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Universiteit Leiden



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## ACKNOWLEDGMENTS

Wanneer ben je klaar? Deze vraag is mij zo vaak gesteld, dat ik het mezelf bijna ook begon af te vragen. Nu is voor mij de reis altijd leuker dan de aankomst, maar eens wordt het tijd om even aan te merken, al is het maar om iedereen te bedanken! Als ik iemand vergeet, dan kost me dat een biertje.

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Dank aan iedereen die ik bij workshops ben tegengekomen als participant of als organisator. Applied Bayesian Nonparametrics workshop (Como, 2014). The Statistical Physics of Inference and Control Theory (Granada, 2012). Summer school Neural Dynamics Approaches to Cognitive Robotics (Porto, 2011). Neuromorphic Engineering Workshop (Capo Caccia,

2010). Workshop on Self-Organizing Systems (Klagenfurt, 2009). Neuromorphic Engineering Workshop (Telluride, 2008). Dank vooral aan Max en Toni.

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Lieve ouders, dank voor alles! Jullie hebben nooit druk uitgeoefend om (academisch) te presteren. Daarom houd ik, denk ik, juist zoveel van de wetenschap. Het is nooit een verplichting geweest... Eén van mijn eerste ervaringen was dat ik op D'n Diek met mijn vader de computer moest terugbrengen. Ik had als tienjarige lopen knoeien aan de *config.sys* en *autoexec.bat* bestanden om *extended memory* aan te spreken (het DOS tijdperk, 1990). Vervolgens kregen ze het bij de computerspecialzaak niet zo snel in orde. Mij brak het zweet uit, maar bij mijn vader niet. Hij was trots. Toen heb ik geleerd dat je nieuwsgierig mag zijn en fouten mag maken.

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## CURRICULUM VITAE

Anne Cornelis van Rossum was born in Dirksland, Goeree-Overflakkee, Netherlands on the 30<sup>th</sup> of December, 1980. After attending atheneum, Anne followed a BSc of Electrical Engineering at the Delft University of Technology, also known as TU Delft, from 1999 to 2002. In the next year, Anne took a ten-month sabbatical in South-America. Thereafter, Anne completed a MSc in Media & Knowledge Engineering at the TU Delft (with courses on speech recognition, neural networks, expert systems, digital signal processing) and a minor at Leiden University in Cognitive Psychology (with courses on connectionism, memory, attention models). After these studies, in 2006, Anne started as researcher at Almende, a research institute in Rotterdam. Here Anne worked on Dutch and European projects, e.g., ProHeal, Sensei, Fireswarm, and Replicator. In the years thereafter, Anne became involved in the launching stages of new companies: Sense Observation Systems, DoBots, and Crownstone (as CEO). The role of Sense was to bring ubiquitous sensor technology into the life of people, preferably to help them to live healthier lives. At DoBots autonomous robots were brought to the market. Nowadays, Crownstone has as vision to allow everybody to own a smart home. Smart, in the sense that it is a home that knows the location of inhabitants in the house. With this knowledge the house can automatically turn on the lights when someone enters a room. In all those different roles, Anne makes sure to use artificial intelligence for a potentially brighter future.



## PUBLICATIONS

The investigations performed during my Ph.D. research resulted in the following publications.

- A.C. van Rossum, H.X. Lin, J. Dubbeldam, and H.J. van den Herik. Nonparametric Bayesian Line Detection. *International Conference on Pattern Recognition and Methods*, ICPRAM 2016, Rome, Italy, February 24-26, 2016. Best paper award in theory and methods track.
- A.C. van Rossum, H.X. Lin, J. Dubbeldam, and H.J. van den Herik. Fundamentals of Nonparametric Bayesian Line Detection. Springer, 2017.
- A.C. van Rossum, H.X. Lin, J. Dubbeldam, and H.J. van den Herik. Nonparametric Segment Detection. *Proceedings of the Eighth European Starting AI Researcher Symposium*, STAIRS 2016, the Hague, the Netherlands, August 26-27, 2016.
- A.C. van Rossum, H.X. Lin, J. Dubbeldam, and H.J. van den Herik. Triadic Split-Merge Sampler. *The 10th International Conference on Machine Vision*, ICMV 2017, Vienna, Austria, November 13-November 15, 2017.

The research done in this Ph.D. would not have been possible without preliminaries studies in the fields of robotics, that precede the publications on Bayesian methods. The following publications have the writer of this dissertation as first author.

