



Universiteit
Leiden
The Netherlands

Unraveling temporal processes using probabilistic graphical models

de Paula Bueno, M.L.

Citation

De Paula Bueno, M. L. (2020, February 11). *Unraveling temporal processes using probabilistic graphical models*. *SIKS Dissertation Series*. Retrieved from <https://hdl.handle.net/1887/85168>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/85168>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/85168> holds various files of this Leiden University dissertation.

Author: De Paula Bueno, M.L.

Title: Unraveling temporal processes using probabilistic graphical models

Issue Date: 2020-02-11

ACKNOWLEDGMENTS

A PhD is a long and challenging journey. I would like to acknowledge the people who helped me make this possible. But being a PhD student also teaches you a lot about yourself, such as your limitations and strengths, and this part seems to be very individual.

Many say that a PhD is to a great extent about learning how to do independent research, which although seemingly simple, is actually a deep statement about methodology. One of the difficulties of the daily grind of a PhD trajectory is to not forget this when one is immersed in the development of a new algorithm or implementation. Somehow this helps to better handle failures, something I would have never imagined to have such an importance in research.

I learned many valuable lessons from my supervisors, Peter Lucas and Arjen Hommersom. First and foremost, thank you Peter and Arjen for taking me as a PhD student. You helped me develop a much broader view on research and helped me become a better researcher. Peter showed me the importance of having a global perspective about my research, which sometimes made me step back so that I could see farther and overcome deadlocks. Arjen has been willing to discuss many technical details of my research, and patient enough to hear my sometimes confusing ideas and contribute to them. During the meetings with my supervisors, I was very often faced with a critical view in a level that was new to me, something not always easy but important to strengthen ideas in research. We also had interesting discussions about science, culture, cuisine and many other things.

Some chapters of this thesis resulted from a collaboration with Joost Janzing from UMC Radboud. In this collaboration I was exposed to new viewpoints on research, particularly on medicine and medical AI, which was a rich experience. Thank you, Joost, for willing to collaborate and for our insightful discussions.

As a visiting researcher, I spent 6 months at CINTESIS, in Porto, Portugal. Although short, it was an interesting experience where I learned more about research on medical AI. One chapter of this thesis was done in collaboration with Pedro Rodrigues from CINTESIS. I thank Pedro and CINTESIS for hosting me during that time.

I would like to thank the co-authors with whom I collaborated at different moments: Alexis, Martijn, Mariana and Sicco. I also thank Océ Technologies for our collaboration on machine learning for cyber-physical systems.

I am grateful for the time I spent at the software science section of iCIS, Radboud University Nijmegen as a PhD candidate. Ingrid, thank you very much for assisting me before and after landing in Nijmegen with all sorts of administrative stuff. I enjoyed our conversations about Dutch culture a lot. I also thank all the software science staff, and Harco Kuppens for helping with

technical support. I also thank LIACS at Leiden University for hosting me at the final stage of my PhD studies.

I had the chance to have great colleagues at iCIS with whom I worked or shared an office. I thank my office mate Giso for the many insightful discussions we had on our research on probabilistic graphical models, on computer science, as well as for introducing me to the world of good coffee. I had many interesting discussions with Paul, Manxia and Steffen about research and doing research. I also thank Alexis, David, Joshua, Jurriën, Marina, Martijn, Markus and Tim for the pleasant conversations during coffee breaks, *borrelen*, etc.

Some of our earliest friends in Nijmegen were Annika and Sophia. We spent such a great time with them, thank you! I also thank Simone Meeuwsen for the friendship, for having helped us a great deal when moving houses in Nijmegen and for willing to hear my attempts of speaking some Dutch. Also thanks to Boris and Bowon for the interesting conversations about living abroad and for the pleasant meetings.

Agradeço aos meus pais, Celina e Marcos, e meu irmão Matheus, pelo amor e incentivo durante todo o doutorado, em especial ao meu pai pelo incentivo em buscar a carreira acadêmica. Por fim mas não menos importante, agradeço à minha esposa Ilka pelo amor e pelo incentivo em todos os momentos; juntos realizamos e construímos sonhos ao longo dessa jornada nos Países Baixos.

CURRICULUM VITAE

Marcos Luiz de Paula Bueno

- 1984 Born in Catalão, Brazil
- 2003–2007 B.Sc. in Computer Science
Federal University of Goiás, Brazil
- 2008–2010 M.Sc. in Computer Science
Federal University of Uberlândia, Brazil
- 2011–2014 Assistant professor
Department of Computer Science
Federal University of Uberlândia, Brazil
- 2014–2020 PhD student
iCIS, Radboud University Nijmegen, The Netherlands
LIACS, Leiden University, The Netherlands
- 2017 Visiting researcher (6 months)
CINTESIS, University of Porto, Portugal
- 2018– Assistant professor
Department of Computer Science
Federal University of Uberlândia, Brazil

