanner : Autonomous Robotic Action Planning via Knowledge Graph Queries ......................... 953
Ajay Kattepur, Tata Consultancy Services, India
Balamuralidhar P, Tata Consultancy Services, India

Social Robot Navigation based on HRI Non-verbal Communication: A Case Study on Avocado Harvesting ............................................................................................................................................. 957
Juan Pablo Vasconez, Universidad Técnica Federico Santa María, Chile
Leonardo Guevara, Universidad Técnica Federico Santa María, Chile
Fernando Auat Cheein, Universidad Técnica Federico Santa María, Chile

Student Research Abstract

Student Research Abstract: Taking Stigmergy out of the Lab and into the Field .......................................... 961
Siobhan Duncan, Heriot-Watt University, UK

Theme: AI and Agents

KLP - Knowledge and Language Processing Track

Track Co-Chairs:  
Mauro Dragoni, Fondazione Bruno Kessler (FBK), Italy
Marco Rospocher, University of Verona, Italy

Track Editorial ................................................................................................................................................. 965

A Case-based Approach using Phonological Knowledge for Identifying Error Patterns in Children's Speech ............................................................................................................................................. 968
Maria Helena Franciscatto, Federal University of Santa Maria, Brazil
João Carlos Damasceno Lima, Federal University of Santa Maria, Brazil
Celio Trois, Federal University of Santa Maria, Brazil
Vinicius Maran, Federal University of Santa Maria, Brazil
Márcia Keske Soares, Federal University of Santa Maria, Brazil
Cristiano Cortez da Rocha, Penguin Formula, Portugal
Detecting Reliable Novel Word Senses: A Network-Centric Approach ..................................................... 976
Abhik Jana, Indian Institute of Technology Kharagpur, India
Animesh Mukherjee, Indian Institute of Technology Kharagpur, India
Pawan Goyal, Indian Institute of Technology Kharagpur, India

Exploring Lexico-Semantic Patterns for Aspect-Based Sentiment Analysis .............................................. 984
Frederique Baas, Erasmus University Rotterdam, The Netherlands
Olivier Bus, Erasmus University Rotterdam, The Netherlands
Alexander Osinga, Erasmus University Rotterdam, The Netherlands
Nikki van de Ven, Erasmus University Rotterdam, The Netherlands
Steffie van Loenhout, Erasmus University Rotterdam, The Netherlands
Lisanne Vrolijk, Erasmus University Rotterdam, The Netherlands
Kim Schouten, Erasmus University Rotterdam, The Netherlands
Flavius Frasincar, Erasmus University Rotterdam, The Netherlands

Few-shot Classification in Named Entity Recognition task ......................................................................... 993
Alexander Fritzler, Moscow Institute of Physics and Technology and Quantum Brains, Russia
Varvara Logacheva, Moscow Institute of Physics and Technology, Russia
Maksim Kretov, Moscow Institute of Physics and Technology, Russia

Out-of-context Fine-grained Multi-word Entity Classification ................................................................. 1001
Guillaume Jacquet, European Commission, Italy
Jakub Piskorski, European Commission, Italy
Sophie Chesney, Queen Mary University of London, UK

Populating the Knowledge Base of a Conversational Agent: Human vs. Machine ................................. 1011
Hugo Rodrigues, Técnico Lisboa, Portugal
Luisa Coheur, Técnico Lisboa, Portugal
Eric Nyberg, Carnegie Mellon University, USA

Study of Linguistic Features Incorporated in a Literary Book Recommender System ......................... 1027
Haifa Alharthi, University of Ottawa, Canada
Diana Inkpen, University of Ottawa, Canada

Unveiling Middle-Level Concepts through Frequency Trajectories and Peaks Analysis ......................... 1035
Luigi Di Caro, University of Turin, Italy
Alice Ruggeri, University of Turin, Italy

Vocabulary based Community Detection and Characterization ............................................................... 1043
Giorgia Ramponi, Politecnico di Milano, Italy
Marco Brambilla, Politecnico di Milano, Italy
Stefano Ceri, Politecnico di Milano, Italy
Florian Daniel, Politecnico di Milano, Italy
Marco Di Giovanni, Politecnico di Milano, Italy
Poster Papers

A Hybrid Deep Learning Network for Modelling Opinionated Content ................................................................. 1051
Pantelis Agathangelou, University of Nicosia, Cyprus
Ioannis Katakis, University of Nicosia, Cyprus

A Portable Grammar-based NLG System for Verbalization of Structured Data .................................................. 1054
Simon Mille, Universitat Pompeu Fabra, Spain
Stamatia Dasiopoulou, Universitat Pompeu Fabra, Spain
Leo Wanner, ICREA and Universitat Pompeu Fabra, Spain

Looking into the Past: Evaluating the Effect of Time Gaps in a Personalized Sentiment Model .......... 1057
Siwen Guo, University of Luxembourg, Luxembourg
Sviatlana Höhn, University of Luxembourg, Luxembourg
Christoph Schommer, University of Luxembourg, Luxembourg

Overwhelmed by Negative Emotions? Maybe You are being Cyber-bullied! ...................................................... 1061
Pinar Arslan, Université Côte d’Azur, France
Michele Corazza, Université Côte d’Azur, France
Elena Cabrio, Université Côte d’Azur, France
Serena Villata, Université Côte d’Azur, France

Theme: AI and Agents
KomIS - Knowledge Discovery meets Information Systems Track

Track Co-Chairs: Fabio Mercorio, University of Milano-Bicocca, Italy
Mario Mezzanzanica, University of Milano-Bicocca, Italy
Antonio Picariello, University of Naples "Federico II", Italy

Track Editorial ....................................................................................................................................................... 1064

An Effective and Efficient Algorithm for Ranking Web Documents via Genetic Programming ........ 1065
Ricardo Baeza-Yates, Northeastern University at Silicon Valley, USA
Alfredo Cuzzocrea, University of Trieste, Italy
Domenico Crea, University of Calabria, Italy
Giovanni Lo Bianco, University of Calabria, Italy

How to Implement a Big Data Clustering Algorithm: A Brief Report on Lesson Learned .................. 1073
Michele Ianni, University of Calabria, Italy
Elio Masiari, ICAR-CNR, Italy
Giuseppe M. Mazzeo, Facebook, USA
Carlo Zaniolo, UCLA, USA

On-line Aggregation of POIs from Google and Facebook ............................................................................... 1081
Maurizio Toccu, University of Bergamo, Italy
Giuseppe Psaila, University of Bergamo, Italy
Davide Altomare, Enel SpA, Italy

Topic-based Indexing of Federated Datasets ...................................................................................................... 1090
Ciro Sorrentino, University of Sannio, Italy
Ester Giallonardo, University of Sannio, Italy
Eugenio Zimeo, University of Sannio, Italy
VisCrimePredict: A System for Crime Trajectory Prediction and Visualisation from Heterogeneous Data Sources

Ahsan Morshed, Swinburne University of Technology, Australia
Abdur Rahim Mohammad Forkan, Swinburne University of Technology, Australia
Pei-Wei Tsai, Swinburne University of Technology, Australia
Prem Prakash Jayaraman, Swinburne University of Technology, Australia
Timos Sellis, Swinburne University of Technology, Australia
Dimitrios Georgakopoulos, Swinburne University of Technology, Australia
Irene Moser, Swinburne University of Technology, Australia
Rajiv Ranjan, Newcastle University, UK

Poster Papers

A Deep Learning based Community Detection approach

Giancarlo Sperlì, University of Naples "Federico II", Italy

Catfish Density Estimation by Aerial Images Analysis and Deep Learning

Donatello Conte, University of Tours, France
Pierre Gaucher, University of Tours, France
Carlo Sansone, University of Naples Federico II, Italy

Theme: AI and Agents

KRR - Knowledge Representation and Reasoning Track

Track Co-Chairs: Stefano Bistarelli, Università di Perugia, Italy
Martine Ceberio, University of Texas El Paso, USA
Eric Monfroy, Universidad Técnica Federico Santa María, Valparaiso, Chile and Université de Nantes, France
Francesco Santini, Università di Perugia, Italy

Track Editorial

Conflict History based Search for Constraint Satisfaction Problem

Djamal Habet, Aix Marseille University, LIS, France
Cyril Terrioux, Aix Marseille University, LIS, France

Expressive Cardinality Constraints on ALCSCC Concepts

Franz Baader, Technische Universität Dresden, Germany

Inferential Equivalence, Normal Forms, and Isomorphisms of Knowledge Bases in Institutions of Conditional Logics

Christoph Beierle, FernUniversität in Hagen, Germany

Interpretations and Models for Assumption-Based Argumentation

Samy Sá, Universidade Federal do Ceará, Brazil
João Alcântara, Universidade Federal do Ceará, Brazil

On Scaling the Enumeration of the Preferred Extensions of Abstract Argumentation Frameworks

Gianvincenzo Alfano, University of Calabria, Italy
Sergio Greco, University of Calabria, Italy
Francesco Parisi, University of Calabria, Italy
Representing and Comparing Large Sets of Extensions of Abstract Argumentation Frameworks
Odinaldo Rodrigues, King's College London, UK

Poster Papers

Hybrid Temporal Situation Calculus
Vitaliy Batusov, York University, Canada
Giuseppe De Giacomo, Sapienza Università di Roma, Italy
Mikhail Soutchanski, Ryerson University, Canada

