

# University Academic Curriculum Vitae

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**Personal information** Name: Ivan Donadello

**Education since leaving school**

- 2018: Ph.D. in Information and Communication Technologies **cum laude**, University of Trento joint with Fondazione Bruno Kessler (Trento, Italy).  
*Thesis:* "Semantic Image Interpretation: Integration of Numerical Data and Logical Knowledge for Cognitive Vision".  
*Supervisor:* Prof. Luciano Serafini.  
*Areas:* Knowledge Representation, Machine Learning and Computer Vision.
- 2008: BSc in Computer Engineering, University of Padua.
- 2012: MSc in Computer Engineering, University of Padua.

**Present appointment**

- *Researcher with fixed term contract (RTDa)* at Free University of Bozen-Bolzano from the 1<sup>st</sup> of July 2024.
- My research area regards the application of advanced Machine Learning techniques in Process Mining. In particular, I focus on i) Neuro-Symbolic models to predict the next event; ii) Prescriptive Process Monitoring; iii) synthetic log generation with symbolic techniques; iv) counterfactual generation for Predictive Process Monitoring by integrating symbolic and numeric techniques; v) conformance checking in presence of uncertainty. I also work on the development of a software solution (Declare4Py) for Declarative Process Mining tasks, such as log generation, conformance checking, model discovery, query checking.

**Professional experience**

From/to	Job title	Name of academic Institution	Academic level	Responsibilities
2021/07 2024/07	Assistant Professor	Free University of Bozen-Bolzano	RTDa	Research position at the KRDB group where I focused on the following research topics: i) development of Declare4Py, a Python tool for Declarative Process Mining; ii) Predictive Process Monitoring with Neuro-Symbolic approaches; iii) Prescriptive Process Monitoring; iv) synthetic log generation with symbolic techniques; v) counterfactual generation for Predictive Process Monitoring by integrating symbolic and numeric techniques; vi) conformance checking in presence of uncertainty.
2021/02 2021/07	Assistant Researcher	Free University of Bozen-	Post-Doc	Research position at the KRDB group where I focused on Machine Learning techniques for: i) construction

		Bolzano		processes to predict the next event to be performed in a construction site; ii) automatic generation of synthetic datasets of scheduled activities of constructions processes.
2018/05 2020/12	Researcher	Fondazione Bruno Kessler (FBK)	Post-Doc	Research position at the eHealth lab (headed by Stefano Forti) where I developed AI agents (the "Salute+" app and the "Mediterranean Diet" Telegram bot) for coaching users at following healthy lifestyles. I also collected a public dataset of food images about the Mediterranean diet. Dataset and code public available at: <a href="https://github.com/ivanDonadello/Food-Categories-Classification">https://github.com/ivanDonadello/Food-Categories-Classification</a> . I started a research collaboration with Anthony Hunter (h-index 51) of University College of London funded with a mobility grant of 2000 €. The achieved results have been published in international top conferences and in one high-ranking journal. Three papers are currently being under review in high-ranking journals.
2013/09 2018/05	-	University of Trento and Fondazione Bruno Kessler	Ph.D. Student	Ph.D. at Data and Knowledge Management (DKM) unit (headed by Luciano Serafini) with the semantic image interpretation research topic. The topic involves the combination of machine learning techniques with structured knowledge representation. I contribute to the development of a new Neural-Symbolic integration framework called <i>Logic Tensor Networks</i> and I developed a prototype of a semantic image interpretation system (video demo at <a href="https://www.youtube.com/watch?v=y2-altg3FFw">https://www.youtube.com/watch?v=y2-altg3FFw</a> ). The achieved results have been published in international top conferences and in my Ph.D. thesis.
2013/05 2013/09	Assistant Researcher	Fondazione Bruno Kessler	MSc	Research assistant at Data and Knowledge Management (DKM) unit (headed by Luciano Serafini). I worked on the ePlanning applied research industrial project funded by Local Government under L.P. 13/12/1999, n. 6, art.5, 2012-2014. The project involved the DKM unit and the local company Edizioni Centro Studi Erickson S.p.A. that produces and distributes didactic material about learning difficulties and remediation activities. I developed an ontology-based and reasoning system deployed in the core of the <i>SOFIA ICF</i> software that supports teachers in writing individualized education plans for

				students with special educational needs.	
2012/10 2013/02	Analyst Developer	Accenture	MSc	I was part of the development team for building and testing a CRM software for an insurance company.	
2008/04 2008/09	Consultant	Nestar Iniziativa	BSc	I implemented a feasibility study for the acquisition of a Knowledge Management system integrated with a CRM. I experienced how to conduct the requirements analysis, business process mapping and software selection.	
2007/10 2008/01	Internship	Compusoft	BSc student	I developed a Django Web application for e-commerce interfaced with the enterprise resource planning software.	