SIKS DISSERTATIONS

-
- 2011 01 Botond Cseke (RUN), Variational Algorithms for Bayesian Inference in Latent Gaussian Models
- 02 Nick Tinnemeier (UU), Organizing Agent Organizations. Syntax and Operational Semantics of an Organization-Oriented Programming Language
- 03 Jan Martijn van der Werf (TUE), Compositional Design and Verification of Component-Based Information Systems
- 04 Hado van Hasselt (UU), Insights in Reinforcement Learning; Formal analysis and empirical evaluation of temporal-difference
- 05 Bas van der Raadt (VU), Enterprise Architecture Coming of Age - Increasing the Performance of an Emerging Discipline.
- 06 Yiwen Wang (TUE), Semantically-Enhanced Recommendations in Cultural Heritage
- 07 Yujia Cao (UT), Multimodal Information Presentation for High Load Human Computer Interaction
- 08 Nieske Vergunst (UU), BDI-based Generation of Robust Task-Oriented Dialogues
- 09 Tim de Jong (OU), Contextualised Mobile Media for Learning
- 10 Bart Bogaert (UvT), Cloud Content Contention
- 11 Dhaval Vyas (UT), Designing for Awareness: An Experience-focused HCI Perspective
- 12 Carmen Bratosin (TUE), Grid Architecture for Distributed Process Mining
- 13 Xiaoyu Mao (UvT), Airport under Control. Multiagent Scheduling for Airport Ground Handling
- 14 Milan Lovric (EUR), Behavioral Finance and Agent-Based Artificial Markets
- 15 Marijn Koolen (UvA), The Meaning of Structure: the Value of Link Evidence for Information Retrieval
- 16 Maarten Schadd (UM), Selective Search in Games of Different Complexity
- 17 Jiyin He (UVA), Exploring Topic Structure: Coherence, Diversity and Relatedness
- 18 Mark Ponsen (UM), Strategic Decision-Making in complex games
- 19 Ellen Rusman (OU), The Mind's Eye on Personal Profiles
- 20 Qing Gu (VU), Guiding service-oriented software engineering - A view-based approach
- 21 Linda Terlouw (TUD), Modularization and Specification of Service-Oriented Systems
- 22 Junte Zhang (UVA), System Evaluation of Archival Description and Access
- 23 Wouter Weerkamp (UVA), Finding People and their Utterances in Social Media
- 24 Herwin van Welbergen (UT), Behavior Generation for Interpersonal Coordination with Virtual Humans On Specifying, Scheduling and Realizing Multimodal Virtual Human Behavior
- 25 Syed Waqar ul Qounain Jaffry (VU), Analysis and Validation of Models for Trust Dynamics
- 26 Matthijs Aart Pontier (VU), Virtual Agents for Human Communication - Emotion Regulation and Involvement-Distance Trade-Offs in Embodied Conversational Agents and Robots
- 27 Aniel Bhulai (VU), Dynamic website optimization through autonomous management of design patterns
- 28 Rianne Kaptein (UVA), Effective Focused Retrieval by Exploiting Query Context and Document Structure
- 29 Faisal Kamiran (TUE), Discrimination-aware Classification
- 30 Egon van den Broek (UT), Affective Signal Processing (ASP): Unraveling the mystery of emotions
- 31 Ludo Waltman (EUR), Computational and Game-Theoretic Approaches for Modeling Bounded Rationality
- 32 Nees-Jan van Eck (EUR), Methodological Advances in Bibliometric Mapping of Science
- 33 Tom van der Weide (UU), Arguing to Motivate Decisions
- 34 Paolo Turrini (UU), Strategic Reasoning in Interdependence: Logical and Game-theoretical Investigations

- 35 Maaïke Harbers (UU), Explaining Agent Behavior in Virtual Training
 - 36 Erik van der Spek (UU), Experiments in serious game design: a cognitive approach
 - 37 Adriana Burlutiu (RUN), Machine Learning for Pairwise Data, Applications for Preference Learning and Supervised Network Inference
 - 38 Nyree Lemmens (UM), Bee-inspired Distributed Optimization
 - 39 Joost Westra (UU), Organizing Adaptation using Agents in Serious Games
 - 40 Viktor Clerc (VU), Architectural Knowledge Management in Global Software Development
 - 41 Luan Ibraimi (UT), Cryptographically Enforced Distributed Data Access Control
 - 42 Michal Sindlar (UU), Explaining Behavior through Mental State Attribution
 - 43 Henk van der Schuur (UU), Process Improvement through Software Operation Knowledge
 - 44 Boris Reuderink (UT), Robust Brain-Computer Interfaces
 - 45 Herman Stehouwer (UvT), Statistical Language Models for Alternative Sequence Selection
 - 46 Beibei Hu (TUD), Towards Contextualized Information Delivery: A Rule-based Architecture for the Domain of Mobile Police Work
 - 47 Azizi Bin Ab Aziz (VU), Exploring Computational Models for Intelligent Support of Persons with Depression
 - 48 Mark Ter Maat (UT), Response Selection and Turn-taking for a Sensitive Artificial Listening Agent
 - 49 Andreea Niculescu (UT), Conversational interfaces for task-oriented spoken dialogues: design aspects influencing interaction quality
-
- 2012 01 Terry Kakeeto (UvT), Relationship Marketing for SMEs in Uganda
 - 02 Muhammad Umair (VU), Adaptivity, emotion, and Rationality in Human and Ambient Agent Models
 - 03 Adam Vanya (VU), Supporting Architecture Evolution by Mining Software Repositories
 - 04 Jurriaan Souer (UU), Development of Content Management System-based Web Applications
 - 05 Marijn Plomp (UU), Maturing Interorganisational Information Systems
 - 06 Wolfgang Reinhardt (OU), Awareness Support for Knowledge Workers in Research Networks
 - 07 Rianne van Lambalgen (VU), When the Going Gets Tough: Exploring Agent-based Models of Human Performance under Demanding Conditions
 - 08 Gerben de Vries (UVA), Kernel Methods for Vessel Trajectories
 - 09 Ricardo Neisse (UT), Trust and Privacy Management Support for Context-Aware Service Platforms
 - 10 David Smits (TUE), Towards a Generic Distributed Adaptive Hypermedia Environment
 - 11 J.C.B. Rantham Prabhakara (TUE), Process Mining in the Large: Preprocessing, Discovery, and Diagnostics
 - 12 Kees van der Sluijs (TUE), Model Driven Design and Data Integration in Semantic Web Information Systems
 - 13 Suleman Shahid (UvT), Fun and Face: Exploring non-verbal expressions of emotion during playful interactions
 - 14 Evgeny Knutov (TUE), Generic Adaptation Framework for Unifying Adaptive Web-based Systems
 - 15 Natalie van der Wal (VU), Social Agents. Agent-Based Modelling of Integrated Internal and Social Dynamics of Cognitive and Affective Processes.
 - 16 Fiemke Both (VU), Helping people by understanding them - Ambient Agents supporting task execution and depression treatment
 - 17 Amal Elgammal (UvT), Towards a Comprehensive Framework for Business Process Compliance
 - 18 Eltjo Poort (VU), Improving Solution Architecting Practices
 - 19 Helen Schonenberg (TUE), What's Next? Operational Support for Business Process Execution
 - 20 Ali Bahramisharif (RUN), Covert Visual Spatial Attention, a Robust Paradigm for Brain-Computer Interfacing
 - 21 Roberto Cornacchia (TUD), Querying Sparse Matrices for Information Retrieval
 - 22 Thijs Vis (UvT), Intelligence, politie en veiligheidsdienst: verenigbare grootheden?
 - 23 Christian Muehl (UT), Toward Affective Brain-Computer Interfaces: Exploring the Neurophysiology of Affect during Human Media Interaction
 - 24 Laurens van der Werff (UT), Evaluation of Noisy Transcripts for Spoken Document Retrieval

