

# Pierre Monnin

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## Research Scientist in Artificial Intelligence

### Summary

I am a Research Scientist in AI within the Centre Inria d'Université Côte d'Azur, member of the Wimmics research team. Previously, I was a Junior Fellow in AI at Université Côte d'Azur (2023 – 2025), and a researcher in Artificial Intelligence in the industry, with Orange (2020 – 2023). I received my Doctoral degree in Computer Science from Université de Lorraine, Nancy, France, in 2020.

My research focuses on neuro-symbolic AI with and for knowledge graphs. I investigate interactions between domain knowledge in knowledge graphs and different forms of reasoning in a neuro-symbolic perspective (e.g., injection of domain knowledge in Machine Learning models, analogical reasoning). In particular, I study such interactions in the context of the lifecycle of knowledge graphs (construction, matching, refinement, mining, knowledge discovery), and their usage in downstream applications (e.g., recommender systems, explainable AI). My work involves both theoretical and applied perspectives, often in interdisciplinary settings (e.g., biomedical, educational domains). I was the Principal Investigator of the ECLADATTA French national project and I am an Investigator of the AT2TA French national project (both funded by the French National Research Agency).

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## Current position

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Since Oct. 2025 **Research Scientist – Centre Inria d’Université Côte d’Azur – Sophia Antipolis, France**  
Research within the Wimmics team, common with the I3S laboratory (Université Côte d’Azur, CNRS)  
Teaching within EFELIA Côte d’Azur and Polytech Nice Sophia (~ 64h of teaching)

## Research stays

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Feb.-Jul. 2025	<b>Visiting Fellow – Télécom Paris – Paris, France</b> Regular visits with Mehwish Alam (5 weeks in total) Grant of 14.4k€ as part of the SHACKLE project
Jan. 2025	<b>Visiting Fellow – Università degli Studi di Bari Aldo Moro – Bari, Italy</b> 3-week visit with Claudia d’Amato Grant of 4k€ from Università degli Studi di Bari Aldo Moro
Nov. 2024	<b>Visiting Fellow – INESC-ID, Instituto Superior Técnico, U. de Lisboa – Lisbon, Portugal</b> 2-week visit with Miguel Couceiro
Jan. 2024	<b>Visiting Fellow – Università degli Studi di Bari Aldo Moro – Bari, Italy</b> 3-week visit with Claudia d’Amato Grant of 4k€ from the I3S laboratory

## Education

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2016 – 2020	<b>PhD in Computer Science – Université de Lorraine – Nancy, France</b> <a href="#">Matching and mining in knowledge graphs of the Web of data</a> <a href="#">Applications in pharmacogenomics</a> <ul style="list-style-type: none"><li>▪ Knowledge matching: identification of identical, more specific, or related knowledge units<ul style="list-style-type: none"><li>– Rule-based approach with ontology-based preorders (ICCS 2020 [35])</li><li>– Graph embedding and clustering-based approach with Graph Convolutional Networks (DL4KG@ESWC 2019 [5], Semantic Web Journal [27])</li></ul></li><li>▪ Knowledge mining<ul style="list-style-type: none"><li>– Scalable mining of path patterns (ALGOS 2020 [15])</li><li>– Extension of Formal Concept Analysis to refine ontology class hierarchies (ISMIS 2017 [16], BDA 2017 (poster) [43], FCA4AI@IJCAI-ECAI 2018 [29])</li></ul></li><li>▪ Explainable AI<ul style="list-style-type: none"><li>– Interpretable features and models to reproduce expert classifications of drugs causing or not side effects (post-hoc explanations) (BMC Medical Informatics and Decision Making [6])</li></ul></li><li>▪ Throughout all works: importance of domain knowledge represented in ontologies</li><li>▪ Applications on real data in pharmacogenomics: more than 50k <math>n</math>-ary relationships linking sets of drugs, genetic factors, and phenotypes, from heterogeneous sources (different vocabularies, levels of granularity)</li><li>▪ Construction and maintenance of PGxLOD, a knowledge graph about pharmacogenomics (BMC Bioinformatics [7])</li><li>▪ Emphasis on Open Science<ul style="list-style-type: none"><li>– Codes on GitHub</li><li>– Public knowledge graph and ontology</li><li>– Deployability and reproducibility with Docker containers</li></ul></li></ul>
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Keywords: Ontology, *n*-ary Tuple, Preorder, Graph Embedding, Path Pattern, Formal Concept Analysis