### Research collaboration with industry

- January 2024 - ongoing: collaboration with Telecom, Capgemini, SmallPixels, Ottozero, Kineton and EMG for the 5VREAL project: "5G Volley Reality Experience & Analytics Live".
- January 2024 - Ongoing: collaboration with Datalane (<https://datalane.nl/en>) for the ReSS-Pro national project: "Recommender Systems for Sustainable Processes".
- January 2024 - Ongoing: collaboration with Würth Italia (<https://eshop.wuerth.it/it/IT/EUR/>) for tutoring Denis Mugisha and Abdalrahman Hwoij Hassan Abdullah in the University Capstone project about seasonality discovery of products.
- Spring 2021: collaboration with Wonderflow (<https://www.wonderflow.ai/>); for tutoring Alessandra Lorefice and Hosna Hooshyar in the University Capstone project about topic and sentiment classification of online reviews of products.
- May 2013 – November 2013: ePlanning industrial project in collaboration with Edizioni Centro Studi Erickson S.p.A. where I developed an ontology that formalizes the main special educative needs of students and the relative reasoning and querying system. Such ontology and reasoning system have been deployed in the core of the SOFIA ICF software (<https://www.erickson.it/it/servizi-digitali/sofia/>) that supports teachers in preparing the Personalized Education Plans for students with special educational needs.

### Third mission activity

- March 2024: Speaker at the "Open Day for Schools", public event for high-school students hosted at NOI Techpark in Bolzano.
- October 2023: Speaker at the public event "Science Live. Get Curious!" of the Long Night of Research initiative with the stand "Allenare il cervello con l'intelligenza artificiale" hosted by Unibz in Bolzano. More information at <https://www.unibz.it/it/home/third-mission/science-live/invisible-island/>
- November 2022: invited speaker at the public event "Data4SmartHealth": an event to develop an AI-focused and data-driven e-health community based at the NOI Techpark in Bolzano. More information at <https://www.eventbrite.it/e/data4smarthealth-2022-registration-436071269907>
- October 2022: Participation at the public event "ScienceSlam.it" where we scientists proved that science is fun. We had 10-minutes presentations and the audience chose the winner. Based at Unibz in Bolzano. More information at <https://www.scienceslam.it/en/2022>
- October 2019: Presentation of the apps "Salute+" and "TreC", developed

by my research in the eHealth group at Fondazione Bruno Kessler during the post-doc, at the Maker Faire 2019 in Rome. Reference stand: "AI for Healthcare and Medicine" of the Laboratory of Artificial Intelligence and Intelligent Systems of CINI consortium. More information at <https://makerfairerome.eu/en/exhibitors/?ids=1335>.

- September 2019: Scientific speed date at the European Researchers' Night 2019, Trento, where I discussed with the general audience my research on AI for healthcare and wellbeing.
- August 2019: Informative presentation titled "Man and machines. Our relationship and future with AI", included in the series of talks "Tra cielo e terra" ("Between sky and hearth") for the general audience, Bagno di Romagna, Italy.
- September 2018: Presentation of the Telegram chatbot "Mediterranean Diet" developed by my research in the eHealth at the European Researchers' Night 2018, Trento. People were invited to add the chatbot in their Telegram application, take photos of images containing dishes and they would receive the correct dishes classification along with information about an exceeding or not sufficient consumption of those dishes.
- April 2018: Presentation of the Semantic Image Interpretation demo at the Trento Smart City Week 2018 fair in the FBK stand. People could use the demo installed in a laptop by selecting a random image and seeing the output of the demo.

### **Experience in academic teaching**

- Studium Generale courses:
  - Fall 2023: Data Science in Action with Python; hours: 18; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
- Bachelor Computer Science courses:
  - Spring 2024: Machine Learning in Practice; hours: 60; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
  - Spring 2023: Machine Learning in Practice; hours: 60; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
  - Spring 2022: Machine Learning in Practice; hours: 60; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
- Bachelor in Electronics and Cyber-Physical Systems Engineering:
  - Fall 2023: Algorithms and Programming; hours: 40; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
- Bachelor in Informatics and Management of Digital Business courses:
  - Fall 2023: Data Structures and Algorithms; hours: 40; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
  - Fall 2022: Data Structures and Algorithms; hours: 20; institution: Free University of Bozen-Bolzano (Italy); role: lab assistant.
  - Fall 2021: Data Structures and Algorithms; hours: 20; institution: Free University of Bozen-Bolzano (Italy); lab assistant.
- Bachelor in Electronics and Cyber-Physical Systems Engineering courses:
  - Fall 2023: Data Structures and Algorithms; hours: 40; institution: Free University of Bozen-Bolzano (Italy); role: teacher.
- Teaching at Summer Schools:
  - Summer 2022: Invited Teacher at the Advances in Artificial Intelligence International Summer school; class title "Argument-Based Computational Persuasion for Behaviour Change in Healthcare"; organizing institutions: University of Milano-Bicocca (Italy) and RCAST - The University of Tokyo (Japan); website: <https://aisummerschool.disco.unimib.it/>
- Ph.D. supervision:
  - Second reader of Renan Lirio De Souza with a thesis about data

augmentation for persuasive dialogues; second reader of the student in collaboration with Mauro Dragoni; institution: Free University of Bozen-Bolzano and Fondazione Bruno Kessler (Italy); ongoing.