- 25 Silja Eckartz (UT), Managing the Business Case Development in Inter-Organizational IT Projects: A Methodology and its Application
 - 26 Emile de Maat (UVA), Making Sense of Legal Text
 - 27 Hayrettin Gurkok (UT), Mind the Sheep! User Experience Evaluation & Brain-Computer Interface Games
 - 28 Nancy Pascall (UvT), Engendering Technology Empowering Women
 - 29 Almer Tigelaar (UT), Peer-to-Peer Information Retrieval
 - 30 Alina Pommeranz (TUD), Designing Human-Centered Systems for Reflective Decision Making
 - 31 Emily Bagarukayo (RUN), A Learning by Construction Approach for Higher Order Cognitive Skills Improvement, Building Capacity and Infrastructure
 - 32 Wietske Visser (TUD), Qualitative multi-criteria preference representation and reasoning
 - 33 Rory Sie (OUN), Coalitions in Cooperation Networks (COCOON)
 - 34 Pavol Jancura (RUN), Evolutionary analysis in PPI networks and applications
 - 35 Evert Haasdijk (VU), Never Too Old To Learn – On-line Evolution of Controllers in Swarm- and Modular Robotics
 - 36 Denis Ssebugwawo (RUN), Analysis and Evaluation of Collaborative Modeling Processes
 - 37 Agnes Nakakawa (RUN), A Collaboration Process for Enterprise Architecture Creation
 - 38 Selmar Smit (VU), Parameter Tuning and Scientific Testing in Evolutionary Algorithms
 - 39 Hassan Fatemi (UT), Risk-aware design of value and coordination networks
 - 40 Agus Gunawan (UvT), Information Access for SMEs in Indonesia
 - 41 Sebastian Kelle (OU), Game Design Patterns for Learning
 - 42 Dominique Verpoorten (OU), Reflection Amplifiers in self-regulated Learning
 - 43 Withdrawn
 - 44 Anna Tordai (VU), On Combining Alignment Techniques
 - 45 Benedikt Kratz (UvT), A Model and Language for Business-aware Transactions
 - 46 Simon Carter (UVA), Exploration and Exploitation of Multilingual Data for Statistical Machine Translation
 - 47 Manos Tsagkias (UVA), Mining Social Media: Tracking Content and Predicting Behavior
 - 48 Jorn Bakker (TUE), Handling Abrupt Changes in Evolving Time-series Data
 - 49 Michael Kaisers (UM), Learning against Learning - Evolutionary dynamics of reinforcement learning algorithms in strategic interactions
 - 50 Steven van Kervel (TUD), Ontology driven Enterprise Information Systems Engineering
 - 51 Jeroen de Jong (TUD), Heuristics in Dynamic Sceduling: a practical framework with a case study in elevator dispatching
-
- 2013 01 Viorel Milea (EUR), News Analytics for Financial Decision Support
 - 02 Erietta Liarou (CWI), MonetDB/DataCell: Leveraging the Column-store Database Technology for Efficient and Scalable Stream Processing
 - 03 Szymon Klarman (VU), Reasoning with Contexts in Description Logics
 - 04 Chetan Yadati (TUD), Coordinating autonomous planning and scheduling
 - 05 Dulce Pumareja (UT), Groupware Requirements Evolutions Patterns
 - 06 Romulo Goncalves (CWI), The Data Cyclotron: Juggling Data and Queries for a Data Warehouse Audience
 - 07 Giel van Lankveld (UvT), Quantifying Individual Player Differences
 - 08 Robbert-Jan Merk (VU), Making enemies: cognitive modeling for opponent agents in fighter pilot simulators
 - 09 Fabio Gori (RUN), Metagenomic Data Analysis: Computational Methods and Applications
 - 10 Jeewanie Jayasinghe Arachchige (UvT), A Unified Modeling Framework for Service Design.
 - 11 Evangelos Pournaras (TUD), Multi-level Reconfigurable Self-organization in Overlay Services
 - 12 Marian Razavian (VU), Knowledge-driven Migration to Services
 - 13 Mohammad Safiri (UT), Service Tailoring: User-centric creation of integrated IT-based homecare services to support independent living of elderly
 - 14 Jafar Tanha (UVA), Ensemble Approaches to Semi-Supervised Learning Learning
 - 15 Daniel Hennes (UM), Multiagent Learning - Dynamic Games and Applications
 - 16 Eric Kok (UU), Exploring the practical benefits of argumentation in multi-agent deliberation
 - 17 Koen Kok (VU), The PowerMatcher: Smart Coordination for the Smart Electricity Grid
 - 18 Jeroen Janssens (UvT), Outlier Selection and One-Class Classification