Student Research Abstract

Student Research Abstract: Automatic Derivation of Formulas by Graph Embedding and Pattern Matching Network
MinCong Luo, China Institute of Atomic Energy, China

Student Research Abstract: Modelling the Dynamics of Forgetting and Remembering by a System of Belief Changes
Kai Sauerwald, FernUniversität in Hagen, Germany

Theme: Distributed Systems

MCA - Mobile Computing and Applications Track

Track Co-Chairs: Hong Va Leong, The Hong Kong Polytechnic University, China
Sheikh Iqbal Ahamed, Marquette University, USA

Track Editorial

A Multi-Objective Indoor Localization Service for Smartphones
Andreas Konstantinidis, Frederick University, Cyprus
Aphrodite Demetriades, Frederick University, Cyprus
Savvas Pericleous, Frederick University, Cyprus

A Scalable and Accurate Feature Representation Method for Identifying Malicious Mobile Applications
Bo Sun, National Institute of Information and Communications Technology, Japan
Tao Ban, National Institute of Information and Communications Technology, Japan
Shun-Chieh Chang, Institute for Information Industry, Taiwan
Yeali S. Sun, National Taiwan University, Taiwan
Takeshi Takahashi, National Institute of Information and Communications Technology, Japan
Daisuke Inoue, National Institute of Information and Communications Technology, Japan

Acousess: Smartphone-based Logger to Assess Acoustical Conditions – Subjective Noise Conditions on some Circumference and Intraindividual Variation
Takahiro Miura, AIST, Japan
Mari Ueda, Kanagawa Institute of Technology, Japan
Masaaki Hiroe, Kobayashi Institute of Physical Research, Japan
Ken-ichiro Yabu, The University of Tokyo, Japan
Machine Learning for Improving Mobile User Satisfaction ................................................................. 1200
Ismat Chaib Draa, Université Polytechnique Hauts-de-France, France
Fabien Bouquillon, Université Polytechnique Hauts-de-France, France
Smail Niar, Université Polytechnique Hauts-de-France, France
Emmanuelle Grislin-Le Strugeon, Université Polytechnique Hauts-de-France, France

MoCA: A Novel Privacy-preserving Contextual Advertising Platform on Mobile Devices .................. 1208
Jung-Hyun Lee, Korea University, South Korea
Woo-Jong Ryu, Korea University, South Korea
Kang-Min Kim, Korea University, South Korea
SangKeun Lee, Korea University, South Korea

Poster Papers

Extended Sammon Projection and Wavelet Kernel Extreme Learning Machine for Gait-based Legitimate User Identification ...................................................................................................................... 1216
Muhammad Ahmad, Innopolis University, Russia
Adil Mehmood Khan, Innopolis University, Russia
Manuel Mazzara, Innopolis University, Russia
Salvatore Distefano, University of Messina, Italy
Amjad Ali, Korea University, South Korea
Ali Tufail, Islamic University of Medina, Saudi Arabia

Student Research Abstract

Student Research Abstract: Smart Mobile Crowdsensing for Tinnitus Research ................................. 1220
Muntazir Mehdi, Ulm University, Germany

Theme: Distributed Systems

MiDOS - Microservices, DevOps, and Service-Oriented Architecture Track
Track Co-Chairs:  Luis Cruz-Filipe, University of Southern Denmark, Denmark
Elisabetta Di Nitto, Politecnico di Milano, Italy
Jacopo Mauro, University of Southern Denmark, Denmark

Track Editorial ............................................................................................................................................... 1224

An Extensible Data-Driven Approach for Evaluating the Quality of Microservice Architectures ...... 1225
Mario Cardarelli, University of L'Aquila, Italy
Ludovico Iovino, Gran Sasso Science Institute, Italy
Paolo Di Francesco, Gran Sasso Science Institute, Italy
Amleto Di Salle, University of L'Aquila, Italy
Ivano Malavolta, Vrije Universiteit Amsterdam, The Netherlands
Patricia Lago, Vrije Universiteit Amsterdam, The Netherlands

Attack Graph Generation for Microservice Architecture ........................................................................... 1235
Amjad Ibrahim, Technical University of Munich, Germany
Stevica Bozholoski, Technical University of Munich, Germany
Alexander Pretschner, Technical University of Munich, Germany
Reactive Microservices for the Internet of Things: A Case Study in Fog Computing ........................................... 1243
Cleber Jorge Lira de Santana, Federal Institute of Bahia and Federal University of Bahia, Brazil
Brenno de Mello Alencar, Federal University of Bahia, Brazil
Cássio V. Serafim Prazeres, Federal University of Bahia, Brazil

Transparent Tracing of Microservice-based Applications ................................................................. 1252
Matheus Santana, Federal University of Pernambuco, Brazil
Adalberto Sampaio Jr., Federal University of Pernambuco, Brazil
Marcos Andrade, Federal University of Pernambuco, Brazil
Nelson S. Rosa, Federal University of Pernambuco, Brazil

Poster Papers

A Model-driven Workflow for Distributed Microservice Development .................................................. 1260
Florian Rademacher, Dortmund University of Applied Sciences and Arts, Germany
Jonas Sorgalla, Dortmund University of Applied Sciences and Arts, Germany
Sabine Sachweh, Dortmund University of Applied Sciences and Arts, Germany
Albert Zündorf, Universität Kassel, Germany

Theme: AI and Agents

MLA - Machine Learning and its Applications Track

Track Co-Chairs: Keon Myung Lee, Chungbuk National University, South Korea
Jee-Hyong Lee, Sungkyunkwan University, South Korea

An Adaptive Framework for Applying Machine Learning in Smart Spaces ........................................... 1263
Sachin Bhardwaj, Chungbuk National University, South Korea
Keon Myung Lee, Chungbuk National University, South Korea
Jee-Hyong Lee, Sungkyunkwan University, South Korea

Causality Relationship Among Attributes Applied in an Educational Data Set ...................................... 1271
Walisson Ferreira de Carvalho, Centro Universitário Una, Brazil
Luis Enrique Zarate, Pontifical Catholic University of Minas Gerais, Brazil

Evolving MIMO Multi-Layered Artificial Neural Networks using Grammatical Evolution .................. 1278
Qadeer Ahmad, Namal College, Pakistan
Atif Rafiq, University of Limerick, Ireland
Muhammad Adil Raja, University of Limerick, Ireland
Noman Javed, Namal College, Pakistan

Exact Gaussian Process Regression with Distributed Computations ...................................................... 1286
Duc-Trung Nguyen, EURECOM, France
Maurizio Filippone, EURECOM, France
Pietro Michiardi, EURECOM, France

GAN is a Friend or Foe? A Framework to Detect Various Fake Face Images ........................................ 1296
Shahroz Tariq, SUNY Korea, South Korea
Sangyup Lee, SUNY Korea, South Korea
Hoyoung Kim, SUNY Korea, South Korea
Youjin Shin, SUNY Korea, South Korea
Simon S. Woo, SUNY Korea, South Korea
How Do Implementation Bugs Affect the Results of Machine Learning Algorithms? ........................................ 1304
Maurizio Leotta, Università di Genova, Italy
Dario Olianas, Università di Genova, Italy
Filippo Ricca, Università di Genova, Italy
Nicoletta Noceti, Università di Genova, Italy

Influence Maximization for Effective Advertisement in Social Networks: Problem, Solution, and Evaluation ................................................................. 1314
Suk-Jin Hong, Hanyang University, South Korea
Yun-Yong Ko, Hanyang University, South Korea
Moonjeung Joe, Gyeongnam National University of Science and Technology, South Korea
Sang-Wook Kim, Hanyang University, South Korea

Marlon – A Domain-Specific Language for Multi-Agent Reinforcement Learning on Networks .......... 1322
Tim Molderez, Vrije Universiteit Brussel, Belgium
Bjarno Oeyen, Vrije Universiteit Brussel, Belgium
Coen De Roover, Vrije Universiteit Brussel, Belgium
Wolfgang De Meuter, Vrije Universiteit Brussel, Belgium

Population Anomaly Detection through Deep Gaussianization ................................................................. 1330
David Tolpin, Offtopia, Israel

Real-Time Botnet Detection using Nonnegative Tucker Decomposition .................................................. 1337
Hideaki Kanehara, Waseda University, Japan
Yuma Murakami, Waseda University, Japan
Jumpei Shimamura, Clwit Inc., Japan
Takeshi Takahashi, National Institute of Information and Communications Technology, Japan
Daisuke Inoue, National Institute of Information and Communications Technology, Japan
Noboru Murata, Waseda University, Japan

Convolutional Neural Network with Structural Input for Visual Object Tracking ............................... 1345
Mustansar Fiaz, Kyungpook National University, South Korea
Arif Mahmood, Information Technology University, Pakistan
Soon Ki Jung, Kyungpook National University, South Korea

Poster Papers

An Efficient Deep Learning Platform for Detecting Objects ................................................................. 1353
Hansol Lee, Soongsil University, South Korea
Younggwon Kim, Soongsil University, South Korea
Juw Won Park, University of Louisville, USA
Sung Y. Shin, South Dakota University, USA
Jiman Hong, Soongsil University, South Korea