- Thesis supervision:
  - Ilaria Brescia with a thesis on next event prediction for Process Mining with Deep Learning; degree: BS; institution: Free University of Bozen-Bolzano (Italy); ongoing.
  - Isidora Erakovic with a thesis on a desktop interface for Prescriptive Process Monitoring; degree: BS; institution: Free University of Bozen-Bolzano (Italy); ongoing.
  - Matteo Zorzi with a thesis on temporal log generation with declarative models; degree: BS; institution: Free University of Bozen-Bolzano (Italy); ongoing.
  - Michael von Troyer with a thesis on leveraging the MESH ontology for medical topics extraction; degree: BS; institution: Free University of Bozen-Bolzano (Italy); ongoing.
  - Singh Manpreet with thesis titled “A Python Tool for Log Generation Based on Declarative Process Models”; degree: BS; institution: Free University of Bozen-Bolzano (Italy); degree in June 2023.
  - Martina Burlando with thesis titled “A Review of Business Process Analysis Tools: a B2B Perspective”; degree: BS; institution: Free University of Bozen-Bolzano (Italy); degree in June 2023.
  - Andrea Perri with thesis titled “Outcome Prediction of Persuasive Agent Dialogues with Machine Learning Techniques”; degree: BS; institution: Free University of Bozen-Bolzano (Italy); degree in September 2022.
  - Milena Rodrigues Tenorio with thesis title “Spatial-Temporal Reasoning in Symbolic Neural Network for Semantic Interpretation of Videos”; co-supervision with her supervisor Professor Edjar Mota; degree: MS; institution: Federal University of Amazonas (Brazil); degree in 2021.
  - Radu Loghin with thesis title “A Conversation Agent for Harvesting Arguments and Counter-arguments about the Mediterranean Diet Guidelines”; degree: BS; institution: University of Trento (Italy); degree in March 2021.
  - Alessio Gottardi with thesis title “A Conversation Agent for Harvesting Arguments and Counter-arguments about the Mediterranean Diet Guidelines”; degree: BS; institution: University of Trento (Italy); degree in September 2021.
  - Alberto Ercolani with thesis title “PartNet: An Ontology for Semantic Image Interpretation”; degree: BS; institution: University of Trento (Italy); degree in March 2017.
- Other Supervision
  - Spring 2022: Student Supervision of Xhemalaj Diellsimeone in a free-credits project about development of a Linear Temporal Logic conformance checker for business process analysis; Bachelor in Computer Science at Free University of Bozen-Bolzano (Italy).
  - Spring 2022: Edoardo Bianchi in a Capstone Project about Pinot Blanc wine quality Analysis and estimation; joint collaboration with Emanuele Boselli (<https://www.unibz.it/it/faculties/agricultural-environmental-food-sciences/academic-staff/person/37607-emanuele-boselli>); Master in Computer Science at Free University of Bozen-Bolzano;
  - April 2018 – December 2020: Supervision of 6 high school

students during their internship at Fondazione Bruno Kessler in the areas of Machine Learning and Conversational Agents.

- Other Teaching Activities
  - 2024 – ongoing: Tutoring for the Bachelor in Electronics and Cyber-Physical Systems Engineering at Free University of Bozen-Bolzano.
  - Summer 2022: Invited Teacher at the Advances in Artificial Intelligence International Summer school; class title “Argument-Based Computational Persuasion for Behaviour Change in Healthcare”; organizing institutions: University of Milano-Bicocca (Italy) and RCAST - The University of Tokyo (Japan); website: <https://aisummerschool.disco.unimib.it/>
  - March 2019: I gave a class titled "Deep Learning Driven by Fuzzy Logic for Semantic Image Interpretation" at University of Padova (Italy) as part of the academic course “Intelligent Systems” taught by Silvana Badaloni.

### Other academic responsibilities

- May 2024 - Ongoing: Doctorial Consortium Chair at the Conference of the Italian Association for Artificial Intelligence (AIIA) 2024 hosted by Free University of Bozen-Bolzano in November 2024.
- October 2022: Chair of the Demonstration track of the 26<sup>th</sup> Enterprise Computing Conference (EDOC), Free University of Bozen-Bolzano (Italy), 3<sup>rd</sup> - 7<sup>th</sup> October 2022.
- October 2014: Volunteer at the 13<sup>th</sup> International Semantic Web Conference (ISWC) 2014, Riva del Garda (TN, Italy), 19<sup>th</sup> - 23<sup>rd</sup> October 2014. Organizers: Fondazione Bruno Kessler and Semantic Web Science Association.