- 19 Renze Steenhuizen (TUD), Coordinated Multi-Agent Planning and Scheduling
 - 20 Katja Hofmann (UvA), Fast and Reliable Online Learning to Rank for Information Retrieval
 - 21 Sander Wubben (UvT), Text-to-text generation by monolingual machine translation
 - 22 Tom Claassen (RUN), Causal Discovery and Logic
 - 23 Patricio de Alencar Silva (UvT), Value Activity Monitoring
 - 24 Haitham Bou Ammar (UM), Automated Transfer in Reinforcement Learning
 - 25 Agnieszka Anna Latoszek-Berendsen (UM), Intention-based Decision Support. A new way of representing and implementing clinical guidelines in a Decision Support System
 - 26 Alireza Zarghami (UT), Architectural Support for Dynamic Homecare Service Provisioning
 - 27 Mohammad Huq (UT), Inference-based Framework Managing Data Provenance
 - 28 Frans van der Sluis (UT), When Complexity becomes Interesting: An Inquiry into the Information eXperience
 - 29 Iwan de Kok (UT), Listening Heads
 - 30 Joyce Nakatumba (TUE), Resource-Aware Business Process Management: Analysis and Support
 - 31 Dinh Khoa Nguyen (UvT), Blueprint Model and Language for Engineering Cloud Applications
 - 32 Kamakshi Rajagopal (OUN), Networking For Learning; The role of Networking in a Lifelong Learner's Professional Development
 - 33 Qi Gao (TUD), User Modeling and Personalization in the Microblogging Sphere
 - 34 Kien Tjin-Kam-Jet (UT), Distributed Deep Web Search
 - 35 Abdallah El Ali (UvA), Minimal Mobile Human Computer Interaction
 - 36 Than Lam Hoang (TUE), Pattern Mining in Data Streams
 - 37 Dirk Börner (OUN), Ambient Learning Displays
 - 38 Eelco den Heijer (VU), Autonomous Evolutionary Art
 - 39 Joop de Jong (TUD), A Method for Enterprise Ontology based Design of Enterprise Information Systems
 - 40 Pim Nijssen (UM), Monte-Carlo Tree Search for Multi-Player Games
 - 41 Jochem Liem (UVA), Supporting the Conceptual Modelling of Dynamic Systems: A Knowledge Engineering Perspective on Qualitative Reasoning
 - 42 Léon Planken (TUD), Algorithms for Simple Temporal Reasoning
 - 43 Marc Bron (UVA), Exploration and Contextualization through Interaction and Concepts
-
- 2014 01 Nicola Barile (UU), Studies in Learning Monotone Models from Data
 - 02 Fiona Tuluiyano (RUN), Combining System Dynamics with a Domain Modeling Method
 - 03 Sergio Raul Duarte Torres (UT), Information Retrieval for Children: Search Behavior and Solutions
 - 04 Hanna Jochmann-Mannak (UT), Websites for children: search strategies and interface design - Three studies on children's search performance and evaluation
 - 05 Jurriaan van Reijssen (UU), Knowledge Perspectives on Advancing Dynamic Capability
 - 06 Damian Tamburri (VU), Supporting Networked Software Development
 - 07 Arya Adriansyah (TUE), Aligning Observed and Modeled Behavior
 - 08 Samur Araujo (TUD), Data Integration over Distributed and Heterogeneous Data Endpoints
 - 09 Philip Jackson (UvT), Toward Human-Level Artificial Intelligence: Representation and Computation of Meaning in Natural Language
 - 10 Ivan Salvador Razo Zapata (VU), Service Value Networks
 - 11 Janneke van der Zwaan (TUD), An Empathic Virtual Buddy for Social Support
 - 12 Willem van Willigen (VU), Look Ma, No Hands: Aspects of Autonomous Vehicle Control
 - 13 Arlette van Wissen (VU), Agent-Based Support for Behavior Change: Models and Applications in Health and Safety Domains
 - 14 Yangyang Shi (TUD), Language Models With Meta-information
 - 15 Natalya Mogles (VU), Agent-Based Analysis and Support of Human Functioning in Complex Socio-Technical Systems: Applications in Safety and Healthcare
 - 16 Krystyna Milian (VU), Supporting trial recruitment and design by automatically interpreting eligibility criteria
 - 17 Kathrin Dentler (VU), Computing healthcare quality indicators automatically: Secondary Use of Patient Data and Semantic Interoperability
 - 18 Mattijs Ghijsen (UVA), Methods and Models for the Design and Study of Dynamic Agent Organizations