- A.C. van Rossum and H.J. van den Herik. Circadian Robot Metamorphosis. *Tenth International Conference on Epigenetic Robotics*, EPIROB 2010, Örenäs Slott, Sweden, November 5-7, 2010.
- A.C. van Rossum and H.J. van den Herik. Designing Robot Metamorphosis. *22nd Benelux Conference on Artificial Intelligence*, BNAIC2010, Luxembourg, Luxembourg, October 25-26, 2010.
- A.C. van Rossum. Genetic Encoding of Robot Metamorphosis: How to Evolve a Glider with a Genetic Regulatory Network. *International Conference on Swarm Intelligence*, ANTS2010, Brussels, Belgium, September 8-10, 2010.

The author has contributed to the following publications.

- W. Bulten, A.C. van Rossum, W.F.G. Haselager. Human SLAM, indoor localisation of devices and users. *First International Conference on Internet-of-Things Design and Implementation*, IoTDI2016, Berlin, Germany, April 4-6, 2016.

- V. Rai, A. C. van Rossum, and N. Correll. Self-Assembly of Modular Robots from a Finite Number of Modules using Graph Grammars *International Conference on Intelligent Robots and Systems IROS2011*, San Francisco, United States of America, September 25-30, 2011.
- M. Szymanski, L. Winkler, D. Laneri, F. Schlachter, A. C. van Rossum, T. Schmickl, R. Thenius. SymbicatorRTOS: a Flexible and Dynamic Framework for Bio-inspired Robot Control Systems and Evolution. In: *Evolutionary Computation*, 2009.

The research performed by master students under the author's supervision has also been of large influence on the research in this dissertation. Their research can be found in the following master theses.

- O. Krystalakos. Automatic Appliance Identification. Faculty of Social Sciences, Radboud University, 2020.
- R. Bellana. Anomaly detection using autoencoders for Ambient Assisted Living. Graduate School of Natural Sciences. Utrecht University, 2018.
- N. Wielinga. Configuration of Ambient Environments by Speech. Department of Mathematics and Computer Science Software Engineering and Technology Research Group. Eindhoven University of Technology, 2018.
- J.I.J. Makkinje. Appliance Identification using Long Short-Term Memory Recurrent Neural Networks. Faculty of Science. Utrecht University, 2018.
- F.D. Andriessen, Ready for Detection. Stair-detecting in RGB-D images using OpenCV and an Adaboosting Algorithm. Space Engineering. Delft University of Technology, 2017.
- A. Sofos. Evaluation of Machine Learning Techniques for Passive Presence Detection. Erasmus School of Economics. Erasmus University Rotterdam, 2017.
- R. Hajnovicsova. Pull-E- The Assistive Shopping Trolley. Faculty of Mechanical, Maritime and Materials Engineering. Delft University of Technology, 2017.
- W. Bulten. Human SLAM. Simultaneous Localisation and Configuration (SLAC) of Indoor Wireless Sensor Networks and their Users. Faculty of Social Sciences, Radboud University, 2015.
- P. Chatzichristodoulou. Towards Lifelong Mapping in Pointclouds. Department of Knowledge Engineering. Maastricht University, 2015.
- A. Bekker. BitsLab. A Smart Product for Weight Loss Through Behavior Change. Industrial Design Engineering. Delft University of Technology, 2015.
- R.N. Kannankutty. Innovating Independent Living. Faculty of Technology, Policy and Management. Delft University of Technology, 2014.
- R.Q. Vlasveld. Temporal Segmentation using Support Vector Machines in the context of Human Activity Recognition. Department of Information and Computing Science. Utrecht University, 2014.
- J. van den Haspel. Distributed Control of Refrigerators for the Smart Grid. Faculty of Mechanical, Maritime and Materials Engineering. Delft University of Technology, 2013.
- L. Blik. Nonlinear System Identification and Control for Autonomous Robots. Delft Institute of Applied Mathematics. Delft University of Technology, 2013.
- J. Hulshof. ARSON. A Robotic Search Optimization. Faculty of Mechanical, Maritime and Materials Engineering. Delft University of Technology, 2013.
- M.J. Hulscher. Joint Action Reasoning for Local Agents. Faculty of Mechanical, Maritime and Materials Engineering. Delft University of Technology, 2013.

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- R. Tukker. Echo State Networks for Hierarchical Cognitive Control. Donders Institute. Radboud University Nijmegen, 2012.
  - V. Rai. Self Assembly of Modular Robots with Finite Number of Modules Using Graph Grammar. Department of Electrical Computer and Energy Engineering. University of Colorado Boulder, 2011.
  - T.P. Schmidt. Robotics: Environmental Awareness Through Cognitive Sensor Fusion. Department of Artificial Intelligence. University of Groningen, 2010.
  - F. van Polen. Towards a Sentient Environment Using a Neural Sensor Network. Department of Information and Computing Sciences. Utrecht University, 2008.