### Memberships

#### Journal Reviewing

- Journal of Web Semantics
- Semantic Web Journal
- Progress in Artificial Intelligence
- ACM Computing Surveys
- Journal of Medical Internet Research
- Artificial intelligence review
- Information Processing and Management
- Neurocomputing
- Educational and Psychological Measurement
- Applied Ontology
- Information Fusion
- User Modeling and User-Adapted Interaction

#### Conference Technical Program Committees

- AAAI Conference on Artificial Intelligence (AAAI)
- Business Process Management Conference (BPM)
- International Conference on Process Mining (ICPM)
- International Joint Conference on Artificial Intelligence (IJCAI)
- International Semantic Web Conference (ISWC)

- European Semantic Web Conference (ESWC)
- European Conference on Artificial Intelligence (ECAI)
- Knowledge Engineering and Knowledge Management (EKAW), poster and demo session
- ACM Symposium on Applied Computing (SAC)
- International Conference on Health Informatics (HEALTHINF)
- The World Conference on eXplainable Artificial Intelligence

#### Workshop Technical Program Committees

- International Workshop on Neural-Symbolic Learning and Reasoning Experiences and Directions Workshop (NeSy)
- AIXIA Workshop on Artificial Intelligence for Healthcare (HC@AIXIA)
- International Workshop in Artificial Intelligence for Business Process Management (AI4BPM)
- Workshop on Data meets Applied Ontologies in XAI (DAO-XAI)

## **Research and scholarships**

### Summary of current research

During the RTDa position, I focused on:

- Machine learning techniques for Process Mining: I developed new ML-based techniques for Prescriptive Process Monitoring, Deviance Mining and next event prediction (this with the use of Neuro-Symbolic AI).
- Declarative Process Mining: I started studying a new (fast) conformance checking technique for stochastic event logs and the development of Declare4Py, a Python package implementing the main declarative tasks of Process Mining.
- Neuro-Symbolic AI for Process Mining, in particular the prediction of next events (also paired with Computer Vision techniques), the problem of domain adaptation and the conformance checking of stochastic event logs.
- Virtual Agents for Behavioral Change: I developed a ML-based technique for predicting user utilities in persuasive dialogues.

### Summary of research and scholarships during the previous five years

My Ph.D. topic was Semantic Image Interpretation, that is, the development of algorithms that extract from images a graph describing their semantic content. The nodes of the graph represent the objects in the image and the arcs the relations among them. The main research aspect regards the integration of Machine Learning techniques with Knowledge Representation and Reasoning tools, that is, Neuro-Symbolic AI.

Another stream of research regards the use of AI techniques for the healthcare domain. Indeed, during the post-doc at Fondazione Bruno Kessler, my research focused on the development of AI agents for coaching users at following healthy lifestyles. The topic covers several AI areas: food recognition from images, decision theory to choose the right sequence of arguments to pose to users in order to persuade them at adhering to a healthy diet (awarded with the mobility grant at UCL) and natural language generation for generating the tailored message. Here, decision theory is joined with machine learning techniques that predict the user's utility needed by the system to reason on and to give tailored recommendations. Another research activity regards eXplainable AI (XAI) with the use of semantic technologies. Here, the system returns both an output and its explanation (in natural language) in order to be trustable and persuasive for users.

During the assistant researcher position at Free University of Bozen-Bolzano, I worked on the Confucius project: I focused on the prediction of events in construction processes by using Deep Learning. Such techniques leverage the history contained in the scheduled past construction processes and prior knowledge about the adopted construction template. An event contains information about which activity to perform next, the corresponding location and whether it can be performed in parallel with other activities. In addition, I studied the automatic generation of synthetic datasets of construction processes with the use of probabilistic Petri Nets.

Summary of significant achievements in research and scholarship

- Ph.D. period: IOS Press and AI\*IA awards for best paper and presentation. Nvidia award. ECCV, ACM SAC, IJCAI, IJCNN conference papers. IA, EPM, Frontiers journal paper.
- Visiting research period at the Research Centre for Machine Learning (headed by Artur d’Avila Garcez, h-index 34). City University of London, London, United Kingdom.
- Post Doc at Fondazione Bruno Kessler: ICIAP and ISWC conference papers. AIIM journal paper. Mobility grant at UCL.
- RTDa: book chapter on “Neuro-Symbolic Artificial Intelligence: The State of the Art”. Journal papers on IF, EAAI, IIIE Intelligent Systems, Data Intelligence, JMIR, SNAM. Keynote at AI4BPM (workshop at BPM). Invited tutorials at ICPM and PROFES for Declare4Py. AAI, CAiSE, BPM conference papers. Authoring book on Prescriptive Process Monitoring together with Fabrizio Maria Maggi and Chiara Di Francescomarino (to appear in September 2024).