- 19 Vinicius Ramos (TUE), Adaptive Hypermedia Courses: Qualitative and Quantitative Evaluation and Tool Support
 - 20 Mena Habib (UT), Named Entity Extraction and Disambiguation for Informal Text: The Missing Link
 - 21 Kassidy Clark (TUD), Negotiation and Monitoring in Open Environments
 - 22 Marieke Peeters (UU), Personalized Educational Games - Developing agent-supported scenario-based training
 - 23 Eleftherios Sidiropoulos (UvA/CWI), Space Efficient Indexes for the Big Data Era
 - 24 Davide Ceolin (VU), Trusting Semi-structured Web Data
 - 25 Martijn Lappenschaar (RUN), New network models for the analysis of disease interaction
 - 26 Tim Baarslag (TUD), What to Bid and When to Stop
 - 27 Rui Jorge Almeida (EUR), Conditional Density Models Integrating Fuzzy and Probabilistic Representations of Uncertainty
 - 28 Anna Chmielowiec (VU), Decentralized k-Clique Matching
 - 29 Jaap Kabbedijk (UU), Variability in Multi-Tenant Enterprise Software
 - 30 Peter de Cock (UvT), Anticipating Criminal Behaviour
 - 31 Leo van Moergestel (UU), Agent Technology in Agile Multiparallel Manufacturing and Product Support
 - 32 Naser Ayat (UvA), On Entity Resolution in Probabilistic Data
 - 33 Tesfa Tegegne (RUN), Service Discovery in eHealth
 - 34 Christina Manteli (VU), The Effect of Governance in Global Software Development: Analyzing Transactive Memory Systems.
 - 35 Joost van Ooijen (UU), Cognitive Agents in Virtual Worlds: A Middleware Design Approach
 - 36 Joos Buijs (TUE), Flexible Evolutionary Algorithms for Mining Structured Process Models
 - 37 Maral Dadvar (UT), Experts and Machines United Against Cyberbullying
 - 38 Danny Plass-Oude Bos (UT), Making brain-computer interfaces better: improving usability through post-processing.
 - 39 Jasmina Maric (UvT), Web Communities, Immigration, and Social Capital
 - 40 Walter Omona (RUN), A Framework for Knowledge Management Using ICT in Higher Education
 - 41 Frederic Hogenboom (EUR), Automated Detection of Financial Events in News Text
 - 42 Carsten Eijckhof (CWI/TUD), Contextual Multidimensional Relevance Models
 - 43 Kevin Vlaanderen (UU), Supporting Process Improvement using Method Increments
 - 44 Paulien Meesters (UvT), Intelligent Blauw. Met als ondertitel: Intelligence-gestuurde politiezorg in gebiedsgebonden eenheden.
 - 45 Birgit Schmitz (OUN), Mobile Games for Learning: A Pattern-Based Approach
 - 46 Ke Tao (TUD), Social Web Data Analytics: Relevance, Redundancy, Diversity
 - 47 Shangsong Liang (UVA), Fusion and Diversification in Information Retrieval
-
- 2015 01 Niels Netten (UvA), Machine Learning for Relevance of Information in Crisis Response
 - 02 Faiza Bukhsh (UvT), Smart auditing: Innovative Compliance Checking in Customs Controls
 - 03 Twan van Laarhoven (RUN), Machine learning for network data
 - 04 Howard Spoelstra (OUN), Collaborations in Open Learning Environments
 - 05 Christoph Bösch (UT), Cryptographically Enforced Search Pattern Hiding
 - 06 Farideh Heidari (TUD), Business Process Quality Computation - Computing Non-Functional Requirements to Improve Business Processes
 - 07 Maria-Hendrike Peetz (UvA), Time-Aware Online Reputation Analysis
 - 08 Jie Jiang (TUD), Organizational Compliance: An agent-based model for designing and evaluating organizational interactions
 - 09 Randy Klaassen (UT), HCI Perspectives on Behavior Change Support Systems
 - 10 Henry Hermans (OUN), OpenU: design of an integrated system to support lifelong learning
 - 11 Yongming Luo (TUE), Designing algorithms for big graph datasets: A study of computing bisimulation and joins
 - 12 Julie M. Birkholz (VU), Modi Operandi of Social Network Dynamics: The Effect of Context on Scientific Collaboration Networks
 - 13 Giuseppe Procaccianti (VU), Energy-Efficient Software
 - 14 Bart van Straalen (UT), A cognitive approach to modeling bad news conversations
 - 15 Klaas Andries de Graaf (VU), Ontology-based Software Architecture Documentation

- 16 Changyun Wei (UT), Cognitive Coordination for Cooperative Multi-Robot Teamwork
 - 17 André van Cleeff (UT), Physical and Digital Security Mechanisms: Properties, Combinations and Trade-offs
 - 18 Holger Pirk (CWI), Waste Not, Want Not! - Managing Relational Data in Asymmetric Memories
 - 19 Bernardo Tabuenca (OUN), Ubiquitous Technology for Lifelong Learners
 - 20 Lois Vanhée (UU), Using Culture and Values to Support Flexible Coordination
 - 21 Sibren Fetter (OUN), Using Peer-Support to Expand and Stabilize Online Learning
 - 22 Zhemín Zhu (UT), Co-occurrence Rate Networks
 - 23 Luit Gazendam (VU), Cataloguer Support in Cultural Heritage
 - 24 Richard Berendsen (UVA), Finding People, Papers, and Posts: Vertical Search Algorithms and Evaluation
 - 25 Steven Woudenberg (UU), Bayesian Tools for Early Disease Detection
 - 26 Alexander Hogenboom (EUR), Sentiment Analysis of Text Guided by Semantics and Structure
 - 27 Sándor Héman (CWI), Updating compressed column stores
 - 28 Janet Bagorogoza (TiU), Knowledge Management and High Performance; The Uganda Financial Institutions Model for HPO
 - 29 Hendrik Baier (UM), Monte-Carlo Tree Search Enhancements for One-Player and Two-Player Domains
 - 30 Kiavash Bahreini (OU), Real-time Multimodal Emotion Recognition in E-Learning
 - 31 Yakup Koç (TUD), On the robustness of Power Grids
 - 32 Jerome Gard (UL), Corporate Venture Management in SMEs
 - 33 Frederik Schadd (TUD), Ontology Mapping with Auxiliary Resources
 - 34 Victor de Graaf (UT), Gesocial Recommender Systems
 - 35 Jungxao Xu (TUD), Affective Body Language of Humanoid Robots: Perception and Effects in Human Robot Interaction
-
- 2016**
- 01 Syed Saiden Abbas (RUN), Recognition of Shapes by Humans and Machines
 - 02 Michiel Christiaan Meulendijk (UU), Optimizing medication reviews through decision support: prescribing a better pill to swallow
 - 03 Maya Sappelli (RUN), Knowledge Work in Context: User Centered Knowledge Worker Support
 - 04 Laurens Rietveld (VU), Publishing and Consuming Linked Data
 - 05 Evgeny Sherkhonov (UVA), Expanded Acyclic Queries: Containment and an Application in Explaining Missing Answers
 - 06 Michel Wilson (TUD), Robust scheduling in an uncertain environment
 - 07 Jeroen de Man (VU), Measuring and modeling negative emotions for virtual training
 - 08 Matje van de Camp (TiU), A Link to the Past: Constructing Historical Social Networks from Unstructured Data
 - 09 Archana Nottamkandath (VU), Trusting Crowdsourced Information on Cultural Artefacts
 - 10 George Karafotias (VUA), Parameter Control for Evolutionary Algorithms
 - 11 Anne Schuth (UVA), Search Engines that Learn from Their Users
 - 12 Max Knobbout (UU), Logics for Modelling and Verifying Normative Multi-Agent Systems
 - 13 Nana Baah Gyan (VU), The Web, Speech Technologies and Rural Development in West Africa - An ICT4D Approach
 - 14 Ravi Khadka (UU), Revisiting Legacy Software System Modernization
 - 15 Steffen Michels (RUN), Hybrid Probabilistic Logics - Theoretical Aspects, Algorithms and Experiments
 - 16 Guangliang Li (UVA), Socially Intelligent Autonomous Agents that Learn from Human Reward
 - 17 Berend Weel (VU), Towards Embodied Evolution of Robot Organisms
 - 18 Albert Meroño Peñuela (VU), Refining Statistical Data on the Web
 - 19 Julia Efremova (Tu/e), Mining Social Structures from Genealogical Data
 - 20 Daan Odijk (UVA), Context & Semantics in News & Web Search
 - 21 Alejandro Moreno Celleri (UT), From Traditional to Interactive Playspaces: Automatic Analysis of Player Behavior in the Interactive Tag Playground
 - 22 Grace Lewis (VU), Software Architecture Strategies for Cyber-Foraging Systems
 - 23 Fei Cai (UVA), Query Auto Completion in Information Retrieval