Machine Learning based Real-Time Vehicle Data Analysis for Safe Driving Modeling .......................... 1355
Pamul Yadav, Ulsan National Institute of Science and Technology, South Korea
Sangsu Jung, MtoV Inc., South Korea
Dhananjay Singh, Hankuk University of Foreign Studies, South Korea
Multiple Perspectives HMM-based Feature Engineering for Credit Card Fraud Detection
Yvan Lucas, Universität Passau, Germany
Pierre-Edouard Portier, INSA Lyon, France
Léa Laporte, INSA Lyon, France
Sylvie Calabretto, INSA Lyon, France
Olivier Caelen, ATOS Worldline, France
Liyun He-Guelton, ATOS Worldline, France
Michael Granitzer, Universität Passau, Germany

Toward a Continuous Authentication System using a Biologically Inspired Machine Learning Approach: A Case Study
Obada Al Zoubi, American University of Beirut, Lebanon
Mariette Awad, American University of Beirut, Lebanon

Theme: Distributed Systems
NET - Networking Track
Track Co-Chairs: Mário M. Freire, University of Beira Interior, Portugal
Marília Curado, University of Coimbra, Portugal
Ivan Ganchev, University of Limerick, Ireland and University of Plovdiv “Paisii Hilendarski”, Bulgaria

A Hierarchical Architectural Model for Network Security Exploring Situational Awareness
Ricardo Borges Almeida, Federal University of Pelotas, Brazil
Victor Covalski, Federal University of Pelotas, Brazil
Roger Machado, Federal University of Pelotas, Brazil
Diórgenes Yuri Leal da Rosa, Federal University of Pelotas, Brazil
Adenauer Corrêa Yamin, Federal University of Pelotas, Brazil
Lucas Medeiros Donato, De Montfort University, UK
Ana Marilza Pernas, Federal University of Pelotas, Brazil

On Simplifying Congestion Window Handling for CMT-SCTP
Marcelo Ricardo Leitner, Technological Federal University of Paraná, Brazil
Mauro S.P. Fonseca, Technological Federal University of Paraná, Brazil
Anelise Munaretto, Technological Federal University of Paraná, Brazil

On the Analogy between Quantum Circuit Design Automation and Virtual Network Embedding
Andreas Fischer, Deggendorf Institute of Technology, Germany
Alexandru Paler, Linz Institute of Technology, Austria

Reducing Energy Consumption in SDN-based Data Center Networks through Flow Consolidation Strategies
Marcelo da Silva Conterato, Pontifícia Universidade Católica do Rio Grande do Sul, Brazil
Tiago Coelho Ferreto, Pontifícia Universidade Católica do Rio Grande do Sul, Brazil
Fábio Rossi, Federal Institute of Education, Science and Technology, Brazil
Wagner dos Santos Marques, Pontifícia Universidade Católica do Rio Grande do Sul, Brazil
Paulo Silas Severo de Souza, Pontifícia Universidade Católica do Rio Grande do Sul, Brazil
Poster Papers

**Implementing Content-based Publish/Subscribe with OpenFlow** ............................................................ 1392
Helge Parzyjegla, Universität Rostock, Germany
Christian Wernecke, Universität Rostock, Germany
Gero Mühl, Universität Rostock, Germany
Eike Schweissguth, Universität Rostock, Germany
Dirk Timmermann, Universität Rostock, Germany

**Student Research Abstract**

**Student Research Abstract: Extending LoRa Networks: Dynamic Routing Protocols and Sub-GHz Radio Technology for Very Long Range Mesh Networks** ................................................................. 1396
Roger Pueyo Centelles, Universitat Politècnica de Catalunya, Spain

**Theme: System Software and Security**

**NGPS - Next Generation Programming Paradigms and Systems Track**

**Track Co-Chairs:** Davide Ancona, Università di Genova, Italy
Frédéric Louergue, Northern Arizona University, USA
Mirko Viroli, Alma Mater Studiorum - Università di Bologna, Italy
Danilo Pianini, Alma Mater Studiorum - Università di Bologna, Italy

**Track Editorial** ............................................................................................................................................... 1398

**Safe Usage of Registers in BSPlib** ............................................................................................................. 1400
Arvid Jakobsson, Huawei France Research Center, France
Frédéric Dabrowski, University of Orléans, France
Wadoud Bousdira, University of Orléans, France

**Theme: System Software and Security**

**OS - Operating Systems Track**

**Track Co-Chairs:** George Hamer, South Dakota State University, USA
Bongiae Kim, Sun Moon University, South Korea
Jaehueung Lee, Daejeon University, South Korea

**A Solution for a Detailed Mathematical Model for the Aircraft Landing Problem on a Single and Multiple Runway System** .............................................................................................................. 1408
Meriem Ben Messaoud, University of Tunis, Tunisia
Khaled Ghedira, University of Tunis, Tunisia

**Binary Transformation of Applications to run on Bare PCs** ......................................................................... 1416
Rasha Almajed, Towson University, USA
Ramesh Karne, Towson University, USA
Alexander Wijesinha, Towson University, USA

**Cache-Aware Block Allocation for Memory-Technology Storage Targeted File Systems** ....................... 1424
Jaehoeong Ahn, University of Seoul, South Korea
Choulseung Hyun, University of Seoul, South Korea
Donghee Lee, University of Seoul, South Korea
Sam H. Noh, Ulsan National Institute of Science and Technology, South Korea
A Robust and Secure Backup System for Protecting Malware ................................................................. 1432
Myungjoon Shon, Soongsil University, South Korea
Heejin Kim, Soongsil University, South Korea
Kicheol Park, Soongsil University, South Korea
Juw Won Park, University of Louisville, USA
Kwanghee Won, South Dakota State University, USA
Jiman Hong, Soongsil University, South Korea

HPanal: A Framework for Analyzing Tradeoffs of Huge Pages ............................................................... 1438
Gunhee Choi, Dankook University, South Korea
Juhyung Son, Dankook University, South Korea
Jongmoo Choi, Dankook University, South Korea
Seong-je Cho, Dankook University, South Korea
Youjip Won, KAIST, South Korea

Multithreaded Double Queuing for Balanced CPU-GPU Memory Copying ........................................... 1444
Sanghun Cho, Sungkyunkwan University, South Korea
Jaewan Hong, Sungkyunkwan University, South Korea
Jungsik Choi, Sungkyunkwan University, South Korea
Hwansoo Han, Sungkyunkwan University, South Korea

My Cloudy Time Machine: A Scalable Microservice-based Platform for Data Processing in
Cloud-Edge Systems – A Proof of Concept for the ROBIN-Cloud Project .............................................. 1451
Darius-Florentin Neatu, University Politecnica of Bucharest, Romania
Radu-Dumitru Stochitoiu, University Politehnica of Bucharest, Romania
Andrei-Vlad Postoaca, University Politehnica of Bucharest, Romania
Ion-Dorinel Filip, University Politehnica of Bucharest, Romania
Florin Pop, University Politehnica of Bucharest, Romania

Poster Papers

A Rendezvous Node Selection Protocol for Drone-based Data Collection ............................................... 1459
Hong Min, Hoseo University, South Korea
Kwangsoo Jo, Hoseo University, South Korea
Jinman Jung, Hannam University, South Korea
Bongiae Kim, Sun Moon University, South Korea
Junyoung Heo, Hansung University, South Korea

Predicting 24-hours Ahead Photovoltaic Power Output using Forecast Information ......................... 1462
Jaehyun Kim, Korea Electronics Technology Institute, South Korea
Taehyoung Kim, Korea Electronics Technology Institute, South Korea
Jieun Lee, Korea Electronics Technology Institute, South Korea
Kyung Sun Ham, Korea Electronics Technology Institute, South Korea
Track Co-Chairs: Ronald Petrlic, Federal Commissioner for Data Protection and Freedom of Information, Germany
Christoph Sorge, Saarland University, Germany

Track Editorial

Dynamic Attribute-Based Privacy-Preserving Genomic Susceptibility Testing
Mina Namazi, University of Vigo, Spain
Cihan Eryonucu, Bilkent University, Turkey
Erman Ayday, Bilkent University, Turkey
Fernando Pérez-González, University of Vigo, Spain

Engineering Privacy by Design – Lessons from the Design and Implementation of an Identity Wallet Platform
Fatbardh Veseli, Capgemini, Germany
Jetzabel Serna Olvera, Goethe University Frankfurt, Germany
Tobias Pulls, Karlstad University, Sweden
Kai Rannenberg, Goethe University Frankfurt, Germany

Mind Your Wallet's Privacy: Identifying Bitcoin Wallet Apps and User's Actions through Network Traffic Analysis
Fabio Aiolli, University of Padua, Italy
Mauro Conti, University of Padua, Italy
Ankit Gangwal, University of Padua, Italy
Mirko Polato, University of Padua, Italy

Privacy-Enhanced System Design Modeling based on Privacy Features
Amir Shayan Ahmadian, University of Koblenz Landau, Germany
Daniel Strüber, University of Koblenz Landau, Germany
Jan Jürjens, University of Koblenz Landau, Germany

Recommender-based Privacy Requirements Elicitation – EPICUREAN: An Approach to Simplify Privacy Settings in IoT Applications with Respect to the GDPR
Christoph Stach, University of Stuttgart, Germany
Frank Steimle, University of Stuttgart, Germany

Poster Papers

AILocker: Authenticated Image Locker for Video
Jihye Kim, Kookmin University, South Korea
Hankyung Ko, Hanyang University, South Korea
Hyunok Oh, Hanyang University, South Korea