Within the PractiKPharma project funded by the French National Research Agency (ANR)

Thesis supervisors :

- Amedeo Napoli (Senior Researcher, CNRS, LORIA)
- Adrien Coulet (Associate Professor, Université de Lorraine, LORIA)

Thesis written and defended in English on December 16<sup>th</sup>, 2020 with the following committee:

Chair	Marianne Clausel	Full Professor, Université de Lorraine, IECL
Reviewers	Claudia d'Amato	Associate Professor, University of Bari
	Fabien Gandon	Senior Researcher, Inria Sophia Antipolis - Méditerranée
Examiners	Céline Rouveirol	Full Professor, Université Sorbonne Paris Nord
	Matthias Samwald	Associate Professor, Medical University of Vienna

2012 – 2015      **Engineering Diploma (M.Sc. equivalent) – TELECOM Nancy – Nancy, France**  
Major in Software engineering – Valedictorian

[Engineering master thesis](#)  
*3D visualization applied to aircraft MRO.*  
*What purposes? What technologies? What developments?*  
Based on my internship at Swiss AviationSoftware – Graded 17/20

2010 – 2012      **Integrated preparatory class – ECE – Paris, France**  
Valedictorian

2010                **Scientific Baccalaureate – Lycée Stanislas – Villers-Lès-Nancy, France**  
Major in Mathematics – with distinction

## Previous professional positions

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2023 – 2025	<b>Junior Fellow in AI – Université Côte d'Azur – Sophia Antipolis, France</b> Research within the Wimmics team of the I3S laboratory Teaching within EFELIA Côte d'Azur and Polytech Nice Sophia (~ 128h of teaching)
2023 – 2024	<b>Temporary lecturer – TELECOM Nancy – Nancy, France</b> 18-hour class about artificial intelligence
2020 – 2023	<b>Researcher – Orange – Belfort, France</b> Permanent contract Knowledge Engineering and Machine Learning for knowledge graph construction and refinement
2022 – 2023	<b>Temporary lecturer – TELECOM Nancy – Nancy, France</b> 8-hour class about knowledge-based systems
2016 – 2020	<b>PhD student in Computer Science – LORIA / Université de Lorraine – Nancy, France</b>  2019 – 2020      Temporary teaching and research fellow (ATER) – IDMC ~ 192h of teaching  2016 – 2019      Teaching assistant – TELECOM Nancy ~ 64h of teaching per year
2015 – 2016	<b>Temporary lecturer – TELECOM Nancy – Nancy, France</b> ~ 14h of teaching
2015 – 2016	<b>Software developer – Swiss AviationSoftware – R&amp;D department – Basel, Switzerland</b> 6-month internship; followed by a permanent contract Development of a UI component to display animated 3D models from aircraft documentation
2010 – 2015	<b>Private teacher – Student tutoring associations</b> Private lessons or groups of 10 to 30 students Mathematics, programming, compiler theory, signal processing

2014	<b>Student Entrepreneurship Department (PeEL) – Université de Lorraine – Nancy, France</b> 3-month internship; entrepreneurial project
2013	<b>Caisse d'Epargne – Human Resources Information System – Metz, France</b> 3-month fixed-term contract Development of a software analyzing HR databases to automatically produce organization charts (divisions, positions, people)
2012	<b>Caisse d'Epargne – Human Resources Information System – Metz, France</b> 9-week internship Agile development of a software for career management within a 3-person team

## Awards

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- **Best student research paper award [9]** at the 21st European Semantic Web Conference (ESWC 2024)
- **Best resource paper award [10]** at the 21st European Semantic Web Conference (ESWC 2024)
- **Best paper award [14]** at the 23rd International Conference on Knowledge Engineering and Knowledge Management (EKAW 2022)
- **Best paper award [40]** at the French Conference IC (“Ingénierie des connaissances” - Knowledge Engineering) 2022 co-located with PFIA 2022
- **Best thesis award [49]** at French Conference EGC 2022, awarded by the French Association EGC (“Extraction et Gestion des Connaissances” - Knowledge Extraction and Engineering)
- **1<sup>st</sup> prize [25]** (Accuracy Track) at the Semantic Web Challenge on Tabular Data to Knowledge Graph Matching 2021, co-located with the 20th International Semantic Web Conference (ISWC 2021)
- **3<sup>rd</sup> prize [26]** at the Semantic Web Challenge on Tabular Data to Knowledge Graph Matching 2020, co-located with the 19th International Semantic Web Conference (ISWC 2020)