- 24 Brend Wanders (UT), Repurposing and Probabilistic Integration of Data; An Iterative and data model independent approach
 - 25 Julia Kiseleva (TU/e), Using Contextual Information to Understand Searching and Browsing Behavior
 - 26 Dilhan Thilakarathne (VU), In or Out of Control: Exploring Computational Models to Study the Role of Human Awareness and Control in Behavioural Choices, with Applications in Aviation and Energy Management Domains
 - 27 Wen Li (TUD), Understanding Geo-spatial Information on Social Media
 - 28 Mingxin Zhang (TUD), Large-scale Agent-based Social Simulation - A study on epidemic prediction and control
 - 29 Nicolas Höning (TUD), Peak reduction in decentralised electricity systems - Markets and prices for flexible planning
 - 30 Ruud Mattheij (UvT), The Eyes Have It
 - 31 Mohammad Khelghati (UT), Deep web content monitoring
 - 32 Eelco Vriezekolk (UT), Assessing Telecommunication Service Availability Risks for Crisis Organisations
 - 33 Peter Bloem (UVA), Single Sample Statistics, exercises in learning from just one example
 - 34 Dennis Schunselaar (TUE), Configurable Process Trees: Elicitation, Analysis, and Enactment
 - 35 Zhaochun Ren (UVA), Monitoring Social Media: Summarization, Classification and Recommendation
 - 36 Daphne Karreman (UT), Beyond R2D2: The design of nonverbal interaction behavior optimized for robot-specific morphologies
 - 37 Giovanni Sileno (UvA), Aligning Law and Action - a conceptual and computational inquiry
 - 38 Andrea Minuto (UT), Materials that Matter - Smart Materials meet Art & Interaction Design
 - 39 Merijn Bruijnes (UT), Believable Suspect Agents; Response and Interpersonal Style Selection for an Artificial Suspect
 - 40 Christian Detweiler (TUD), Accounting for Values in Design
 - 41 Thomas King (TUD), Governing Governance: A Formal Framework for Analysing Institutional Design and Enactment Governance
 - 42 Spyros Martzoukos (UVA), Combinatorial and Compositional Aspects of Bilingual Aligned Corpora
 - 43 Saskia Koldijk (RUN), Context-Aware Support for Stress Self-Management: From Theory to Practice
 - 44 Thibault Sellam (UVA), Automatic Assistants for Database Exploration
 - 45 Bram van de Laar (UT), Experiencing Brain-Computer Interface Control
 - 46 Jorge Gallego Perez (UT), Robots to Make you Happy
 - 47 Christina Weber (UL), Real-time foresight - Preparedness for dynamic innovation networks
 - 48 Tanja Buttler (TUD), Collecting Lessons Learned
 - 49 Gleb Polevoy (TUD), Participation and Interaction in Projects. A Game-Theoretic Analysis
 - 50 Yan Wang (UVT), The Bridge of Dreams: Towards a Method for Operational Performance Alignment in IT-enabled Service Supply Chains
-
- 2017 01 Jan-Jaap Oerlemans (UL), Investigating Cybercrime
- 02 Sjoerd Timmer (UU), Designing and Understanding Forensic Bayesian Networks using Argumentation
 - 03 Daniël Harold Telgen (UU), Grid Manufacturing; A Cyber-Physical Approach with Autonomous Products and Reconfigurable Manufacturing Machines
 - 04 Mrunal Gawade (CWI), Multi-core Parallelism in a Column-store
 - 05 Mahdiah Shadi (UVA), Collaboration Behavior
 - 06 Damir Vandić (EUR), Intelligent Information Systems for Web Product Search
 - 07 Roel Bertens (UU), Insight in Information: from Abstract to Anomaly
 - 08 Rob Konijn (VU), Detecting Interesting Differences: Data Mining in Health Insurance Data using Outlier Detection and Subgroup Discovery
 - 09 Dong Nguyen (UT), Text as Social and Cultural Data: A Computational Perspective on Variation in Text
 - 10 Robby van Delden (UT), (Steering) Interactive Play Behavior
 - 11 Florian Kunneman (RUN), Modelling patterns of time and emotion in Twitter #anticipointment
 - 12 Sander Leemans (TUE), Robust Process Mining with Guarantees