Research grants

Date granted	Award Holder(s)	Funding Body	Title	Amount received
November 2019	Personal award	FBK	Mobility grant for a visiting research period of 2 months at University College London under the supervision of Anthony Hunter, London, UK.	2000 €
August 2016	Data and Knowledge Management Unit at FBK	Nvidia	Nvidia GPU hardware grant.	GPU Tesla K40 with value of 2000 €

Research awards

Date granted	Award Holder(s)	Funding Body	Title	Amount received
September 2015	Personal award to the Ph.D. student	Italian Association for Artificial Intelligence	Best paper and presentation award at the Doctoral Consortium of the Italian Conference on Artificial Intelligence, AI*IA 2015, Ferrara, Italy.	-
September 2014	Personal award to all the authors	IOS press	Best paper award at CONTACT workshop at European Conference on Computer Vision, ECCV	500

## Participation in Funded projects

- April 2024 - ongoing: “Prescriptive Support when Monitoring Processes Aware Systems (PRISMA)”. Partners: Free University of Bozen-Bolzano (Italy). Scope: internal project. Funding organization: Free University of Bozen-Bolzano.
- January 2024 - ongoing: “5G Volley Reality Experience & Analytics Live (5VREAL-Pro)”. Partners: Free University of Bozen-Bolzano (Italy), Telecom, Capgemini, Fondazione Bruno Kessler, SmallPixels, Ottozero, Kineton, EMG. Scope: national. Funding agency: Ministero delle Imprese e del Made in Italy.
- April 2024 - ongoing: “Recommender Systems for Sustainable Processes (ReSS-Pro)”. Partners: Free University of Bozen-Bolzano (Italy), Datalane (Netherlands). Scope: national. Funding agency: Cariverona.
- 2023: “Continuous process Auditing Technology (CAT)”. Partners: Free University of Bozen-Bolzano (Italy). Scope: national.
- 2021 - 2022: “Confucius - Study the past if you would define the future: Discovering Patterns in Scheduling and Monitoring Data”. Partners: Free University of Bozen-Bolzano, Fondazione Bruno Kessler (Italy), Frener & Reifer GmbH (Italy). Scope: national.
- 2019 - 2020: European Project “Training Blueprint for the Digital Transformation of Health and Care (TBDTHC)”. Partners: Technische Universitaet Dresden (Germany), Stichting Smart Homes (Netherlands), Fhs Kufstein Tirol Bildungs GmbH (Austria), Fondazione Bruno Kessler (Italy), Co.Ge.S. Don Lorenzo Milani Società cooperativa Sociale (Italy). Scope: European, <https://erasmus-plus.ec.europa.eu/projects/search/details/2018-1-IT01-KA202-006735>.

## Publications

DBLP: <https://dblp.org/pid/153/0744.html>

Scholar: <https://scholar.google.com/citations?user=NpmfDzsAAAAJ&hl=it>

In italic font the leading authors of the paper. A star (\*) indicates especially significant publications.

### Books – Authored

- (\*) *F. M. Maggi, I. Donadello, C. Di Francescomarino*. Predictive Monitoring of Business Processes. Springer. Expected publication date: 09/24.

### Chapters in Books

- (\*) *L. Serafini, A. d'Avila Garcez, S. Badreddine, I. Donadello, M. Spranger, F. Bianchi*. Logic tensor networks: Theory and applications. Neuro-Symbolic Artificial Intelligence: The State of the Art, IOS Press, 2022. 10.3233/FAIA210498

### Journal articles in refereed academic journals

- (\*) *Bennetot, A., Donadello, I., El Qadi, A., Dragoni, M., Frossard, T., Wagner, B., ... & Diaz Rodriguez, N.* A Practical Guide on Explainable AI Techniques Applied on Biomedical Use Case Applications. ACM Computing Surveys, to appear in 2024.
- (\*) *Donadello, I., Di Francescomarino, C., Maggi, F. M., Ricci, F., & Shikhizada, A.* (2023). Outcome-oriented prescriptive process monitoring based on temporal logic patterns. Engineering Applications of Artificial Intelligence, 126, 106899, 10.1016/j.engappai.2023.106899
- (\*) *Díaz-Rodríguez, N., Lamas, A., Sanchez, J., Franchi, G., Donadello, I., Tabik, S., ... & Herrera, F.*