## Funding of research projects

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SHACKLE (Feb.-Jul. 2025)	<b>Principal Investigator</b> Sub-grant agreement of ENFIELD, a EU Horizon Research and Innovation Action  This project funds regular research stays to study the neuro-symbolic integration of validation schemata ( <i>i.e.</i> SHACL shapes) from knowledge graphs in Machine Learning models to improve their soundness and completeness.  Funding for my institution (Université Côte d'Azur): 14.4k€ Total project funding: 14.4k€ Partners: Télécom Paris, Université Côte d'Azur (PI)
ECLADATTA (2023 – 2026)	<b>Principal Investigator (2023); Associate Member (2023 – 2026)</b> French National Research Agency (ANR) Generic Call 2022  I set up and led during 6 months this 42-month project which aims at proposing a joint pipeline for extracting and reconciling knowledge from texts, tables, and knowledge graphs. After leaving my position at Orange, I became an associate member.  Funding for my institution (Orange): 196k€ Total project funding: 601k€ Partners: EURECOM, IRIT, Orange (PI)
AT2TA (2023 – 2026)	<b>Investigator; WP co-leader</b> French National Research Agency (ANR) Generic Call 2022  This 42-month project aims at exploring the theory and applications of analogical reasoning. I am co-leading the work package on use cases and applications. I am leading the task studying interactions between knowledge management and analogical reasoning. After leaving my position at Orange, I transferred this project to Université Côte d'Azur.  Funding for my institution (Orange then Université Côte d'Azur): 30k€ Total project funding: 669k€ Partners: LORIA (PI), IHU Imagine, IRIT, Inria, Infologic, Université Côte d'Azur

## Community services

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### Event organization activities

ESWC 2026	Web & Publicity co-chair with Tabea Tietz and Ignacio García 23rd European Semantic Web Conference <i>Upcoming in May 2026</i>
Course at URS 2025	Co-organizer with Miguel Couceiro, Ndeye-Emilie Mbengue, and Lucas Jarnac Course and shared-task “Analogical reasoning through the lens of KGs” Within the Unite! Research School 2025 Curriculum preparation and 1-hour class on “Knowledge Graphs & Machine Learning” ~ 20 attendees
PGx Track 2025	Co-organizer with Adrien Coulet Within the Ontology Alignment Evaluation Initiative 2025 (OAEI 2025)
Principia Analogiae 2025	Co-general chair with Miguel Couceiro, Dafna Shahaf, and Zied Bouraoui ~ 20 attendees
3 <sup>rd</sup> M4D2	Co-organizer with Miguel Couceiro 3rd Symposium Mathematics for Decision and Discovery ~ 20 attendees
PGx Track 2024	Co-organizer with Adrien Coulet Within the Ontology Alignment Evaluation Initiative 2024 (OAEI 2024)
Neuro-symbolic AI 2023	Co-general chair with Zied Bouraoui and Fatiha Saïs International workshop supported by AfIA and GDR RADIA Co-located with the international conference ECSQARU 2023 ~ 80 attendees
PGx Track 2023	Co-organizer with Adrien Coulet Within the Ontology Alignment Evaluation Initiative 2023 (OAEI 2023)
ATA 2023	General co-chair with Miguel Couceiro, Fadi Badra, and Esteban Marquer International workshop on Analogies: from Theory to Applications Co-located with the international conference ICCBR 2023 ~ 25 attendees
ISWC 2022	Proceedings & Metadata co-chair with Giuseppe Pirrò 21st International Semantic Web Conference ~ 500 attendees
ATA 2022	General co-chair with Miguel Couceiro, Esteban Marquer, and Pierre-Alexandre Murena International workshop on Analogies: from Theory to Applications Co-located with the international conference ICCBR 2022 ~ 25 attendees
ALGOS 2020	General co-chair with Miguel Couceiro and Amedeo Napoli International conference on ALgebras, Graphs and Ordered Sets ~ 200 attendees