- 13 Gijs Huisman (UT), Social Touch Technology - Extending the reach of social touch through haptic technology
 - 14 Shoshannah Tekofsky (UvT), You Are Who You Play You Are: Modelling Player Traits from Video Game Behavior
 - 15 Peter Berck (RUN), Memory-Based Text Correction
 - 16 Aleksandr Chuklin (UVA), Understanding and Modeling Users of Modern Search Engines
 - 17 Daniel Dimov (UL), Crowdsourced Online Dispute Resolution
 - 18 Ridho Reinanda (UVA), Entity Associations for Search
 - 19 Jeroen Vuurens (UT), Proximity of Terms, Texts and Semantic Vectors in Information Retrieval
 - 20 Mohammadbashir Sedighi (TUD), Fostering Engagement in Knowledge Sharing: The Role of Perceived Benefits, Costs and Visibility
 - 21 Jeroen Linssen (UT), Meta Matters in Interactive Storytelling and Serious Gaming (A Play on Worlds)
 - 22 Sara Magliacane (VU), Logics for causal inference under uncertainty
 - 23 David Graus (UVA), Entities of Interest — Discovery in Digital Traces
 - 24 Chang Wang (TUD), Use of Affordances for Efficient Robot Learning
 - 25 Veruska Zamborlini (VU), Knowledge Representation for Clinical Guidelines, with applications to Multimorbidity Analysis and Literature Search
 - 26 Merel Jung (UT), Socially intelligent robots that understand and respond to human touch
 - 27 Michiel Joosse (UT), Investigating Positioning and Gaze Behaviors of Social Robots: People's Preferences, Perceptions and Behaviors
 - 28 John Klein (VU), Architecture Practices for Complex Contexts
 - 29 Adel Alhuraibi (UvT), From IT-BusinessStrategic Alignment to Performance: A Moderated Mediation Model of Social Innovation, and Enterprise Governance of IT"
 - 30 Wilma Latuny (UvT), The Power of Facial Expressions
 - 31 Ben Ruijl (UL), Advances in computational methods for QFT calculations
 - 32 Thaer Samar (RUN), Access to and Retrievability of Content in Web Archives
 - 33 Brigit van Loggem (OU), Towards a Design Rationale for Software Documentation: A Model of Computer-Mediated Activity
 - 34 Maren Scheffel (OU), The Evaluation Framework for Learning Analytics
 - 35 Martine de Vos (VU), Interpreting natural science spreadsheets
 - 36 Yuanhao Guo (UL), Shape Analysis for Phenotype Characterisation from High-throughput Imaging
 - 37 Alejandro Montes Garcia (TUE), WiBAF: A Within Browser Adaptation Framework that Enables Control over Privacy
 - 38 Alex Kayal (TUD), Normative Social Applications
 - 39 Sara Ahmadi (RUN), Exploiting properties of the human auditory system and compressive sensing methods to increase noise robustness in ASR
 - 40 Altaf Hussain Abro (VUA), Steer your Mind: Computational Exploration of Human Control in Relation to Emotions, Desires and Social Support For applications in human-aware support systems
 - 41 Adnan Manzoor (VUA), Minding a Healthy Lifestyle: An Exploration of Mental Processes and a Smart Environment to Provide Support for a Healthy Lifestyle
 - 42 Elena Sokolova (RUN), Causal discovery from mixed and missing data with applications on ADHD datasets
 - 43 Maaïke de Boer (RUN), Semantic Mapping in Video Retrieval
 - 44 Garm Lucassen (UU), Understanding User Stories - Computational Linguistics in Agile Requirements Engineering
 - 45 Bas Testerink (UU), Decentralized Runtime Norm Enforcement
 - 46 Jan Schneider (OU), Sensor-based Learning Support
 - 47 Jie Yang (TUD), Crowd Knowledge Creation Acceleration
 - 48 Angel Suarez (OU), Collaborative inquiry-based learning
-
- 2018 01 Han van der Aa (VUA), Comparing and Aligning Process Representations
 - 02 Felix Mannhardt (TUE), Multi-perspective Process Mining
 - 03 Steven Bosems (UT), Causal Models For Well-Being: Knowledge Modeling, Model-Driven Development of Context-Aware Applications, and Behavior Prediction