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- 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

- 1 Niels Netten (UvA) *Machine Learning for Relevance of Information in Crisis Response*
- 2 Faiza Bukhsh (UvT) *Smart auditing: Innovative Compliance Checking in Customs Controls*
- 3 Twan van Laarhoven (RUN) *Machine learning for network data*
- 4 Howard Spoelstra (OUN) *Collaborations in Open Learning Environments*
- 5 Christoph Bösch (UT) *Cryptographically Enforced Search Pattern Hiding*
- 6 Farideh Heidari (TUD) *Business Process Quality Computation - Computing Non-Functional Requirements to Improve Business Processes*
- 7 Maria-Hendrike Peetz (UvA) *Time-Aware Online Reputation Analysis*
- 8 Jie Jiang (TUD) *Organizational Compliance: An agent-based model for designing and evaluating organizational interactions*
- 9 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 Luit Gazendam (VU) *Cataloguer Support in Cultural Heritage*
- 23 Richard Berendsen (UvA) *Finding People, Papers, and Posts: Vertical Search Algorithms and Evaluation*
- 24 Steven Woudenberg (UU) *Bayesian Tools for Early Disease Detection*
- 25 Alexander Hogenboom (EUR) *Sentiment Analysis of Text Guided by Semantics and Structure*
- 26 Sándor Héman (CWI) *Updating compressed column stores*
- 27 Janet Bagorogoza (TiU) *KNOWLEDGE MANAGEMENT AND HIGH PERFORMANCE; The Uganda Financial Institutions Model for HPO*
- 28 Hendrik Baier (UM) *Monte-Carlo Tree Search Enhancements for One-Player and Two-Player Domains*
- 29 Kiavash Bahreini (OU) *Real-time Multimodal Emotion Recognition in E-Learning*
- 30 Yakup Koç (TUD) *On the robustness of Power Grids*
- 31 Jerome Gard (UL) *Corporate Venture Management in SMEs*
- 32 Frederik Schadd (TUD) *Ontology Mapping with Auxiliary Resources*
- 33 Victor de Graaf (UT) *Gesocial Recommender Systems*
- 34 Jungxao Xu (TUD) *Affective Body Language of Humanoid Robots: Perception and Effects in Human Robot Interaction*