### Reviewing activities

- International Journals
  - Transactions on Graph Data and Knowledge (Editorial Board member)
  - Special Issue “Analogies: from Mathematical Foundations to Applications and Interactions with ML and AI” in Annals of Mathematics and Artificial Intelligence (Guest Editor)
  - Special Issue in honor of Maurice Pouzet in Discrete Mathematics & Theoretical Computer Science (Guest Editor)
  - Special Issue on Neurosymbolic AI and Ontologies of the Neurosymbolic Artificial Intelligence Journal (Guest Editorial Board member)
  - Special Issue on Tools & Systems of the Semantic Web Journal (Guest Editorial Board member)

- Special Issue on Ontology Matching and Machine Learning of the Semantic Web Journal (Guest Editorial Board member)
- Semantic Web Journal
- Journal of Web Semantics
- IEEE Transactions on Knowledge and Data Engineering
- International Journal of Approximate Reasoning
- Data & Knowledge Engineering
- The European Journal on Artificial Intelligence
- Discrete Mathematics & Theoretical Computer Science
- Communications Medicine
- SoftwareX
- Neurocomputing
- Scientific Reports
- Pattern Recognition Letters
- ACM Computing Surveys
- Engineering Applications of Artificial Intelligence
- International Conferences
  - ESWC 2026 (Resources Track Program Committee member)
  - SAC 2026 (Knowledge & Natural Language Processing Track Program Committee member)
  - TheWebConf 2026 (Semantics & Knowledge Track Program Committee member)
  - AAAI 2026 (Program Committee member)
  - ISWC 2025 (Posters & Demos Track Program Committee member)
  - ECAI 2025 (Program Committee member)
  - ECML-PKDD 2025 (Research Track Program Committee member)
  - ESWC 2025 (Resources Track Program Committee member)
  - SAC 2025 (Knowledge & Natural Language Processing Track Program Committee member)
  - TheWebConf 2025 (Semantics & Knowledge Track Program Committee member)
  - EKAW 2024 (Program Committee member)
  - ISWC 2024 (Posters & Demos Track Program Committee member)
  - CIKM 2024 (additional reviewer)
  - ECML-PKDD 2024 (Research Track Program Committee member)
  - ECAI 2024 (Program Committee member)
  - ESWC 2024 (Resources Track Program Committee member)
  - TheWebConf 2024 (Program Committee member)
  - ISWC 2023 (Research Track Program Committee member)
  - ECML-PKDD 2023 (Research Track Program Committee member)
  - EKAW 2022 (additional reviewer)
  - MedInfo 2021 (reviewer)
  - IJCAI 2019 (assistant reviewer)
- International Workshops
  - XAI-KRKG, co-located with ECAI 2025 (Program Committee member)
  - XAI-KG, co-located with ESWC 2025 (Program Committee member)
  - AIMLAI, co-located with ECML-PKDD 2024 (subreviewer)
  - DL4KG, co-located with ISWC 2023 (Program Committee member)
  - AIMLAI, co-located with ECML-PKDD 2023 (subreviewer)
  - IARML, co-located with IJCAI 2023 (Program Committee member)

- DL4KG, co-located with ISWC 2022 (Program Committee member)
- IARML, co-located with IJCAI-ECAI 2022 (Program Committee member)
- National Conferences
  - EGC 2026 (Program Committee member)
  - RJCIA 2024 (Program Committee member)
- Funding agencies
  - ENFIELD EU project – 2nd Innovation Scheme Open Call (2025)
  - Région Normandie – WINNINGNormandy Fellowship Program (2022)

## Miscellaneous

- Spokesperson (2025 – 2027) of AfIA (“Association française pour l’Intelligence Artificielle” – French Artificial Intelligence Society)
- Member of the GOBLIN EU COST ACTION, co-leader of Task 3.1 “KGs and Deep Learning”
- Member of the Cognitive AI W3C Community Group
- Member of GDR RADIA (“Groupement De Recherche Raisonnement, Apprentissage et Décision en Intelligence Artificielle” – Research Group on Reasoning, Learning, and Decision in Artificial Intelligence)
- Member of SIF (“Société informatique de France” – French Computer Science Society)

## Supervision

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### PhD students (8)