A Comparison of System Description Models for Data Protection by Design
Pierre Dewitte, KU Leuven, Belgium
Kim Wuyts, KU Leuven, Belgium
Laurens Sion, KU Leuven, Belgium
Dimitri Van Landuyt, KU Leuven, Belgium
Ivo Emanuelov, KU Leuven, Belgium
Peggy Valcke, KU Leuven, Belgium
Wouter Joosen, KU Leuven, Belgium
Theme: System Software and Security

PL - Programming Languages Track

Track Co-Chairs: Barrett R. Bryant, University of North Texas, USA
Rajeev Raje, Indiana University-Purdue University-Indianapolis, USA

An Attribute Language Definition for Adaptable Parsing Expression Grammars ............................................. 1518
Elton M. Cardoso, Universidade Federal de Ouro Preto, Brazil
Rodrigo G. Ribeiro, Universidade Federal de Ouro Preto, Brazil
Leonardo V.S. Reis, Universidade Federal de Juiz de Fora, Brazil
Mariza A.S. Bigonha, Universidade Federal de Minas Gerais, Brazil
Roberto S. Bigonha, Universidade Federal de Minas Gerais, Brazil
Vladimir O. Di Iorio, Universidade Federal de Viçosa, Brazil

CPEG: A Typed Tree Construction from Parsing Expression Grammars with Regex-Like Captures ...... 1526
Daisuke Yamaguchi, Yokohama National University, Japan
Kimio Kuramitsu, Japan Women’s University, Japan

Musket: A Domain-Specific Language for High-Level Parallel Programming with Algorithmic Skeletons .................................................................................................................. 1534
Christoph Rieger, University of Münster, Germany
Fabian Wrede, University of Münster, Germany
Herbert Kuchen, University of Münster, Germany

PureMEM: A Structured Programming Model for Transiently Powered Computers ................................. 1544
Caglar Durmaz, Ege University, Turkey
Kasim Sinan Yildirim, Ege University, Turkey
Geylani Kardas, Ege University, Turkey

Retrieval of Individual Solutions from Encapsulated Search with a Potentially Infinite Search Space ...... 1552
Jan C. Dageförde, University of Münster, Germany
Herbert Kuchen, University of Münster, Germany

π: Towards a Simple Formal Semantic Framework for Compiler Construction ........................................... 1562
Christiano Braga, Universidade Federal Fluminense, Brazil

Poster Papers

Applying a Data-centric framework for Developing Model Transformations ............................................. 1570
Luiz Carlos Camargo, Federal University of Paraná, Brazil
Marcos Didonet Del Fabro, Federal University of Paraná, Brazil

Fyr: A Memory-safe and Thread-safe Systems Programming Language ......................................................... 1574
Torben Weis, University of Duisburg-Essen, Germany
Marian Waltereit, University of Duisburg-Essen, Germany
Maximilian Uphoff, University of Duisburg-Essen, Germany

Parallel Programming with Coq: Map and Reduce Skeletons on Trees ...................................................... 1578
Jolan Philippe, Northern Arizona University, USA
Frédéric Loulergue, Northern Arizona University, USA
Theme: Software Design and Development
RE - Requirements Engineering Track
Track Co-Chairs: Maria Lencastre, Universidade de Pernambuco, Brazil
João Araújo, NOVA LINCS, Universidade Nova de Lisboa, Portugal

Track Editorial ............................................................................................................................................... 1582

ARRoW: Automatic Runtime Reappraisal of Weights for Self-Adaptation ................................. 1584
Luis H. Garcia Paucar, Aston University, UK
Nelly Bencomo, Aston University, UK
Kevin Kam Fung Yuen, Singapore University of Social Sciences, Singapore

Contemporary Requirements Challenges and Issues: An Empirical Study in 11 Organizations ....... 1592
Feng Chen, National Institute of Informatics, Japan
Norah Power, University of Limerick, Ireland
J.J. Collins, University of Limerick, Ireland
Fuyuki Ishikawa, National Institute of Informatics, Japan

Goal Modeling for Collaborative Groups of Cyber-Physical Systems with GRL: Reflections on
Applicability and Limitations based on Two Studies Conducted in Industry ................................................. 1600
Marian Daun, University of Duisburg-Essen, Germany
Viktoria Stenkova, University of Duisburg-Essen, Germany
Lisa Krajinski, University of Duisburg-Essen, Germany
Jennifer Brings, University of Duisburg-Essen, Germany
Torsten Bandyszak, University of Duisburg-Essen, Germany
Thorsten Weyer, University of Duisburg-Essen, Germany

Logic-based Methodology to Help Security Architects in Eliciting High-Level Network
Security Requirements .................................................................................................................................. 1610
Romain Laborde, University Paul Sabatier, France
Sravani Teja Bulusu, University Paul Sabatier, France
Ahmad Samer Wazan, University Paul Sabatier, France
Francois Barrere, University Paul Sabatier, France
Abdelmalek Benzekri, University Paul Sabatier, France

Requirements for Preventing Logic Flaws in the Authentication Procedure of Web Applications ..... 1620
Youssou Ndiaye, University Rennes, France
Oliver Barais, University Rennes, France
Arnaud Blouin, University Rennes, France
Ahmed Bouabdallah, IMT Atlantique, France
Nicolas Aillery, Orange, France

Poster Papers

Elicitation of Technical Requirements in Large Research Projects: The CERBERO Approach ......... 1629
M. Masin, IBM, Israel
F. Palumbo, Università degli Studi di Sassari, Italy
J. Adriaanse, TNO, The Netherlands
H. Myrhaug, Ambiesense, UK
F. Regazzoni, Università della Svizzera Italiana, Switzerland
M. Sanchez, Thales Alenia Space, Spain
K. Zedda, Abinsula, Italy
Student Research Abstract

Student Research Abstract: SRCMIMM: Managing Requirements Change Activities in Global Software Development ......................................................... 1633
Muhammad Azeem Akbar, Chongqing University, China

Theme: System Software and Security

RS - Recommender Systems: Theory and Applications Track

Track Co-Chairs: Markus Zanker, Free University of Bozen-Bolzano, Italy
Li Chen, Hong Kong Baptist University, China
Panagiotis Symeonidis, Free University of Bozen-Bolzano, Italy
Yong Zheng, Illinois Institute of Technology, USA

Track Editorial ............................................................................................................................................... 1637

Community-Aware Diversification of Recommendations .................................................................................. 1639
Mesut Kaya, University College Cork, Ireland
Derek Bridge, University College Cork, Ireland

Global versus Individual Accuracy in Contextual Multi-Armed Bandit .............................................................. 1647
Nicolas Gutowski, ERIS, ESEO-TECH, France
Tassadit Amghar, Université d'Angers - LERIA, France
Olivier Camp, ERIS, ESEO-TECH, France
Fabien Chhel, ERIS, ESEO-TECH, France

Matrix Factorization based Heuristics for Constraint-based Recommenders ....................................................... 1655
Seda Polat Erdeniz, Graz University of Technology, Austria
Alexander Felfernig, Graz University of Technology, Austria
Ralph Samer, Graz University of Technology, Austria
Muesluem Atas, Graz University of Technology, Austria

Top-N Group Recommendations with Fairness .................................................................................................. 1663
Dimitris Sacharidis, Technische Universität Wien, Austria

Towards Explaining Recommendations through Local Surrogate Models ....................................................... 1671
Caio Nóbrega, Federal University of Campina Grande, Brazil
Leandro Marinho, Federal University of Campina Grande, Brazil

Poster Papers

CoRE: A Cold-start Resistant and Extensible Recommender System ................................................................. 1679
Mostafa Bayomi, Trinity College Dublin, Ireland
Annalina Caputo, Trinity College Dublin, Ireland
Matthew Nicholson, Trinity College Dublin, Ireland
Anirban Chakraborty, Trinity College Dublin, Ireland
Séamus Lawless, Trinity College Dublin, Ireland
Preselection of Documents for Personalized Recommendations of Job Postings based on Word Embeddings ................................................................. 1683
Steffen Schnitzer, Technische Universität Darmstadt, Germany
Dominik Reis, Technische Universität Darmstadt, Germany
Wael Alkhatib, Technische Universität Darmstadt, Germany
Christoph Rensing, Technische Universität Darmstadt, Germany
Ralf Steinmetz, Technische Universität Darmstadt, Germany

The Influence of Trust Cues on the Trustworthiness of Online Reviews for Recommendations .......... 1687
Catalin-Mihaie Barbu, University of Duisburg-Essen, Germany
Guillermo Carbonell, University of Duisburg-Essen, Germany
Jürgen Ziegler, University of Duisburg-Essen, Germany

Theme: Software Design and Development
SATTA - Software Architecture: Theory, Technology, and Applications Track
Track Co-Chairs:  Marcello M. Bersani, Politecnico di Milano, Italy
Sungwon Kang, Korea Advanced Institute of Science and Technology, South Korea
Patrizia Scandurra, DIGIP, University of Bergamo, Italy

Track Editorial ............................................................................................................................................... 1690

A RESTful Architecture for Data Exploration as a Service ................................................................. 1692
Yun Zhang, University of New South Wales, Australia
Xiwei Xu, University of New South Wales, Australia
Suhrid Satyal, University of New South Wales, Australia
Shiping Chen, University of New South Wales, Australia
Liming Zhu, University of New South Wales, Australia