## 2016

- 1 Syed Saiden Abbas (RUN) *Recognition of Shapes by Humans and Machines*
- 2 Michiel Christiaan Meulendijk (UU) *Optimizing medication reviews through decision support: prescribing a better pill to swallow*
- 3 Maya Sappelli (RUN) *Knowledge Work in Context: User Centered Knowledge Worker Support*
- 4 Laurens Rietveld (VU) *Publishing and Consuming Linked Data*
- 5 Evgeny Sherkhonov (UvA) *Expanded Acyclic Queries: Containment and an Application in Explaining Missing Answers*
- 6 Michel Wilson (TUD) *Robust scheduling in an uncertain environment*
- 7 Jeroen de Man (VU) *Measuring and modeling negative emotions for virtual training*
- 8 Matje van de Camp (TiU) *A Link to the Past: Constructing Historical Social Networks from Unstructured Data*
- 9 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 Efreanova (Tu/e) *Mining Social Structures from Genealogical Data*
  - 20 Daan Odijk (UvA) *Context & Semantics in News & Web Search*
  - 21 Alejandro Moreno Céleri (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 Vriezেকolk (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**
- 1 Jan-Jaap Oerlemans (UL) *Investigating Cybercrime*
  - 2 Sjoerd Timmer (UU) *Designing and Understanding Forensic Bayesian Networks using Argumentation*
  - 3 Daniël Harold Telgen (UU) *Grid Manufacturing; A Cyber-Physical Approach with Autonomous Products and Reconfigurable Manufacturing Machines*
  - 4 Mrunal Gawade (CWI) *MULTI-CORE PARALLELISM IN A COLUMN-STORE*
  - 5 Mahdieh Shadi (UvA) *Collaboration Behavior*
  - 6 Damir Vandic (EUR) *Intelligent Information Systems for Web Product Search*
  - 7 Roel Bertens (UU) *Insight in Information: from Abstract to Anomaly*
  - 8 Rob Konijn (VU) *Detecting Interesting Differences: Data Mining in Health Insurance Data using Outlier Detection and Subgroup Discovery*
  - 9 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, Radboud University (RUN) *Memory-Based Text Correction*
- 16 Aleksandr Chuklin (UvA) *Understanding and Modelling Users of Modern Search Engines*
- 17 Daniel Dimov (UL) *Crowdsourced Online Dispute Resolution*
- 18 Ridho Reinanda (UvA) *Entity Associations for Search*
- 19 Jeroen Vuurens (TUD) *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 Thaeer 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 (OUN) *The Evaluation Framework for Learning Analytics*
- 35 Martine de Vos (VU) *Interpreting natural science spreadsheets*
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- 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*
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- 45 Bas Testerink (UU) *Decentralized Runtime Norm Enforcement*
- 46 Jan Schneider (OU) *Sensor-based Learning Support*
- 47 Yie Yang (TUD) *Crowd Knowledge Creation Acceleration*
- 48 Angel Suarez (OU) *Collaborative inquiry-based learning*
- 2018**
- 1 Han van der Aa (VUA) *Comparing and Aligning Process Representations*
- 2 Felix Mannhardt (TUE) *Multi-perspective Process Mining*
- 3 Steven Bosems (UT) *Causal Models For Well-Being: Knowledge Modeling, Model-Driven Development of Context-Aware Applications, and Behavior Prediction*
- 4 Jordan Janeiro (TUD) *Flexible Coordination Support for Diagnosis Teams in Data-Centric Engineering Tasks*
- 5 Hugo Huurdeman (UvA) *Supporting the Complex Dynamics of the Information Seeking Process*
- 6 Dan Ionita (UT) *Model-Driven Information Security Risk Assessment of Socio-Technical Systems*
- 7 Jieting Luo (UU) *A formal account of opportunism in multi-agent systems*
- 8 Rick Smetsers (RUN) *Advances in Model Learning for Software Systems*
- 9 Xu Xie (TUD) *Data Assimilation in Discrete Event Simulations*



- 10 Julienka Mollee (VUA) *Moving forward: supporting physical activity behavior change through intelligent technology*
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  - 12 Xixi Lu (TUE) *Using behavioral context in process mining*
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  - 18 Henriette Nakad (UL) *De Notaris en Private Rechtspraak*
  - 19 Minh Duc Pham (VUA) *Emergent relational schemas for RDF*
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  - 21 Aad Sloomaker (OUN) *EMERGO: a generic platform for authoring and playing scenario-based serious games*
  - 22 Eric Fernandes de Mello Araújo (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*
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  - 26 Roelof 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 (VU) *The "K" in "semantic web" stands for "knowledge": scaling semantics to the web*
- 2019**
- 1 Rob van Eijk (UL) *Web privacy measurement in real-time bidding systems. A graph-based approach to RTB system classification*
  - 2 Emmanuelle Beauxis- Aussalet (CWI, UU) *Statistics and Visualizations for Assessing Class Size Uncertainty*
  - 3 Eduardo Gonzalez Lopez de Murillas (TUE) *Process Mining on Databases: Extracting Event Data from Real Life Data*
  - 4 Ridho Rahmadi (RUN) *Finding stable causal structures from clinical data*
  - 5 Sebastiaan van Zelst (TUE) *Process Mining with Streaming Data*
  - 6 Chris Dijkshoorn (VU) *Nichesourcing for Improving Access to Linked Cultural Heritage Datasets*
  - 7 Soude Fazeli (TUD) *Recommender Systems in Social Learning Platforms*
  - 8 Frits de Nijs (TUD) *Resource-constrained Multi-agent Markov Decision Processes*
  - 9 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 (UvT) *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 (VUA) *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 Akos Kadar (OUN) *Learning visually grounded and multilingual representations*