Starting in 2026	<b>Krysto Dagues de la Hellerie – Université Côte d’Azur / Berger-Levrault (CIFRE)</b> Representing intervention scenarios and decisions using knowledge graphs: application to industrial maintenance Co-supervised with Fabien Gandon, Catherine Faron, and Franck Michel
Starting in Dec. 2025	<b>Hanna Abi Akl – Université Côte d’Azur / DSTI (CIFRE)</b> Neuro-symbolic and knowledge-based approaches to develop reasoning abilities in Large Language Models Co-supervised with Fabien Gandon and Catherine Faron
Oct. 2025 – Oct. 2028	<b>Génesis Montenegro – Université Côte d’Azur / Berger-Levrault (CIFRE)</b> From raw corpus to lexical-semantic graph: a methodological framework for industrial, agile and high-performance GraphRAG Co-supervised with Fabien Gandon, Catherine Faron, and Franck Michel
Oct. 2025 – Oct. 2028	<b>Ndeye-Emilie Mbengue – Université Côte d’Azur / Universidade de Lisboa</b> Abstraction and analogical reasoning to improve knowledge representation in low-resource languages Co-supervised with Fabien Gandon and Miguel Couceiro
Oct. 2024 – Oct. 2027	<b>Guillaume Méroué – Université Côte d’Azur</b> Decentralized coordination of intelligent processes to improve the quality of a collection of knowledge graphs Co-supervised with Fabien Gandon
Oct. 2024 – Oct. 2027	<b>Nicolas Robert – Université Côte d’Azur</b> Knowledge graph embedding models: symbolic knowledge injection and discovery Co-supervised with Catherine Faron Publication: [17]

Mar. 2023 – Mar. 2026	<b>Lucas Jarnac – Orange / Université de Lorraine (CIFRE)</b> Reconciliation of uncertain knowledge from heterogeneous sources for knowledge graph refinement Co-supervised with Miguel Couceiro I supervised Lucas Jarnac until the end of my contract with Orange (August 2023) Publications: [13, 31, 37, 46]
Sept. 2021 – Sept. 2024	<b>Nicolas Hubert – Université de Lorraine</b> From semantic-aware to semantic-driven knowledge graph embedding models for link prediction Without being his official supervisor, I collaborated with Nicolas and his supervisors (Armelle Brun and Davy Monticolo) on his thesis. Publications: [3, 9, 10, 12, 14, 22, 44, 45, 59]

## Interns and student projects (21)

Oct. 2025 – Mar. 2026	<b>Yaël Burdese, M.Sc. Year 2 (Bac+5)</b> 6-month research project Comprehensively comparing GraphRAG approaches: from constructed graphs to generated results Co-supervised with Fabien Gandon and Catherine Faron
Mar. 2025 – Aug. 2025	<b>Krysto Dagues de la Hellerie, M.Sc. Year 2 (Bac+5)</b> 6-month internship Semantic Web Retrieval Augmented Generation Co-supervised with Fabien Gandon, in collaboration with the Forgeron3 company
Apr. 2024 – Aug. 2024	<b>Adrien Chassaing-Monjou, M.Sc. Year 2 (Bac+5)</b> 5-month internship Analogical Reasoning for Knowledge Graph Refinement Co-supervised with Miguel Couceiro
Mar. 2024 – Jul. 2024	<b>Guillaume Méroué, M.Sc. Year 2 (Bac+5)</b> 4-month internship Analogical Reasoning for Link Prediction in Knowledge Graphs Co-supervised with Fabien Gandon
Oct. 2023 – Mar. 2024	<b>Lynda Attouche, M.Sc. Year 2 (Bac+5)</b> 6-month research project Improving automatic text classification by leveraging class hierarchies Co-supervised with Catherine Faron and Molka Dhouib
Oct. 2023 – Mar. 2024	<b>Guillaume Méroué, M.Sc. Year 2 (Bac+5)</b> 6-month research project Analogical Reasoning for Link Prediction in Knowledge Graphs Co-supervised with Miguel Couceiro
Oct. 2023 – Jun. 2024	<b>Mohammad Al Takach, Abbas Awarkeh, Bassem Jaber, M.Sc. Year 1 (Bac+4)</b> 8-month research project Analogical Reasoning for Link Prediction in Knowledge Graphs Co-supervised with Miguel Couceiro
Jun. 2023 – Aug. 2023	<b>Adrien Chassaing-Monjou, M.Sc. Year 1 (Bac+4)</b> 3-month internship Exploring analogical proportions to align Knowledge Graphs Co-supervised with Miguel Couceiro and Esteban Marquer
Oct. 2022 – Jun. 2023	<b>Omar Abedelkader, Juba Ait-Abdelmalek, Ekaterina Kozachenko, M.Sc. Year 1 (Bac+4)</b> 8-month research project Exploring analogies for automatic semantic annotation taking into account context Co-supervised with Stergos Afantinos, Miguel Couceiro, and Esteban Marquer