- (2022). EXplainable Neural-Symbolic Learning (X-NeSyL) methodology to fuse deep learning representations with expert knowledge graphs: The MonuMAI cultural heritage use case. *Information Fusion*, 79, 58-83, 10.1016/j.inffus.2021.09.022
- *Dragoni, M., Donadello, I., & Cambria, E.* (2022). OntoSenticNet 2: Enhancing reasoning within sentiment analysis. *IEEE Intelligent Systems*, 37(2), 103-110, 10.1109/MIS.2021.3093659
  - (\*) *Bassi, G., Donadello, I., Gabrielli, S., Salcuni, S., Giuliano, C., & Forti, S.* (2022). Early Development of a Virtual Coach for Healthy Coping Interventions in Type 2 Diabetes Mellitus: Validation Study. *JMIR formative research*, 6(2), e27500, 10.2196/27500
  - *Dragoni, M., Bailoni, T., Donadello, I., Martin, J. C., & Lindgren, H.* (2023). Integrating Functional Status Information into Knowledge Graphs to Support Self-Health Management. *Data Intelligence*, 1-22, 10.1007/s13278-022-00935-3
  - *Donadello, I., & Dragoni, M.* (2022). AI-enabled persuasive personal health assistant. *Social Network Analysis and Mining*, 12(1), 10.1007/s13278-022-00935-3
  - (\*) *M. Dragoni, I. Donadello, and C. Eccher.* Explainable AI meets persuasiveness: Translating reasoning results into behavioral change advice. *Artificial Intelligence in Medicine (AIM)*, 2020, 10.1007/s13278-022-00935-3
  - *A. Spoto, F. Serra, I. Donadello, U. Granzoli, and G. Vidotto.* New perspectives in the adaptive assessment of depression: the ATS-PD version of the QUEDS. *Frontiers in psychology*, 2018, 10.3389/fpsyg.2018.01101
  - (\*) *I. Donadello, A. Spoto, F. Sambo, S. Badaloni, U. Granzoli, and G. Vidotto.* ATS-PD: an adaptive testing system for psychological disorders. *Educational and psychological measurement*, 2017, 10.1177/0013164416652188.
  - (\*) *I. Donadello and L. Serafini.* Integration of numeric and symbolic information for semantic image interpretation. *Intelligenza Artificiale*, 2016, 10.3233/IA-160093

#### Conference papers

- (\*) *Donadello, I., Felli, P., Maggi, F. M., Montali, M., Innes, C.,* (to appear in September 2024). Conformance Checking of Fuzzy Logs against Declarative Temporal Specifications. *BPM 2024*, conference rating A.
- (\*) *Di Francescomarino, C., Donadello, I., Ghidini, C., Maggi, F. M., Rizzi, W., & Tessaris, S.* (2024, June). Making Sense of Temporal Event Data: A Framework for Comparing Techniques for the Discovery of Discriminative Temporal Patterns. In *International Conference on Advanced Information Systems Engineering* (pp. 423-439). Cham: Springer Nature Switzerland.
- *Alman, A., Donadello, I., Maggi, F. M., & Montali, M.* (2023, December). Declarative Process Mining for Software Processes: The RuM Toolkit and the Declare4Py Python Library. In *International Conference on Product-Focused Software Process Improvement* (pp. 13-19). Cham: Springer Nature Switzerland, 10.1007/978-3-031-49269-3\_2
- (\*) *Donadello, I., Hunter, A., Teso, S., & Dragoni, M.* (2022, June). Machine learning for utility prediction in argument-based computational persuasion. In *proceedings of the AAAI conference on artificial intelligence* (Vol. 36, No. 5, pp. 5592-5599), 10.1609/aaai.v36i5.20499
- *Teixeira, M. S., Donadello, I., & Dragoni, M.* (2021). Explanations in Digital Health: The Case of Supporting People Lifestyles. In *Artificial Intelligence in Medicine: 19th International Conference on Artificial Intelligence in Medicine, AIME 2021, Virtual Event, June 15–18, 2021, Proceedings* (pp. 287-292). Springer International Publishing, 10.1007/978-3-030-77211-6\_32
- *Donadello, I., & Dragoni, M.* (2020, November). SeXAI: a semantic explainable artificial intelligence framework. In *International Conference of the Italian Association for Artificial Intelligence* (pp. 51-66). Cham: Springer International Publishing. 10.1007/978-3-030-77091-4\_4
- *Donadello, M. Dragoni, and C. Eccher.* Explaining reasoning algorithms with persuasiveness: a case study for a behavioral change system. In *Proceedings of the 35th Annual ACM Symposium on Applied Computing (ACM SAC)*, pages 646–653, 2020, 10.1145/3341105.3373910
- (\*) *I. Donadello and L. Serafini.* Compensating supervision incompleteness with prior knowledge in semantic image interpretation. In *International Joint Conference on Neural Networks (IJCNN)*, 2019 Budapest, Hungary, July 14-19, 2019, pages 1–8, 2019, 10.1109/IJCNN.2019.8852413
- *I. Donadello and M. Dragoni.* An end-to-end semantic platform for nutritional diseases management. In *International Semantic Web Conference (ISWC)*, pages 363–381. Springer, Cham, 2019, 10.1007/978-3-030-30796-7\_23
- (\*) *I. Donadello and M. Dragoni.* Ontology-driven food category classification in images. In *International Conference on Image Analysis and Processing (ICIAP)*, pages 607–617. Springer, Cham, 2019, 10.1007/978-3-030-30645-8\_55
- *L. Serafini, I. Donadello, and A. d. Garcez.* Learning and reasoning in logic tensor networks: theory and application to semantic image interpretation. In *Proceedings of the Symposium on Applied*

