Universiteit
Leiden
The Netherlands

Robust rules for prediction and description

Manuel Proenca, H.

Citation

Manuel Proenca, H. (2021, October 26). *Robust rules for prediction and description*. *SIKS Dissertation Series*. Retrieved from https://hdl.handle.net/1887/3220882

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/1887/3220882

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

List of publications

1. H. M. Proença, S. M. Vieira, U. Kaymak, R. J. Almeida, and J. M. Sousa. Optimizing probabilistic fuzzy systems for classification using metaheuristics. In *2016 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*, pages 1635–1641. IEEE, 2016

2. C. M. Salgado, C. Azevedo, H. Proença, and S. M. Vieira. Missing data. *Secondary analysis of electronic health records*, pages 143–162, 2016

3. C. M. Salgado, C. Azevedo, H. Proença, and S. M. Vieira. Noise versus outliers. *Secondary analysis of electronic health records*, pages 163–183, 2016

4. H. M. Proença, R. Klijn, T. Bäck, and M. van Leeuwen. Identifying flight delay patterns using diverse subgroup discovery. In *2018 IEEE SSCI*, pages 60–67. IEEE, 2018

5. H. M. Proença and M. van Leeuwen. Interpretable multiclass classification by mdl-based rule lists. *Information Sciences*, 512:1372–1393, 2020

6. H. M. Proença, P. Grünwald, T. Bäck, and M. van Leeuwen. Discovering outstanding subgroup lists for numeric targets using mdl. In *Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, pages 19–35. Springer, 2020

7. H. M. Proença, T. Bäck, and M. van Leeuwen. Robust subgroup discovery. *Data Mining and Knowledge Discovery (preprint available in arXiv:2103.13686)*, submitted

Acknowledgements

Even though this dissertation only bears one name, it is dedicated to all that I have met on my path. I could not have done it alone; thank you to everyone that in some way contributed to this work.

The first praises go to my supervisor, Matthijs van Leeuwen, whose guidance helped me transverse the sinuous paths of research. You not only inspired me as a researcher, but as a person. I could always count on you, both professionally and personally. You have never pre-emptively judged my choices and I am deeply honoured to have been your student.
Secondly, I would like to thank my promotor, Thomas Bäck. Thank you for accepting an unknown Portuguese student as your PhD student. You always trusted me to make the right decisions and allowed me to pursue my research without impediments. Despite your busy schedule, your door was always open when I needed you.

As a part of an Indian-Dutch collaboration, I was able to hone my research skills with international experts and delve into my fascination of the Indian culture. First, I would like to thank Dhish Saxena, Arioli Arumugam, and Rajesh Alla, for welcoming me so warmly. A special thanks to Divyam and Sarang, that besides my colleagues became close friends. Divyam, thank you for guiding me through Roorkee and Bangalore. Sarang Kapoor, thank you for all the spirited research sparring. Finally, thank you Michael Emmerich for all the fond memories from our trips to India.

Throughout my PhD, I had the pleasure to work with amazing researchers. I would like to thank João Sousa and Susana Viera, for their initial support; Peter Grünwald, for always keeping the door open for my questions; Antti Ukkonen, for the brainstorming sessions; Alexandros Agapitos, whose ambitious ideas were contagious; and

David Lynch, for being the best remote colleague.

LIACS is a special place, where welcoming colleagues swiftly become your friends. I would like to thank everyone that was part of NACO, EDA, and the coffee club. In particular, I would like to thank: Ricardo Cachucho, for advising me even before I arrived in Leiden; Marvin, for always being ready to hear; Jan, for bringing me to the infamous gladiator workout; Irene, my first office mate; Daniela, for sharing the hectic organization of a digital conference; Sander, for the rough start that turned out into a good relationship; Theodoros, my faithful companion of existential PhD discussions; Lise, for our nonsensical chats in Dutch-Portuguese; Peter, for the philosophical discussions; Cláudio, for hosting me; and Lincen, for the MDL discussions.

While abroad, your friends are an intrinsic part of your success, and slowly they become part of your family.
I was lucky to have lived at Zoe, the affectionate name we gave our house, for four years. In it everyone shared meals, laughter, and stories. I would especially like to thank: Esther Weigmann, for becoming such a close friend; Justina Gabrielaityte, for all the laughter and potato dinners you brought; Lorenzo Pasqualleto, for turning an ordinary moment into an unforgettable experience; Andreas Pedersen, for the trips where you got sunburned when I did not; and Léa-Rose, for always bringing banal conversations to the next level. Also, as honorary guests of the house, I would like to thank Bart Bezemer, my tea and chess companion; Neda Malkawi, with whom I share fascination for Thai massages; and Alberto Ferraresso, for judging the parking of bicycles with me.
Depois, há o meu grupo de amigos portugueses em Leiden, que sempre me fizeram sentir em casa. Eu gostaria de agradecer ao: Nuno, por estar lá desde o início; Vasco, porque sempre pude bater à tua porta; Inês, por fazeres sempre um pão extra; Ricardo Castro, pela tua honestidade; João Cunha, por não sabermos conversar por pouco tempo; Cátia, por teres energia para mover o mundo; Paulo, o meu conterrâneo; Tiago Jorge; Tiago Cabrita; Bruno; e Helena Morais.
Finalmente, muchas gracias Laura por ser el apoyo que mejoró mi vida. ¡Gracias por organizar esas copas donde te conocí!

Then there are all the friends that even away, were always present. Thank you Joaquim Viegas, for being the best organizer of any event; Cátia, for inviting me to the swimming pool; Cigin, for our yearly meetings; Miguel Reis, for sharing the same passion for growth; António Coutinho, for all the Bayesian deliberations; Madalina, for sharing your best moments; Daniel Matos, for being always there; and Gonçalo Guiomar, for the long conversations.