- 04 Jordan Janeiro (TUD), Flexible Coordination Support for Diagnosis Teams in Data-Centric Engineering Tasks
 - 05 Hugo Huurdeman (UVA), Supporting the Complex Dynamics of the Information Seeking Process
 - 06 Dan Ionita (UT), Model-Driven Information Security Risk Assessment of Socio-Technical Systems
 - 07 Jieting Luo (UU), A formal account of opportunism in multi-agent systems
 - 08 Rick Smetsers (RUN), Advances in Model Learning for Software Systems
 - 09 Xu Xie (TUD), Data Assimilation in Discrete Event Simulations
 - 10 Julienka Mollee (VUA), Moving forward: supporting physical activity behavior change through intelligent technology
 - 11 Mahdi Sargolzaei (UVA), Enabling Framework for Service-oriented Collaborative Networks
 - 12 Xixi Lu (TUE), Using behavioral context in process mining
 - 13 Seyed Amin Tabatabaei (VUA), Computing a Sustainable Future
 - 14 Bart Joosten (UVT), Detecting Social Signals with Spatiotemporal Gabor Filters
 - 15 Naser Davarzani (UM), Biomarker discovery in heart failure
 - 16 Jaebok Kim (UT), Automatic recognition of engagement and emotion in a group of children
 - 17 Jianpeng Zhang (TUE), On Graph Sample Clustering
 - 18 Henriette Nakad (UL), De Notaris en Private Rechtspraak
 - 19 Minh Duc Pham (VUA), Emergent relational schemas for RDF
 - 20 Manxia Liu (RUN), Time and Bayesian Networks
 - 21 Aad Slootmaker (OUN), EMERGO: a generic platform for authoring and playing scenario-based serious games
 - 22 Eric Fernandes de Mello Araujo (VUA), Contagious: Modeling the Spread of Behaviours, Perceptions and Emotions in Social Networks
 - 23 Kim Schouten (EUR), Semantics-driven Aspect-Based Sentiment Analysis
 - 24 Jered Vroon (UT), Responsive Social Positioning Behaviour for Semi-Autonomous Telepresence Robots
 - 25 Riste Gligorov (VUA), Serious Games in Audio-Visual Collections
 - 26 Roelof Anne Jelle de Vries (UT), Theory-Based and Tailor-Made: Motivational Messages for Behavior Change Technology
 - 27 Maikel Leemans (TUE), Hierarchical Process Mining for Scalable Software Analysis
 - 28 Christian Willemse (UT), Social Touch Technologies: How they feel and how they make you feel
 - 29 Yu Gu (UVT), Emotion Recognition from Mandarin Speech
 - 30 Wouter Beek, The "K" in "semantic web" stands for "knowledge": scaling semantics to the web
-
- 2019 01 Rob van Eijk (UL), Web privacy measurement in real-time bidding systems. A graph-based approach to RTB system classification
 - 02 Emmanuelle Beauxis Aussalet (CWI, UU), Statistics and Visualizations for Assessing Class Size Uncertainty
 - 03 Eduardo Gonzalez Lopez de Murillas (TUE), Process Mining on Databases: Extracting Event Data from Real Life Data Sources
 - 04 Ridho Rahmadi (RUN), Finding stable causal structures from clinical data
 - 05 Sebastiaan van Zelst (TUE), Process Mining with Streaming Data
 - 06 Chris Dijkshoorn (VU), Nichesourcing for Improving Access to Linked Cultural Heritage Datasets
 - 07 Soude Fazeli (TUD), Recommender Systems in Social Learning Platforms
 - 08 Frits de Nijs (TUD), Resource-constrained Multi-agent Markov Decision Processes
 - 09 Fahimeh Alizadeh Moghaddam (UVA), Self-adaptation for energy efficiency in software systems
 - 10 Qing Chuan Ye (EUR), Multi-objective Optimization Methods for Allocation and Prediction
 - 11 Yue Zhao (TUD), Learning Analytics Technology to Understand Learner Behavioral Engagement in MOOCs
 - 12 Jacqueline Heinerman (VU), Better Together
 - 13 Guanliang Chen (TUD), MOOC Analytics: Learner Modeling and Content Generation
 - 14 Daniel Davis (TUD), Large-Scale Learning Analytics: Modeling Learner Behavior & Improving Learning Outcomes in Massive Open Online Courses

- 15 Erwin Walraven (TUD), Planning under Uncertainty in Constrained and Partially Observable Environments
 - 16 Guangming Li (TUE), Process Mining based on Object-Centric Behavioral Constraint (OCBC) Models
 - 17 Ali Hurriyetoglu (RUN), Extracting actionable information from microtexts
 - 18 Gerard Wagenaar (UU), Artefacts in Agile Team Communication
 - 19 Vincent Koeman (TUD), Tools for Developing Cognitive Agents
 - 20 Chide Groenouwe (UU), Fostering technically augmented human collective intelligence
 - 21 Cong Liu (TUE), Software Data Analytics: Architectural Model Discovery and Design Pattern Detection
 - 22 Martin van den Berg (VU), Improving IT Decisions with Enterprise Architecture
 - 23 Qin Liu (TUD), Intelligent Control Systems: Learning, Interpreting, Verification
 - 24 Anca Dumitrache (VU), Truth in Disagreement - Crowdsourcing Labeled Data for Natural Language Processing
 - 25 Emiel van Miltenburg (VU), Pragmatic factors in (automatic) image description
 - 26 Prince Singh (UT), An Integration Platform for Synchronodal Transport
 - 27 Alessandra Antonaci (OUN), The Gamification Design Process applied to (Massive) Open Online Courses
 - 28 Esther Kuindersma (UL), Cleared for take-off: Game-based learning to prepare airline pilots for critical situations
 - 29 Daniel Formolo (VU), Using virtual agents for simulation and training of social skills in safety-critical circumstances
 - 30 Vahid Yazdanpanah (UT), Multiagent Industrial Symbiosis Systems
 - 31 Milan Jelisavcic (VU), Alive and Kicking: Baby Steps in Robotics
 - 32 Chiara Sironi (UM), Monte-Carlo Tree Search for Artificial General Intelligence in Games
 - 33 Anil Yaman (TUE), Evolution of Biologically Inspired Learning in Artificial Neural Networks
 - 34 Negar Ahmadi (TUE), EEG Microstate and Functional Brain Network Features for Classification of Epilepsy and PNES
 - 35 Lisa Facey-Shaw (OUN), Gamification with digital badges in learning programming
 - 36 Kevin Ackermans (OUN), Designing Video-Enhanced Rubrics to Master Complex Skills
 - 37 Jian Fang (TUD), Database Acceleration on FPGAs
 - 38 Ákos Kádár (TiU), Learning visually grounded and multilingual representations
-
- 2020 01 Armon Toubman (UL), Calculated Moves: Generating Air Combat Behaviour
- 02 Marcos Luiz de Paula Bueno (UL), Unraveling Temporal Processes using Probabilistic Graphical Models
-