Computing (ACM SAC), pages 125–130, 2017, 10.1145/3019612.3019642

- (\*) *I. Donadello*, L. Serafini, and A. d'Avila Garcez. Logic tensor networks for semantic image interpretation. In Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence (IJCAI), pages 1596–1602, 2017, 10.24963/ijcai.2017/221
- (\*) *I. Donadello* and L. Serafini. Mixing low-level and semantic features for image interpretation. Workshop at the European Conference on Computer Vision (ECCV), pages 283–298. Springer, Cham, 2014. **Best paper award**, 10.1007/978-3-319-16181-5\_20
- *M. Rospocher*, *E. Cardillo*, *I. Donadello*, and L. Serafini. On the collaborative development of application ontologies: a practical case study with a sme. In International Conference on Knowledge Engineering and Knowledge Management (EKAW), pages 469–484. Springer, Cham, 2014, 10.1007/978-3-319-13704-9\_36

#### Other publications (without DOI)

- *Ibershimi, T., Xhemalaj, D., Alman, A., Donadello, I., & Maggi, F. M.* (2023). Two Solutions for Checking LTLf Properties in Event Logs. In ICPM Doctoral Consortium/Demo.
- *Donadello, I., Maggi, F. M., Riva, F., & Singh, M.* (2023). ASP-Based Log Generation with Purposes in Declare4Py. In ICPM Doctoral Consortium/Demo.
- *Bailoni, T., Dragoni, M., & Donadello, I.* (2022). Modeling a Functional Status Knowledge Graph For Personal Health. In Artificial Intelligence For Healthcare 2022: 1st AlxIA Workshop on Artificial Intelligence For Healthcare (HC@ AlxIA 2022).
- *Di Francescomarino, C., Donadello, I., Ghidini, C., Maggi, F. M., & Rizzi, W.* (2022). Making sense of temporal data: the DECLARE encoding. PMAI@ IJCAI.
- *Donadello, I., & Dragoni, M.* (2021). Bridging signals to natural language explanations with explanation graphs. In Proceedings of the 2nd Italian Workshop on Explainable Artificial Intelligence.
- (\*) *Donadello, I., Riva, F., Maggi, F. M., & Shikhizada, A.* (2022). Declare4Py: A Python Library for Declarative Process Mining. In Proceedings of the Best Dissertation Award, Doctoral Consortium, and Demonstration & Resources Track at BPM 2022 co-located with 20th International Conference on Business Process Management (BPM 2022).
- *I. Donadello, M. Dragoni.* SeXAI: Introducing Concepts into Black Boxes for Explainable Artificial Intelligence. In Proceedings of the Italian Workshop on Explainable Artificial Intelligence co-located with 19th International Conference of the Italian Association for Artificial Intelligence (AlxIA).
- *I. Donadello, M. Dragoni, and C. Eccher.* Persuasive explanation of reasoning inferences on dietary data. In Joint Proceedings of the 6th International Workshop on Dataset PROFILing and Search & the 1st Workshop on Semantic Explainability co-located with the 18th International Semantic Web Conference (ISWC).
- *I. Donadello.* Semantic Image Interpretation: Integration of Numerical Data and Logical Knowledge for Cognitive Vision. Ph.D. thesis, University of Trento, 2018.
- *I. Donadello.* Ontology-based semantic image interpretation. Doctoral Consortium at The 14th Conference of the Italian Association for Artificial Intelligence (AI\*IA 2015), volume 1485, pages 19–24, 2015. **\*Best paper award\***
- *S. Cramerotti, M. Rospocher, L. Serafini, E. Cardillo, and I. Donadello.* eplanning: An ontology-based system for building individualized education plans for students with special educational needs. Media Education, 6(1): 101–110, 2015.
- *D. Mirylenka, M. Rospocher, I. Donadello, E. Cardillo, and L. Serafini.* Exploring an ontology via text similarity: An experimental study. In IESD@ISWC, 2014.

#### **Publications about the applicant**

November 2015: Informative article about my Ph.D. research topic and another Ph.D. candidate written by Rubin Andrea on Portogruaro.net, a local Venetian local magazine. Rubin A., *Intelligenza Artificiale e “varietà” matematiche*. Portogruaro.net, November/December 2015, <http://www.portogruaro.net/magazine/scheda.php?magazine=68>, page 12.

#### **Further data**

##### Presentations during past 3 years

- June 2024: CAiSE paper presentation titled “Making Sense of Temporal Event Data: A Framework for Comparing Techniques for the Discovery of Discriminative Temporal Patterns” at the 36<sup>th</sup> International Conference on Advanced Information Systems Engineering (CAiSE), Cyprus. Conference rating A.
- December 2023: Invited speaker for a tutorial titled “Declarative Process Mining for Software