Aiding the Realization of Service-oriented Distributed Systems ............................................................. 1701
Marco Autili, University of L'Aquila, Italy
Amleto Di Salle, University of L'Aquila, Italy
Francesco Gallo, University of L'Aquila, Italy
Claudio Pompilio, University of L'Aquila, Italy
Massimo Tivoli, University of L'Aquila, Italy

An Exploratory Study of MVC-based Architectural Patterns in Android Apps ....................................... 1711
Aymen Daoudi, Université du Québec à Montréal, Canada
Ghizlane ElBoussaidi, École de Technologie Supérieure, Canada
Naouel Moha, Université du Québec à Montréal, Canada
Séglé Kpodjedo, École de Technologie Supérieure, Canada

JCaliper: Search-Based Technical Debt Management ............................................................................. 1721
Panagiotis Kouros, University of Macedonia, Greece
Theodore Chaikalis, University of Macedonia, Greece
Elvira-Maria Arvanitou, University of Macedonia, Greece
Alexander Chatziegeorgiou, University of Macedonia, Greece
Apostolos Ampatzoglou, University of Macedonia, Greece
Theodoros Amanatidis, University of Macedonia, Greece
The Effect of Gamification on Software Architecture Knowledge Management: A Student Experiment and Focus Group Study
Benjamin Mayer, Johannes Kepler University, Austria
Rainer Weinreich, Johannes Kepler University, Austria

Theme: Software Design and Development
SE - Software Engineering Track
Track Co-Chairs: Tao Zhang, Harbin Engineering University, China
ByungJeong Lee, University of Seoul, South Korea
Eunjee Song, Baylor University, USA

Track Editorial

A Model-Driven Approach for Behavior-Driven GUI Testing
Hendrik Bünder, itemis AG, Germany
Herbert Kuchen, University of Münster, Germany

A Novel Approach to Automatic Query Reformulation for IR-based Bug Localization
Misoo Kim, Sungkyunkwan University, South Korea
Eunseok Lee, Sungkyunkwan University, South Korea

On the Classification of Software Change Messages using Multi-label Active Learning
Cyrine Gharbi, Higher Institute of Management of Sousse, Tunisia
Mohamed Wiem Mkaouer, Rochester Institute of Technology, USA
Ilyes Jenhani, Prince Mohammad Bin Fahd University, Saudi Arabia
Montassar Ben Messaoud, Higher Institute of Management of Tunis, Tunisia

JUniVerse: Large-scale JUnit-Test Analysis in the Wild
Omar Javed, Università della Svizzera Italiana, Switzerland
Alex Villazón, Universidad Privada Boliviana, Bolivia
Walter Binder, Università della Svizzera Italiana, Switzerland

Live and Global Consistency Checking in a Collaborative Engineering Environment
Michael Alexander Tröls, Johannes Kepler University, Austria
Atif Mashkoor, Johannes Kepler University, Austria
Alexander Egyed, Johannes Kepler University, Austria

Md Rakibul Islam, University of New Orleans, USA
Md Kauser Ahmmed, University of New Orleans, USA
Minhaz F. Zibran, University of New Orleans, USA

NodeMOP: Runtime Verification for Node.js Applications
Filippo Schiavio, Università della Svizzera Italiana, Switzerland
Haiyang Sun, Università della Svizzera Italiana, Switzerland
Daniele Bonetta, Oracle, USA
Andrea Rosà, Università della Svizzera Italiana, Switzerland
Walter Binder, Università della Svizzera Italiana, Switzerland

Parallel Property Checking with Staged Symbolic Execution
Junye Wen, Texas State University, USA
Guowei Yang, Texas State University, USA
Revisiting Continuous Deployment Maturity: A Two-Year Perspective .................................................. 1810
Simo Mäkinen, University of Helsinki, Finland
Timo Lehtonen, Solita Ltd, Finland
Terhi Kilamo, Tampere University of Technology, Finland
Mikko Puonti, Solita Ltd, Finland
Tommi Mikkonen, University of Helsinki, Finland
Tomi Männistö, University of Helsinki, Finland

Runtime Observable and Adaptable UML State Machines: Models@run.time Approach ................. 1818
Miren Illarramendi, Mondragon Unibertsitatea, Spain
Leire Etxeberria, Mondragon Unibertsitatea, Spain
Xabier Elkorobarrutia, Mondragon Unibertsitatea, Spain
Goiuria Sagardui, Mondragon Unibertsitatea, Spain

A Case Study of Systematic Top-down Design of Cyber-physical Models with Integrated Validation and Formal Verification ................................................................. 1828
Christoph Luckeneder, Technische Universität Wien, Austria
Hermann Kaindl, Technische Universität Wien, Austria

Toward a Declarative Language to Generate Explorable Sets of Models ............................................. 1837
Théo Le Calvar, Université d'Angers - LERIA, France
Fabien Chhel, ERIS, ESEO-TECH, France
Frédéric Jouault, ERIS, ESEO-TECH, France
Frédéric Saubion, Université d'Angers - LERIA, France

Usability Evaluation of VR products in Industry – A Systematic Literature Review ............................... 1845
Sai Anirudh Karre, International Institute of Information Technology Hyderabad, India
Neeraj Mathur, International Institute of Information Technology Hyderabad, India
Y. Raghu Reddy, International Institute of Information Technology Hyderabad, India

Using Design Sprint as a Facilitator in Active Learning for Students in the Requirements Engineering Course: An Experience Report ........................................................................ 1852
Vinicius Gomes Ferreira, University of Brasilia, Brazil
Edna Dias Canedo, University of Brasilia, Brazil

Poster Papers

Classifying Software Issue Reports through Association Mining .......................................................... 1860
Mohd Syafiq Zolkeply, Cardiff University, UK
Jianhua Shao, Cardiff University, UK

Mining Constraints for Monitoring Systems of Systems ....................................................................... 1864
Thomas Krismayer, Johannes Kepler University, Austria
Rick Rabiser, Johannes Kepler University, Austria
Paul Grünbacher, Johannes Kepler University, Austria

Privacy Preserving 2-party Queries on Bipartite Graphs with Private Set Intersection .......................... 1867
Sara Ramezanian, University of Helsinki, Finland
Tommi Meskanen, University of Helsinki, Finland
Valtteri Niemi, University of Helsinki, Finland

Synthesising Call Sequences from OCL Operational Contracts ............................................................ 1871
Hao Wu, Maynooth University, Ireland
TestLocal: Just-In-Time Parametrized Testing of Local Variables .................................................. 1874
Marcel Heimlich, Texas Tech University, USA
Akbar Siami Namin, Texas Tech University, USA

Towards a Requirements Language for Modeling Emotion in Videogames ........................................ 1878
Gonçalo Miguéis, FCT/UNL, Portugal
João Araujo, FCT/UNL, Portugal
Ana Moreira, FCT/UNL, Portugal

VeriCCM: Improving the Syntax and Semantics of Requirements Models ............................................ 1881
Danielle Gaither, University of North Texas, USA
Kaushik Madala, University of North Texas, USA
Hyunsook Do, University of North Texas, USA
Barrett R. Bryant, University of North Texas, USA

Student Research Abstract

Student Research Abstract: Empirical Study on Developer’s Perception regarding Reward Practices ..... 1885
Hina Gul Afridi, IQRA National University, Pakistan

Theme: System Software and Security
SEC - Computer Security Track
Track Co-Chairs:    Giampaolo Bella, Università di Catania, Italy
                   Rosario Giustolisi, IT University of Copenhagen, Denmark

Track Editorial ............................................................................................................................................... 1888

A Coarse-Grained Password Model with Memorable Unit-Based Recurrent Neural Networks .......... 1890
Rui Xu, Chinese Academy of Sciences, China
Xiaojun Chen, Chinese Academy of Sciences, China
Jinqiao Shi, Chinese Academy of Sciences, China

A Real-Time Remote IDS Testbed for Connected Vehicles ................................................................. 1898
Valentin Ziegmeier, Technical University of Munich, Germany
Severin Kacianka, Technical University of Munich, Germany
Thomas Huizelmann, Technical University of Munich, Germany
Alexander Pretschner, Technical University of Munich, Germany

Coauthentication ............................................................................................................................................ 1906
Jay Ligatti, University of South Florida, USA
Cagri Cetin, University of South Florida, USA
Shamaria Engram, University of South Florida, USA
Jean-Baptiste Subils, University of South Florida, USA
Dmitry Goldgof, University of South Florida, USA

Detection of Algorithmically Generated Domain Names used by Botnets: A Dual Arms Race .......... 1916
Jan Spooren, KU Leuven, Belgium
Davy Preuveneers, KU Leuven, Belgium
Lieven Desmet, KU Leuven, Belgium
Peter Janssen, , Belgium
Wouter Joosen, KU Leuven, Belgium
Enabling Change-Driven Workflows in Continuous Information Security Management ................. 1924
Michael Brunner, University of Innsbruck, Austria
Andrea Mussmann, University of Innsbruck, Austria
Ruth Breu, University of Innsbruck, Austria

Secure Multi-Execution in Android ............................................................................................ 1934
Dhiman Chakraborty, Saarland University, Germany
Christian Hammer, University of Potsdam, Germany
Sven Bugiel, CISPA – Helmholtz Center for Information Security, Germany

Spectre without Shared Memory ................................................................................................. 1944
Ben Amos, Ben-Gurion University of the Negev, Israel
Niv Gilboa, Ben-Gurion University of the Negev, Israel
Arbel Levy, Ben-Gurion University of the Negev, Israel