## 2020

- 1 Armon Toubman (UL) *Calculated Moves: Generating Air Combat Behaviour*
- 2 Marcos de Paula Bueno (UL) *Unraveling Temporal Processes using Probabilistic Graphical Models*
- 3 Mostafa Deghani (UvA) *Learning with Imperfect Supervision for Language Understanding*
- 4 Maarten van Gompel (RUN) *Context as Linguistic Bridges*
- 5 Yulong Pei (TUE) *On local and global structure mining*
- 6 Preethu Rose Anish (UT) *Stimulation Architectural Thinking during Requirements Elicitation - An Approach and Tool Support*
- 7 Wim van der Vegt (OUN) *Towards a software architecture for reusable game components*
- 8 Ali Mirsoleimani (UL) *Structured Parallel Programming for Monte Carlo Tree Search*
- 9 Myriam Traub (UU) *Measuring Tool Bias and Improving Data Quality for Digital Humanities Research*
- 10 Alifah Syamsiyah (TUE) *In-database Preprocessing for Process Mining*
- 11 Sepideh Mesbah (TUD) *Semantic-Enhanced Training Data Augmentation Methods for Long-Tail Entity Recognition Models*
- 12 Ward van Breda (VU) *Predictive Modeling in E-Mental Health: Exploring Applicability in Personalised Depression Treatment*
- 13 Marco Virgolin (CWI) *Design and Application of Gene-pool Optimal Mixing Evolutionary Algorithms for Genetic Programming*
- 14 Mark Raasveldt (CWI/UL) *Integrating Analytics with Relational Databases*
- 15 Konstantinos Georgiadis (OUN) *Smart CAT: Machine Learning for Configurable Assessments in Serious Games*
- 16 Ilona Wilmont (RUN) *Cognitive Aspects of Conceptual Modelling*
- 17 Daniele Di Mitri (OUN) *The Multimodal Tutor: Adaptive Feedback from Multimodal Experiences*
- 18 Georgios Methenitis (TUD) *Agent Interactions & Mechanisms in Markets with Uncertainties: Electricity Markets in Renewable Energy Systems*
- 19 Guido van Capelleveen (UT) *Industrial Symbiosis Recommender Systems*
- 20 Albert Hankel (VU) *Embedding Green ICT Maturity in Organisations*
- 21 Karine da Silva Miras de Araujo (VU) *Where is the robot?: Life as it could be*
- 22 Maryam Masoud Khamis (RUN) *Understanding complex systems implementation through a modeling approach: the case of e-government in Zanzibar*
- 23 Rianne Conijn (UT) *The Keys to Writing: A writing analytics approach to studying writing processes using keystroke logging*
- 24 Lenin da Nobrega Medeiros (VUA/RUN) *How are you feeling, human? Towards emotionally supportive chatbots*
- 25 Xin Du (TUE) *The Uncertainty in Exceptional Model Mining*
- 26 Krzysztof Leszek Sadowski (UU) *GAMBIT: Genetic Algorithm for Model-Based mixed-Integer optimization*
- 27 Ekaterina Muravyeva (TUD) *Personal data and informed consent in an educational context*
- 28 Bibeg Limbu (TUD) *Multimodal interaction for deliberate practice: Training complex skills with augmented reality*
- 29 Ioan Gabriel Bucur (RUN) *Being Bayesian about Causal Inference*
- 30 Bob Zadok Blok (UL) *Creatief, Creatieve, Creatiefst*
- 31 Gongjin Lan (VU) *Learning better – From Baby to Better*
- 32 Jason Rhuggenaath (TUE) *Revenue management in online markets: pricing and online advertising*
- 33 Rick Gilsing (TUE) *Supporting service-dominant business model evaluation in the context of business model innovation*
- 34 Anna Bon (MU) *Intervention or Collaboration? Redesigning Information and Communication Technologies for Development*
- 35 Siamak Farshidi (UU) *Multi-Criteria Decision-Making in Software Production*

## 2021

- 1 Francisco Xavier Dos Santos Fonseca (TUD) *Location-based Games for Social Interaction in Public Space*

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- 2 Rijk Mercur (TUD) *Simulating Human Routines: Integrating Social Practice Theory in Agent-Based Models*
  - 3 Seyyed Hadi Hashemi (UvA) *Modeling Users Interacting with Smart Devices*
  - 4 Ioana Jivet (OU) *The Dashboard That Loved Me: Designing adaptive learning analytics for self-regulated learning*
  - 5 Davide Dell'Anna (UU) *Data-Driven Supervision of Autonomous Systems*
  - 6 Daniel Davison (UT) *"Hey robot, what do you think?" How children learn with a social robot*
  - 7 Armel Lefebvre (UU) *Research data management for open science*
  - 8 Nardie Fanchamps (OU) *The Influence of Sense-Reason-Act Programming on Computational Thinking*
  - 9 Cristina Zaga (UT) *The Design of Robothings. Non-Anthropomorphic and Non-Verbal Robots to Promote Children's Collaboration Through Play*
  - 10 Quinten Meertens (UvA) *Misclassification Bias in Statistical Learning*
  - 11 Anne van Rossum (UL) *Nonparametric Bayesian Methods in Robotic Vision*