Oct. 2022 – Jun. 2023	<b>Adrien Chassaing-Monjou, Chadi Hani, M.Sc. Year 1 (Bac+4)</b> 8-month research project Exploring analogical proportions between and within Knowledge Graphs Co-supervised with Miguel Couceiro and Esteban Marquer
Sept. 2022 – Feb. 2023	<b>Li-Fan Zhao, M.Sc. Year 2 (Bac+5)</b> 5-month research project Knowledge extraction from tabular data in Electronic Health Records Co-supervised with Adrien Coulet and Bastien Rance
Mar. 2022 – Sept. 2022	<b>Lucas Jarnac, M.Sc. Year 2 (Bac+5)</b> 6-month internship Creation of an Enterprise Knowledge Graph: bootstrapping and knowledge reconciliation Publication: [21]
Jun. 2019 – Aug. 2019	<b>Melvin Moreau, B.Sc. Year 2 (IUT Bac+2)</b> 2-month internship Updating PGxLOD with the newest versions of the integrated Linked Open Data sets Co-supervised with Amedeo Napoli
Jan. 2018 – May 2018	<b>Benoît Frapicciini, Gabi Portelli, M.Sc. Year 1 (Bac+4)</b> 5-month research project Extracting drug side effects from clinical annotations of PharmGKB to refine PGxLOD Co-supervised with Adrien Coulet
Jun. 2017 – Aug. 2017	<b>Graziella Husson, M.Sc. Year 1 (Bac+4)</b> 3-month internship Refining PGxLOD (integrating Linked Open Data sets, transforming PharmGKB data into RDF) Co-supervised with Adrien Coulet Publication: [7]

## Engineers (2)

Nov. 2024 – Sept. 2025	<b>Ndeye-Emilie Mbengue</b> AT2TA project Development of the KGPrune web application Co-supervised with Miguel Couceiro Publication: [18]
Jan. 2024 – Sept. 2024	<b>Cherif Hassan Nousradine</b> AT2TA project Development of the KGPrune web application Co-supervised with Miguel Couceiro

## Available software and data

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- PGxLOD, a knowledge graph to integrate pharmacogenomic knowledge  
<https://pgxlod.loria.fr>
- PGxO, an ontology to represent pharmacogenomic knowledge  
<https://pgxo.loria.fr>
- YAGO4-LP, link prediction datasets based on the YAGO4 knowledge graph  
<https://doi.org/10.5281/zenodo.10677792>
- DB100k+, YAGO3-10+ and NELL-995+: semantically enriched datasets for link prediction  
<https://doi.org/10.5281/zenodo.17438317>
- Wikidata Thematic Subgraph Selection, datasets to train and evaluate algorithms to select thematic subgraphs of interest in a large knowledge graph from seed entities of interest  
<https://doi.org/10.5281/zenodo.8091583>
- Wikidata Thematic Subgraph Selection - An Artwork Dataset for experiments to select thematic subgraphs of interest in a large knowledge graph from seed entities of interest  
<https://doi.org/10.5281/zenodo.15600971>

- Pharmacogenomics datasets for Ontology Matching, datasets based on the PGxLOD knowledge graph to evaluate Ontology Matching algorithms on a structure-based instance matching task from the domain of pharmacogenomics  
<https://doi.org/10.5281/zenodo.8419361>
- analogical-pruning, an analogy-based pruning model for subgraph selection  
<https://github.com/Orange-OpenSource/analogical-pruning>
- PyGraft, a Python tool to generate synthetic schemas and knowledge graphs  
<https://github.com/nicolas-hbt/pygraft>
- KGPrune, an API and Web application to extract subgraphs from Wikidata around user-input entities of interest while avoiding topical drift  
<https://kgprune.loria.fr>
- Code of other experiments on GitHub  
<https://github.com/pmonnin>