Static Security Evaluation of an Industrial Web Application ................................................... 1952
Gebrehiwet B. Welearegai, University of Potsdam, Germany
Max Schlueter, University of Potsdam, Germany
Christian Hammer, University of Potsdam, Germany

The ROP Needle: Hiding Trigger-based Injection Vectors via Code Reuse ................................. 1962
Pietro Borrello, Sapienza University of Rome, Italy
Emilio Coppa, Sapienza University of Rome, Italy
Daniele Cono D’Elia, Sapienza University of Rome, Italy
Camil Demetrescu, Sapienza University of Rome, Italy

Towards Automated Network Mitigation Analysis ..................................................................... 1971
Patrick Speicher, Saarland University, Germany
Marcel Steinmetz, Saarland University, Germany
Jörg Hoffmann, Saarland University, Germany
Michael Backes, Saarland University, Germany
Robert Küninemann, Saarland University, Germany

Student Research Abstract

Student Research Abstract: `Hard to Understand, Easy to Ignore'": An Automated Approach to
Predict Mobile App Permission Requests ................................................................................. 1979
Majid Hatamian, Goethe University Frankfurt, Germany

Student Research Abstract: Digital Forensics in the Internet of Things .................................... 1983
Monina Schwarz, Universität Hamburg, Germany
Theme: Information Systems

SFECS - Sustainability of Fog/Edge Computing Systems Track

Track Co-Chairs: Christian Esposito, University of Napoli “Federico II”, Italy
Florin Pop, University POLITEHNICA of Bucharest, and National Institute of Research and Development in Informatics, Romania
Chang Choi, Chosun University, South Korea

Track Editorial ............................................................................................................................................... 1986

Evaluation of ACE Properties of Traditional SQL and NoSQL Big Data Systems .................. 1988
Maria Teresa Gonzalez-Aparicio, University of Oviedo, Spain
Muhammad Younas, Oxford Brookes University, UK
Javier Tuya, University of Oviedo, Spain
Rubén Casado, Accenture Digital, Spain

Fog Computing as the Key for Seamless Connectivity Handover in Future Vehicular Networks ...... 1996
Maria Rita Palattella, Luxembourg Institute of Science and Technology, Luxembourg
Ridha Soua, University of Luxembourg, Luxembourg
Abdelmajid Khelif, Landshut University of Applied Science, Germany
Thomas Engel, University of Luxembourg, Luxembourg

Resource-Sharing Optimization for Multicast D2D Communications Underlaying LTE-A Uplink Cellular Networks .......................................................................................................................................... 2001
Devarani Devi Ningombam, Chosun University, South Korea
Seokjoo Shin, Chosun University, South Korea

Towards a Seamless Coordination of Cloud and Fog: Illustration through the Internet-of-Things ..... 2008
Zakaria Maamar, Zayed University, UAE
Thar Baker, Liverpool John Moores University, UK
Noura Faci, Université Lyon 1, France
Emir Ugljanin, State University of Novi Pazar, Serbia
Mohammed Al Khafajiy, Liverpool John Moores University, UK
Vanilson Burégio, Federal Rural University of Pernambuco, Brazil

Word2Vec based Spelling Correction Method of Twitter Message ............................................. 2016
Jeongin Kim, Chosun University, South Korea
Taekeun Hong, Chosun University, South Korea
Pankoo Kim, Chosun University, South Korea

Theme: System Software and Security

SiSoS - Software-intensive Systems-of-Systems Track

Track Co-Chairs: Flavio Oquendo, IRISA - UMR CNRS – Univ. Bretagne Sud, France
Khalil Drira, LAAS - CNRS – Univ. Toulouse, France
Axel Legay, Université catholique de Louvain, Belgium
Thais Vasconcelos Batista, DIMA – UFRN, Brazil

Track Editorial ............................................................................................................................................... 2020

Constructing Product-Line Safety Cases from Contract-Based Specifications ......................... 2022
Damir Nešić, Royal Institute of Technology, Sweden
Mattias Nyberg, Royal Institute of Technology, Sweden
Barbara Gallina, Mälardalen University, Sweden
Towards a Fractionation-based Verification: Application on SysML Activity Diagrams .......................... 2032
Samir Ouchani, LINEACT/CESI, France

Poster Papers

The Preliminary Results of a Mapping Study of Deployment and Orchestration for IoT ...................... 2040
Phu H. Nguyen, SINTEF, Norway
Nicolas Ferry, SINTEF, Norway
Gencer Erdogan, SINTEF, Norway
Hui Song, SINTEF, Norway
Stéphane Lavrof, Université Côte d'Azur, France
Jean-Yves Tigli, Université Côte d'Azur, France
Arnor Solberg, TelluIoT, Norway

Data-Driven Environment Modeling for Adaptive System-of-Systems .................................................. 2044
Yong-Jun Shin, Korea Advanced Institute of Science and Technology, South Korea
Young-Min Baek, Korea Advanced Institute of Science and Technology, South Korea
Eunkyoung Jee, Korea Advanced Institute of Science and Technology, South Korea
Doo-Hwan Bae, Korea Advanced Institute of Science and Technology, South Korea

Theme: Information Systems

SONAMA - Social Network and Media Analysis Track
Track Co-Chairs: Sang-Wook Kim, Hanyang University, South Korea

Track Editorial ................................................................................................................................................ 2048

A Computationally Efficient Multi-modal Classification Approach of Disaster-related Twitter Images ..... 2050
Yara Rizk, American University of Beirut, Lebanon
Hadi Samer Jomaa, American University of Beirut, Lebanon
Mariette Awad, American University of Beirut, Lebanon
Carlos Castillo, Universitat Pompeu Fabra, Brazil

Brand Community Analysis on Social Networks using Graph Representation Learning .................... 2060
Marco Brambilla, Politecnico di Milano, Italy
Mattia Gasparini, Politecnico di Milano, Italy

Collaboration Profiles and their Impact on Musical Success ...................................................................... 2070
Mariana O. Silva, Universidade Federal de Minas Gerais, Brazil
Laís M. Rocha, Universidade Federal de Minas Gerais, Brazil
Mirella M. Moro, Universidade Federal de Minas Gerais, Brazil

Community Evolution Prediction in Dynamic Social Networks using Community Features' Change Rates ........................................................................................................................................ 2078
Narimene Dakiche, École Nationale Supérieure d'Informatique, Algeria
Fatima Benbouzid-Si Tayeb, École Nationale Supérieure d'Informatique, Algeria
Yahya Slimani, Manouba University, Tunisia
Karima Benatchba, École Nationale Supérieure d'Informatique, Algeria

Event Detection for Exploring Emotional Upheavals of Depressive People .................................. 2086
PinHua Wu, National Tsing Hua University, Taiwan
JiaLing Koh, National Taiwan Normal University, Taiwan
Arbee L.P. Chen, Asia University, Taiwan
Identification of Credulous Users on Twitter

Alessandro Balestrucci, Gran Sasso Science Institute, Italy
Rocco De Nicola, IMT School for Advanced Studies, Italy
Omar Inverso, Gran Sasso Science Institute, Italy
Catia Trubiani, Gran Sasso Science Institute, Italy

KidsGUARD: Fine Grained Approach for Child Unsafe Video Representation and Detection
Shubham Singh, Indraprastha Institute of Information Technology Delhi, India
Rishabh Kaushal, Indraprastha Institute of Information Technology Delhi, India
Arun Balaji Buduru, Indraprastha Institute of Information Technology Delhi, India
Ponnurangam Kumaraguru, Indraprastha Institute of Information Technology Delhi, India

Multidimensional Analysis of Hot Events from Social Media Sources
Abir Troudi, University of Sfax, Tunisia
Salma Jamoussi, University of Sfax, Tunisia
Corinne Amel Zayani, University of Sfax, Tunisia
Ikram Amous, University of Sfax, Tunisia

Poster Papers

A Tool for Spatio-Temporal Analysis of Social Anxiety with Twitter Data
Joohong Lee, Hanyang University, South Korea
Dongyoung Sohn, Hanyang University, South Korea
Yong Suk Choi, Hanyang University, South Korea

Evaluating Neural Word Embeddings Created from Online Course Reviews for Sentiment Analysis
Danilo Dessì, University of Cagliari, Italy
Mauro Dragoni, Fondazione Bruno Kessler, Italy
Gianni Fenu, University of Cagliari, Italy
Mirko Marras, University of Cagliari, Italy
Diego Reforgiato Recupero, University of Cagliari, Italy

Knapsack-based Reverse Influence Maximization for Target Marketing in Social Networks
Ashis Talukder, Kyung Hee University, South Korea
Choong Seon Hong, Kyung Hee University, South Korea

Predicting Event Attendance exploring Social Influence
Fatemeh Salehi Rizi, University of Passau, Germany
Michael Granitzer, University of Passau, Germany

Semantic Analysis for Paraphrase Identification using Semantic Role Labeling
Eunji Lee, Chosun University, South Korea
Htet Myet Lynn, Chosun University, South Korea
HyounJu Kim, Chosun University, South Korea
Soonja Yeom, University of Tasmania, Australia
Pankoo Kim, Chosun University, South Korea
Theme: System Software and Security

SP - Software Platforms Track

Track Co-Chairs: Jinman Jung, Hannam University, South Korea
Jun Huang, Chongqing University of Posts and Telecom, China

Track Editorial ............................................................................................................................................... 2139