Finalmente, quero agradecer o apoio incondicional da minha família: aos meus pais, Maria e Francisco, sem os quais nada teria sido possível; a minha irmã Carolina; a minha sobrinha Malu; aos meus tios Ivone, Angélica, e João; e à memória do meu primo Jorge. Por último, obrigado à minha família nos países baixos Marie-Helene, Christophe, Maxence, and Gautier.

Obrigado!

Titles in the SIKS dissertation series since 2011

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 Maaike 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), Ontologogy 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 Tuliyano (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 Reijsen (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 Sidirourgos (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 Zhemin 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 colomn 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 Célleri (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 Mahdieh Shadi (UVA), Collaboration Behavior
06 Damir Vandic (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 Maaike 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 Synchromodal 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 Akos Kadar (OUN), Learning visually grounded and multilingual representations

---

2020 01 Armon Toubman (UL), Calculated Moves: Generating Air Combat Behaviour
02 Marcos de Paula Bueno (UL), Unraveling Temporal Processes using Probabilistic Graphical Models
03 Mostafa Deghani (UvA), Learning with Imperfect Supervision for Language Understanding
04 Maarten van Gompel (RUN), Context as Linguistic Bridges

05 Yulong Pei (TUE), On local and global structure mining
06 Preethu Rose Anish (UT), Stimulation Architectural Thinking during Requirements Elicitation - An Approach and Tool Support
07 Wim van der Vegt (OUN), Towards a software architecture for reusable game components
08 Ali Mirsoleimani (UL),Structured Parallel Programming for Monte Carlo Tree Search
09 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 AugmentationMethods 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 01 Francisco Xavier Dos Santos Fonseca (TUD),Location-based Games for Social Interaction in Public Space
02 Rijk Mercuur (TUD), Simulating Human Routines:Integrating Social Practice Theory in Agent-Based Models
03 Seyyed Hadi Hashemi (UVA), Modeling Users Interacting with Smart Devices
04 Ioana Jivet (OU), The Dashboard That Loved Me: Designing adaptive learning analytics for self-regulated learning
05 Davide Dell'Anna (UU), Data-Driven Supervision of Autonomous Systems
06 Daniel Davison (UT), "Hey robot, what do you think?" How children learn with a social robot
07 Armel Lefebvre (UU), Research data management for open science
08 Nardie Fanchamps (OU), The Influence of Sense-Reason-Act Programming on Computational Thinking
09 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
12 Lei Pi (UL), External Knowledge Absorption in Chinese SMEs
13 Bob R. Schadenberg (UT), Robots for Autistic Children: Understanding and Facilitating Predictability for Engagement in Learning

14 Negin Samaeemofrad (UL), Business Incubators: The Impact of Their Support
15 Onat Ege Adali (TU/e), Transformation of Value Propositions into Resource Re-Configurations through the Business Services Paradigm
16 Esam A. H. Ghaleb (UM), BIMODAL EMOTION RECOGNITION FROM AUDIO-VISUAL CUES
17 Dario Dotti (UM), Human Behavior Understanding from motion and bodily cues using deep neural networks
18 Remi Wieten (UU), Bridging the Gap Between Informal Sense-Making Tools and Formal Systems - Facilitating the Construction of Bayesian Networks and Argumentation Frameworks
19 Roberto Verdecchia (VU), Architectural Technical Debt: Identification and Management
20 Masoud Mansoury (TU/e), Understanding and Mitigating Multi-Sided Exposure Bias in Recommender Systems
21 Pedro Thiago Timbó Holanda (CWI), Progressive Indexes

Curriculum Vitae

Hugo Manuel Proença was born on January 21^{st}, 1990, in Hong Kong. Then, he lived his first two years in Macau, after which he went to Lisbon, Portugal. Hugo conducted the first two years of high school (2004-2006) at Liceu Maria Amália Vaz de Carvalho in Lisbon, after which he finalized the last year at Escola Secundária Campos Melo, Covilhã. After that, he returned to Lisbon to join Instituto Superior Técnico, Universidade de Lisboa. There, he obtained a Bachelor degree in Physics Engineering in 2011, and a Master degree in Mechanical Engineering, specializing in Systems Engineering, in 2015. His Mater thesis, titled "Optimizing Probabilistic Fuzzy Systems For Classification" was supervised by João Sousa, and with the support of Susana Vieira, Rui Almeida, and Uzay Kaymak. During the time of his Master thesis, Hugo conducted an internship as a Mechanical Engineer at Mettler Toledo in Changzhou, China.
Soon after his graduation, he performed a data science internship at the Cybernetics Department of the Czech Technical University in Prague. Then, he returned to Lisbon, where he worked with Susana Vieira, and Cátia Salgado, on two chapters of the MIT critical data book "Secondary Analysis of Electronic Health Records".
In June 2016 he started his PhD in Computer Science at Leiden University as a part of the SAPPAO project and joined both the Natural Computing and the Explanatory Data Analysis group, under the supervision of Thomas Bäck and Matthijs van Leeuwen. The project was a Dutch-Indian collaboration which involved a close collaboration with Dhish Saxena, Sarang Kapoor, and Divyam Aggarwal, at IIT Roorkee, and Rajesh Alla, and Arioli Arumugam, at GE Global Research in Bangalore. Here, he specialized on developing interpretable and statistically robust machine learning and data mining methods. From October 2020, for a period of six months, he was a researcher at Huawei Ireland Research Center.