## Technical skills

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Software and Web development	C, C++, Java, VBA, Python, HTML5 & CSS3
DBMS	Oracle, MySQL, MongoDB, Virtuoso
Semantic Web	RDF, RDFS, OWL, SPARQL
Machine Learning, Data Mining	
Version control	Git, SVN
Containerization	Docker
Software	Matlab, L <sup>A</sup> T <sub>E</sub> X
Operating systems	Windows, macOS, Linux (bash scripting)
Project management	Agile methods (Scrum), Test Driven Development

## Languages

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French	Mother tongue
English	Fluent – TOEIC score: 915/990
Spanish	Basics

## Miscellaneous

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Music	Alto saxophone
Reading	Thrillers, science-fiction, fantasy, philosophy, psychology, computer science
Sports	Running, hiking
French driving license	

## Publications

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### 4 selected publications

- Lucas Jarnac, Miguel Couceiro, and **Pierre Monnin**. “Relevant Entity Selection: Knowledge Graph Bootstrapping via Zero-Shot Analogical Pruning”. In: *Proceedings of the 32nd ACM International Conference on Information and Knowledge Management, CIKM 2023, Birmingham, United Kingdom, October 21-25, 2023*. (Rank A). ACM, 2023, pp. 934–944. DOI: 10.1145/3583780.3615030. URL: <https://arxiv.org/pdf/2306.16296.pdf>

This conference paper presents an approach to build a domain-specific knowledge graph by selecting sub-graphs of interest from a large generic graph (such as Wikidata). The originality of this approach lies (*i*) in the fact that we are the first to formalize and precisely evaluate this task, and (*ii*) in the use of analogical reasoning in a neuro-symbolic perspective. Experiments show that our approach achieves comparable or better performance than state-of-the-art models such as LSTM, including in a transfer setting on entities not seen in training, while having 150 to 800 times fewer parameters. These results underline the value of combining different forms of reasoning in artificial intelligence approaches. The method and datasets are made available in an Open Science vision to enable comparative evaluation of subsequent models.

- Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. “Sem@K: Is my knowledge graph embedding model semantic-aware?” In: *Semantic Web* 14.6 (2023). (**Rank Q2**), pp. 1273–1309. DOI: 10.3233/SW-233508

This journal paper presents the Sem@K metric, which measures the semantic validity of graph embedding models. This metric is applicable to link prediction tasks and measures the validity of the entities predicted by the models w.r.t. relation signatures (type constraints in domain and range). This article introduces three versions of Sem@K that take into account the presence or absence of types, potentially hierarchically organized. Our evaluation of a large panel of model families shows common behaviors by family, as well as a trade-off between Sem@K and traditional performance metrics based on the rank of gold entities. Our metric therefore complements the traditional rank-based evaluation and assesses the ability of models to capture relation signatures while being agnostic to them during training. Our approach is aligned with the research direction aimed at overcoming the limitations of traditional model evaluation and neuro-symbolic approaches aimed at qualifying knowledge and abstractions learned by models. This article is the extended version of the work presented at the EKAW 2022 international conference (best paper award) [14] and at the DL4KG 2022 international workshop [22]. Resources developed (code and datasets) are made available to the community.

- **Pierre Monnin**, Chedy Raïssi, Amedeo Napoli, and Adrien Coulet. “Discovering alignment relations with Graph Convolutional Networks: A biomedical case study”. In: *Semantic Web* 13.3 (2022). (**Rank Q2**), pp. 379–398. DOI: 10.3233/SW-210452

This journal paper presents a neuro-symbolic matching approach based on graph embeddings (Graph Convolutional Networks and the Soft Nearest Neighbor Loss) and clustering. We measured the improvements in matching results when enriching the graph prior to training with the results of different inference rules associated with domain knowledge (e.g., class hierarchy, inverse of predicates). We also observed that distances in the embedding space are coherent with the “strength” of the different preexisting alignment relations (e.g., smaller distances for equivalences). Since the model was agnostic to these different alignment types, this could correspond to the emergence of a semantics in the embedding space. These observations open interesting perspectives: (i) they advocate for the further integration of domain knowledge within embedding models, and (ii) they let us consider clustering and distances in the embedding space as a means to suggest alignment relations. This second perspective is in line with current neuro-symbolic works that aim at associating semantics to latent representation spaces of embedding models. Resources developed (code and datasets) are made available to the community.