Analysis of Application Installation Logs on Android Systems .......................................................... 2140
Jinwoo Lee, Soongsil University, South Korea
Yena Lee, Soongsil University, South Korea
Ming Jin, Soongsil University, South Korea
John Kim, Utica College, USA
Jiman Hong, Soongsil University, South Korea

Design and Implementation of Emulab-based Malware Analysis Service through EmuLib ............. 2146
Gibeom Song, Hannam University, South Korea
Manhee Lee, Hannam University, South Korea

Energy Efficient IO stack Design for Wearable Device ............................................................................. 2152
Junghoon Kim, Samsung Electronics, South Korea
Sundoo Kim, Hanyang University, South Korea
Juseong Yun, Hanyang University, South Korea
Youjip Won, KAIST, South Korea

Poster Papers

A Design and Implementation Wind Farm Real-time Simulator with Various Types of Wind Turbines considering Wake Effect ........................................................................................................ 2160
Taehyoun Kim, Korea Electronics Technology Institute, South Korea
Jaehyun Kim, Korea Electronics Technology Institute, South Korea
Jieun Lee, Korea Electronics Technology Institute, South Korea
Kyung Sun Ham, Korea Electronics Technology Institute, South Korea

A Novel Approach for Collecting and Sharing Software Metrics Data .................................................. 2164
Ilya Khomyakov, Innopolis University, Russia
Alberto Sillitti, Innopolis University, Russia

Theme: Software Design and Development

SVT - Software Verification and Testing Track

Track Co-Chairs: Matthias Guedemann, Diffblue Ltd., UK
Leonardo Mariani, University of Milano Bicocca, Italy

Bounded Invariance Checking of Simulink Models ............................................................................... 2168
Predrag Filipovikj, Mälardalen University, Sweden
Guillermo Rodriguez-Navas, Mälardalen University, Sweden
Cristina Secseleanu, Mälardalen University, Sweden

Dynamic Symbolic Execution for the Analysis of Web Server Applications in Java ......................... 2178
Daniel Balasubramanian, Vanderbilt University, USA
Zhenkai Zhang, Vanderbilt University, USA
Dan McDermet, Vanderbilt University, USA
Gabor Karsai, Vanderbilt University, USA
Logic against Ghosts: Comparison of Two Proof Approaches for a List Module .................................................. 2186
Allan Blanchard, Inria Lille - Nord Europe, France
Nikolai Kosmatov, CEA LIST, France
Frédéric Loulergue, Northern Arizona University, USA

Matching Implementations to Specifications: The Corner Cases of ioco ............................................................... 2196
Ramon Janssen, Radboud University, The Netherlands
Jan Tretmans, Radboud University, The Netherlands

Specification of Temporal Properties of Functions for Runtime Verification .............................................................. 2206
Joshua Heneage Dawes, University of Manchester and CERN, UK
Giles Reger, University of Manchester, UK

Statically Analyzing Information Flows – An Abstract Interpretation-based Hyperanalysis for Non-Interference ................................................................. 2215
Isabella Mastroeni, University of Verona, Italy
Michele Pasqua, University of Verona, Italy

Study of Trivial Compiler Equivalence on C++ Object-Oriented Mutation Operators ............................................... 2224
Sergio Segura, Universidad de Sevilla, Spain
Pedro Delgado-Pérez, Universidad de Cádiz, Spain

Verification-based Test Case Generation for Information-Flow Properties .............................................................. 2231
Mihai Herda, Karlsruhe Institute of Technology, Germany
Shmuel Tyszberowicz, Southwest University, China
Joachim Müssig, Karlsruhe Institute of Technology, Germany
Bernhard Beckert, Karlsruhe Institute of Technology, Germany

Theme: Information Systems

SWA - Semantic Web and Applications Track

Track Co-Chairs: Soon Ae Chun, City University of New York, USA
Hyoil Han, Illinois State University, USA
Sangsoo Sung, Google Inc., USA

Track Editorial ............................................................................................................................................................. 2239

Embedding Cardinality Constraints on Neural Link Predictors .......................................................... 2243
Pasquale Minervini, University College London, UK
Emir Muñoz, National University of Ireland Galway, Ireland
Matthias Nickles, National University of Ireland Galway, Ireland

Exploiting Context and Quality for Linked Data Source Selection .............................................................. 2251
Beyza Yaman, Università di Genova, Italy
Giovanna Guerrini, Università di Genova, Italy
Barbara Catania, Università di Genova, Italy
GeoSensor: Semantifying Change and Event Detection over Big Data ..................................................... 2259
Nikiforos Pittaras, NCSR "Demokritos" and University of Athens, Greece
George Papadakis, University of Athens, Greece
George Stamoulis, University of Athens, Greece
Giorgos Argyriou, University of Athens, Greece
Efi Karra Taniskidou, University of Athens, Greece
Emmanouil Thanos, University of Athens, Greece
George Giannakopoulos, NCSR "Demokritos", Greece
Manolis Koubarakis, University of Athens, Greece

How Many and What Types of SPARQL Queries can be Answered through Zero-Knowledge Link Traversal? .................................................................................................................. 2267
Pavlos Fafalios, Leibniz University of Hanover, Germany
Yannis Tzitzikas, FORTH-ICS, Greece

Improving the Performance of Querying Multidimensional RDF Data using Aggregates .................. 2275
Franck Ravat, Institut de Recherche en Informatique de Toulouse, France
Jiefu Song, Institut de Recherche en Informatique de Toulouse, France
Olivier Teste, Institut de Recherche en Informatique de Toulouse, France
Cassia Trojahn, Institut de Recherche en Informatique de Toulouse, France

Partitioning and Local Matching Learning of Large Biomedical Ontologies .................................... 2285
Amir Laadhar, Toulouse Institute of Computer Science Research, France
Faiza Ghozzi, University of Sfax, Tunisia
Imen Megdiche, Toulouse Institute of Computer Science Research, France
Franck Ravat, Toulouse Institute of Computer Science Research, France
Olivier Teste, Toulouse Institute of Computer Science Research, France
Faiez Gargouri, University of Sfax, Tunisia

Semi-Automatic Ontology-Driven Development Documentation – Generating Documents from RDF Data and DITA Templates ........................................................................................................... 2293
Yevgen Pikus, Fraunhofer ISST, Germany
Norbert Weissenberg, Fraunhofer ISST, Germany
Bernhard Holtkamp, Fraunhofer ISST, Germany
Boris Otto, Fraunhofer ISST, Germany

Using Contemporary Constraints to Ensure Data Consistency .............................................................. 2303
David Abián, University of Zaragoza, Spain
Jorge Bernad, University of Zaragoza, Spain
Raquel Trillo-Lado, University of Zaragoza, Spain

Poster Papers

A Tool for Exploring Networks of Computer Scientists as a Graph ....................................................... 2240
Mirko Cesarini, University of Milano-Bicocca, Italy
Fabio Mercorio, University of Milano-Bicocca, Italy
Mario Mezzanzanica, University of Milano-Bicocca, Italy
Vincenzo Moscato, University of Naples Federico II, Italy
Antonio Picariello, University of Naples Federico II, Italy
The Scientific Events Ontology of the OpenResearch.org Curation Platform .............................................. 2311
Said Fathalla, Universität Bonn and Alexandria University, Germany
Sahar Vahdati, Universität Bonn, Germany
Sören Auer, Leibniz University of Hannover and TIB Leibniz Information Center for Science and Technology, Germany
Christoph Lange, Universität Bonn and Fraunhofer IAIS, Germany

Student Research Abstract

Student Research Abstract: User’s Profile Ontology-Based Semantic Model for Personalized Hotel Room Recommendation in the Web of Things ................................................................................................................. 2314
Ronald Ojino, University of Dar es Salaam, Tanzania

Theme: Software Design and Development

UE - Usability Engineering Track

Track Co-Chairs:  Eduardo Mosqueira Rey, University of A Coruña, Spain
Vicente Moret Bonillo, University of A Coruña, Spain
David Alonso Ríos, University of A Coruña, Spain

Track Editorial ............................................................................................................................................... 2317

Cognitive Workload of In-Car Auditory-Vocal Interfaces on Visuospatial Sketchpad based on a Dual Task of Visual Pattern Test ................................................................................................................. 2319
Takahiro Miura, AIST and The University of Tokyo, Japan
Ken-ichiro Yabu, The University of Tokyo, Japan
Youji Shimizu, Nissan Motor Corporation, Japan
Kenichi Tanaka, Nissan Motor Corporation, Japan
Masanitsu Furukawa, Nissan Motor Corporation, Japan
Seiko Michtiyoshi, Nissan Motor Corporation, Japan
Tetsuya Yamamoto, Nissan Motor Corporation, Japan
Kazutaka Ueda, The University of Tokyo, Japan
Tohru Ifukube, The University of Tokyo, Japan

Usability Problems Discovery based on the Automatic Detection of Usability Smells ......................... 2328
Rafael Fontinele Ribeiro, Universidade Federal do Piauí, Brazil
Matheus de Meneses Campanhã Souza, Universidade Federal do Piauí, Brazil
Pedro Almir Martins de Oliveira, Instituto Federal do Maranhão, Brazil
Pedro de Alcântara dos Santos Neto, Universidade Federal do Piauí, Brazil