- Processes: the RuM toolkit and the Declare4Py Python library” at the International Conference on Product-Focused Software Process Improvement (PROFES) (<https://conf.researchr.org/track/profes-2023/profes-2023-workshop-and-tutorial>), Dornbirn (Austria). Conference rating B.
- October 2023: Invited speaker for a technical talk titled "Declarative Process Mining Meets Industry. The Declare4Py Case" at the 4th International Workshop On Leveraging Machine Learning In Process Mining at the 5th International Conference on Process Mining (ICPM) (<https://ml4pm2023.di.unimi.it/>), Rome (Italy).
  - October 2023: demo presentation at the 5<sup>th</sup> International Conference on Process Mining (ICPM) (<https://icpmconference.org/2023/>), Rome (Italy).
  - September 2023: keynote titled "Neuro-Symbolic Artificial Intelligence and Process Mining: a Promising Marriage" at the International Workshop in Artificial Intelligence for Business Process Management at the 21<sup>st</sup> International Conference on Business Process Management (BPM) (<https://sites.google.com/unitn.it/ai4bpm-2023/keynote?authuser=0>), Utrecht (Holland). Conference rating A.
  - February 2023: poster presentation at the AAAI 2023 Bridge Program on Artificial Intelligence and Business Process Management at the 37<sup>th</sup> AAAI Conference on Artificial Intelligence (AAAI) (<https://ai4bpm.com/#/>), Washington DC (USA). Conference rating A++.
  - December 2022: Invited speaker with a talk titled "Computational Persuasion for Behavior Change in Healthcare" at the 22<sup>nd</sup> National Congress of the Italian Association of Telemedicine and Medic Informatics (@ITIM) ([https://drive.google.com/file/d/135r6Wd29BPzylE\\_o8HAHG44\\_5cE2MavS/view?pli=1](https://drive.google.com/file/d/135r6Wd29BPzylE_o8HAHG44_5cE2MavS/view?pli=1)), Bolzano (Italy).
  - September 2022: demo presentation at the 20<sup>th</sup> International Conference on Business Process Management (BPM) (<https://bpm2022.uni-muenster.de/>), Münster (Germany). Conference rating A.
  - February 2022: "Machine Learning for Utility Prediction in Argument-Based Computational Persuasion" paper presentation at the 36<sup>th</sup> AAAI Conference on Artificial Intelligence (AAAI) (<https://aaai-2022.virtualchair.net/index.html>), online. Conference rating A++.

## Statement of interest Computer Skills matching the requirements of the call

**Main ML algorithms:** regression, Bayesian networks, decision trees, SVMs, deep learning, random forests, clustering, Logic Tensor Networks.

**Main ML libraries:** Numpy, Keras, TensorFlow, scikit-learn, PyTorch, Pandas and matplotlib.

**Knowledge representation and reasoning techniques:** main languages, tools and libraries for ontology engineering and representation: RDF, OWL, SPARQL, Protegé, OWLAPI and RDFLib. Knowledge of the triple store Sesame for knowledge graph storing. Knowledge of the main relational DBMS: MySQL, PostgreSQL, SQLite and of the main languages for DB representation: UML and ER.

**Process mining formalisms, tools and libraries:** Linear Temporal Logic, DECLARE, BPMN, PetrNet, automata theory, Disco, RuM, declare4py, Pm4Py, Camunda, bpmn.io

**Object detection and image classification libraries:** Faster R-CNN, SSD, VGG, Inception and ResNet networks. Experience with data augmentation.

**NLP libraries:** NLTK and spaCy for sentence preprocessing (e.g., tokenization, lemmatization) and vectorization. Word and sentence embedding algorithms for information retrieval: Doc2Vec, SentenceBERT, GloVe, fastText and Universal Sentence Encoder.

**Object oriented programming:** Java and Python. Experience with Matlab. Knowledge of Web programming: Django, Flask and Bootstrap.

My background mostly involves two areas of AI: Knowledge Representation and Reasoning (KRR) and Machine Learning (ML). I want to continue working on these fields and on their integration (that is, Neural-Symbolic integration) applied to Process Mining. Neural-Symbolic integration is a promising (and hot) topic started during my Ph.D. where I applied the Logic Tensor Networks (LTN) NeSy framework for predicting relations among objects in images in presence of background knowledge. This framework can be extended with Linear Temporal Logic (LTL) for event prediction in business processes in presence of background knowledge regarding the control flow of the process. Such

application can be instantiated on event logs or processing the data coming from images of cameras that analyze production processes, such as the ones in manufacture or in a construction site.

Another interesting contribution is the improvement and development of Declare4Py, a recent Python library for Process Mining that implements the main Process Mining tasks. Such library has been presented at the main conferences of the community: BPM and ICPM (demo papers and invited tutorials). It is receiving the attention also from the Software Engineering community (invited tutorial at PROFES) and from industry (we are working with SAP Signavio for a new plugin).

In addition, my expertise on teaching data structures, algorithms and Machine Learning allows me to teach foundational Computer Science courses as well as more specific ones about KRR and ML with a certain degree of confidence.

**Language  
competence**

- Italian: Mother tongue.
- English: C1, certified by Free University of Bozen-Bolzano.
- Spanish: Independent user – listening B1, reading B1, spoken production and interaction B1, writing: A2.

Date

13/6/2024