Poster Papers

Developing a Mental Model for use in the Context of Computer Security .............................................. 2336
Isaiah Liljestrand, New Mexico Tech, USA
Marcelo Gonzales, Colorado School of Mines, USA
Dongwan Shin, New Mexico Tech, USA

User Experience Evaluation Focused on Viewpoints and Embodiment ................................................... 2340
Cristina Scheibler, Universidade de Fortaleza, Brazil
Maria Andréia Formico Rodrigues, Universidade de Fortaleza, Brazil
**Theme: Software Design and Development**

**VSPLE - Variability and Software Product Line Engineering Track**

**Track Co-Chairs:** Abdelhak-Djamel Seriai, University of Montpellier, France  
Tewfik Ziadi, University Pierre et Marie Curie, France

**A Generic Traceability Metamodel for Enabling Unified End-to-End Traceability in Software Product Lines** ................................................................. 2344

Philipp Heisig, Dortmund University of Applied Sciences and Arts, Germany  
Jan-Philipp Steghöfer, University of Gothenburg, Sweden  
Christopher Brink, Miele & Cie. KG, Germany  
Sabine Sachweh, Dortmund University of Applied Sciences and Arts, Germany

**Evaluating Variability at the Software Architecture Level: An Overview** ................................................................. 2354

Ana Paula Allian, University of São Paulo, Brazil  
Bruno Sena, University of São Paulo, Brazil  
Elisa Yumi Nakagawa, University of São Paulo, Brazil

**Test Case Selection using Structural Coverage in Software Product Lines for Time-Budget Constrained Scenarios** ................................................................. 2362

Urtzi Markiegi, Mondragon Unibertsitatea, Spain  
Aitor Arrieta, Mondragon Unibertsitatea, Spain  
Leire Etxeberria, Mondragon Unibertsitatea, Spain  
Goiuria Sagardui, Mondragon Unibertsitatea, Spain

**Poster Papers**

**Towards Variant Management and Change Impact Analysis in Safety-oriented Process-Product Lines** ................................................................. 2372

Muhammad Atif Javed, Mälardalen University, Sweden  
Barbara Gallina, Mälardalen University, Sweden  
Anna Carlsson, OHB Sweden, Sweden

---

**Theme: Distributed Systems**

**WCN - Selected Areas of Wireless Communications and Networking Track**

**Track Co-Chairs:** Dongkyun Kim, Kyungpook National University, South Korea  
Wei Wang, San Diego State University, USA

**Track Editorial** ............................................................................................................................................... 2376

**A Matching based Coexistence Mechanism between eMBB and uRLLC in 5G Wireless Networks** ...... 2377

Anupam Kumar Bairagi, Kyung Hee University, South Korea  
Md. Shirajum Munir, Kyung Hee University, South Korea  
Madyan Alsenwi, Kyung Hee University, South Korea  
Nguyen H. Tran, The University of Sydney, Australia  
Choong Seon Hong, Kyung Hee University, South Korea
A New CoAP Congestion Control Scheme using Message Loss Feedback for IoUT
Minseok Kim, Kyungpook National University, South Korea
Sungwon Lee, Kyungpook National University, South Korea
Muhammad Toaha Raza Khan, Kyungpook National University, South Korea
Junho Seo, Kyungpook National University, South Korea
Yeongjoon Bae, Kyungpook National University, South Korea
Yonghwan Jeong, Kyungpook National University, South Korea
Dongkyun Kim, Kyungpook National University, South Korea

Bilal Jan, FATA University, Pakistan
Haleem Farman, Islamia College Peshawar, Pakistan
Murad Khan, Sarhad University of Science & Technology, Pakistan
Syed Hassan Ahmed, Georgia Southern University, USA

Dohyung Kim, Kangwon National University, South Korea
Youngbae Ko, Ajou University, South Korea

On the Feasibility of using IEEE 802.11ad mmWave for Accurate Object Detection
Hossein Ajorloo, University College Cork, Ireland
Cormac J. Sreenan, University College Cork, Ireland
Adrian Loch, IMDEA Networks Institute, Spain
Joerg Widmer, IMDEA Networks Institute, Spain

Reliability of ADS-B Communications: Novel Insights based on an Experimental Assessment
Savio Sciancalepore, Hamad Bin Khalifa University, Qatar
Saeif Alhazbi, Hamad Bin Khalifa University, Qatar
Roberto Di Pietro, Hamad Bin Khalifa University, Qatar

SoftH: Soft Handover Multicriteria Mechanism
Guilherme R.M. de Oliveira, Pontifical Catholic University of Minas Gerais, Brazil
Carlos Renato Storck, Centro Federal de Educação Tecnológica de Minas Gerais, Brazil
Fátima Duarte-Figueiredo, Pontifical Catholic University of Minas Gerais, Brazil

Poster Papers
A New Fuzzy/Evidential Approach to Address the Area Coverage Problem in Mobile Wireless Sensor Networks
Adda Boualem, Ecole Nationale Supérieure d'informatique, Algeria
Yousef Dahmani, Ibn Khaldoun University, Algeria
Marwane Ayaida, CReSTIC, University of Reims Champagne-Ardenne, France
Cyril de Runz, CReSTIC, University of Reims Champagne-Ardenne, France
Theme: Information Systems

WICE - Web-based Technologies for Interactive Computing Education Track

Track Co-Chairs: Maiga Chang, Athabasca University, Canada
Hasan Jamil, University of Idaho, USA

Track Editorial ................................................................................................................................................. 2434

A Web-Based E-Assessment Tool for Design Patterns in UML Class Diagrams ................................. 2435
Tobias Reischmann, University of Münster, Germany
Herbert Kuchen, University of Münster, Germany

Anchoring Interactive Points of Interest on Web-based Instructional Video: Effects on Students' Interaction Behavior and Perceived Experience ................................................................. 2445
Maria da Graça C. Pimentel, University of São Paulo, Brazil
Cristiane A. Yaguinuma, Federal Institute of São Paulo, Brazil
Diogo S. Martins, Federal University of ABC, Brazil
Isabela Zaine, University of São Paulo, Brazil

Integrating Context-Awareness and Multi-Criteria Decision Making in Educational Learning ........ 2453
Yong Zheng, Illinois Institute of Technology, USA
Shephalika Shekhar, Illinois Institute of Technology, USA
Alisha Anna Jose, Illinois Institute of Technology, USA
Sunil Kumar Rai, Illinois Institute of Technology, USA

Meet Cyrus – The Query by Voice Mobile Assistant for the Tutoring and Formative Assessment of SQL Learners ................................................................................................................................. 2461
Josue Espinosa Godinez, University of Idaho, USA
Hasan M. Jamil, University of Idaho, USA

Poster Papers

Resources for Healthcare Workflow Modeling and Analysis ................................................................. 2469
Hossain Shahriar, Kennesaw State University, USA
Chi Zhang, Kennesaw State University, USA
Md Arabin Islam Talukder, Kennesaw State University, USA
Sheikh Iqbal Ahamed, Marquette University, USA

More than the Sum of its Parts: Designing Learning Formats from Core Components .................. 2473
Niels Heller, Ludwig Maximilian University of Munich, Germany
Sebastian Mader, Ludwig Maximilian University of Munich, Germany
François Bry, Ludwig Maximilian University of Munich, Germany
**Theme: Distributed Systems**

**WT - Web Technologies Track**

**Track Co-Chairs:** Francesco Poggi, University of Bologna, Italy  
Cristian Mateos, UNICEN University - Tandil, Argentina  
Tim A. Majchrzak, University of Agder - Kristiansand, Norway

---

**Track Editorial**

---

**A Literature Review of Studies on Interactive 3D Information Visualization for the Web**

Luiz S.S. Baglie, São Paulo State University, Brazil  
Diego R.C. Dias, Federal University of São João Del Rei, Brazil  
Marcelo P. Guimarães, Federal University of São Paulo, Brazil  
José R.F. Brega, São Paulo State University, Brazil

**ALDONA: A Hybrid Solution for Sentence-Level Aspect-Based Sentiment Analysis using a Lexicalised Domain Ontology and a Neural Attention Model**

Donatas Meškelė, Erasmus University Rotterdam, The Netherlands  
Flavius Frasincar, Erasmus University Rotterdam, The Netherlands

**Mind the Cache: Large-Scale Explorative Study of Web Caching**

Hoai Viet Nguyen, Cologne University of Applied Sciences, Germany  
Luigi Lo Iacono, Cologne University of Applied Sciences, Germany  
Hannes Federrath, University of Hamburg, Germany

**Standards-driven Metamodel to Increase Retrievability of Heterogeneous Services**

Martin Garriga, National University of Comahue, Argentina  
Andrés Flores, National University of Comahue, Argentina

**AwaitViz: A Visualizer of JavaScript's async/await Execution Order**

Ena Tominaga, Tokyo Institute of Technology, Japan  
Yoshitaka Arahori, Tokyo Institute of Technology, Japan  
Katsuhiko Gondow, Tokyo Institute of Technology, Japan

---

**Poster Papers**

**Context-Aware Recommendations via Sequential Predictions**

Yong Zheng, Illinois Institute of Technology, USA  
Alisha Anna Jose, Illinois Institute of Technology, USA

**Utility-Based Multi-Criteria Recommender Systems**

Yong Zheng, Illinois Institute of Technology, USA

**Computational Thinking with the Web Crowd using CodeMapper**

Patrick Vanvorce, University of Idaho, USA  
Hasan M. Jamil, University of Idaho, USA