- **Pierre Monnin**, Joël Legrand, Graziella Husson, Patrice Ringot, Andon Tchetchmedjiev, Clément Jonquet, Amedeo Napoli, and Adrien Coulet. “PGxO and PGxLOD: a reconciliation of pharmacogenomic knowledge of various provenances, enabling further comparison”. In: *BMC Bioinformatics* 20-S.4 (2019). (**Rank Q1**), 139:1–139:16. DOI: 10.1186/s12859-019-2693-9

This journal paper presents the construction and usage of the PGxLOD knowledge graph that integrates pharmacogenomic knowledge from the PharmGKB specialized database, and the biomedical literature (automatic relation extraction from text). The paper also introduces a first rule-based approach to match these  $n$ -ary complex knowledge units and measure overlaps between their sources. On the application side, this knowledge graph is a major resource as it offers a consolidated view of the available knowledge in the domain of pharmacogenomics, and allows to measure the complementarity between original knowledge sources. On the computer science side, this graph is an interesting data set for matching and mining approaches because of the specific characteristics of pharmacogenomic knowledge units: their heterogeneous and complex representation ( $n$ -ary relations), and their number (50 000 relations).

**PGxLOD has become one main output of the French national research project PractiKPharma.** It was used to represent knowledge units extracted during the project, and served as the experimental setting for matching and mining approaches. This article and associated artifacts illustrate my commitment to develop both necessary approaches and data sets to advance the state of the art, and to make them publicly available in an Open Science perspective.

## List of publications

Rankings of journals and conferences are provided for reference and are respectively drawn from the Scimago Journal Rank and the CORE Conference Portal. All publications can be accessed through my webpage: <https://pmonnin.github.io/publications.html>. An asterisk (\*) denotes co-authors who contributed equally.

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- [3] Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. "Sem@K: Is my knowledge graph embedding model semantic-aware?" In: *Semantic Web* 14.6 (2023). (**Rank Q2**), pp. 1273–1309. DOI: 10.3233/SW-233508.
- [4] Jixiong Liu, Yoan Chabot, Raphaël Troncy, Viet-Phi Huynh, Thomas Labbé, and **Pierre Monnin**. "From Tabular Data to Knowledge Graphs: A Survey of Semantic Table Interpretation Tasks and Methods". In: *Journal of Web Semantics* (2022). (**Rank Q1**), p. 100761. ISSN: 1570-8268. DOI: 10.1016/j.websem.2022.100761.
- [5] **Pierre Monnin**, Chedy Raïssi, Amedeo Napoli, and Adrien Coulet. "Discovering alignment relations with Graph Convolutional Networks: A biomedical case study". In: *Semantic Web* 13.3 (2022). (**Rank Q2**), pp. 379–398. DOI: 10.3233/SW-210452.
- [6] Emmanuel Bresso\*, **Pierre Monnin\***, Cédric Bousquet, François-Élie Calvier, Ndeye Coumba Ndiaye, Nadine Petitpain, Malika Smaïl-Tabbone, and Adrien Coulet. "Investigating ADR mechanisms with Explainable AI: a feasibility study with knowledge graph mining". In: *BMC Medical Informatics and Decision Making* 21.1 (2021). (**Rank Q2**), p. 171. DOI: 10.1186/s12911-021-01518-6.
- [7] **Pierre Monnin**, Joël Legrand, Graziella Husson, Patrice Ringot, Andon Tchekmedjiev, Clément Jonquet, Amedeo Napoli, and Adrien Coulet. "PGxO and PGxLOD: a reconciliation of pharmacogenomic knowledge of various provenances, enabling further comparison". In: *BMC Bioinformatics* 20-S.4 (2019). (**Rank Q1**), 139:1–139:16. DOI: 10.1186/s12859-019-2693-9.

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## Thesis

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- [53] Miguel Couceiro, **Pierre Monnin**, and Amedeo Napoli, eds. *Proceedings of the First International Conference "Algebras, graphs and ordered sets", ALGOS 2020, Online (originally planned in Nancy, France), August 26-28, 2020*. Vol. 2925. CEUR Workshop Proceedings. CEUR-WS.org, 2021. URL: <http://ceur-ws.org/Vol-2925>.

## Popularization articles

- [54] **Pierre Monnin**, Cherif-Hassan Nousradine, Lucas Jarnac, Laurel Zuckerman, and Miguel Couceiro. "KGPrune : une application Web pour extraire des sous-graphes d'intérêt de Wikidata par élagage analogique". In: *1024 : Bulletin de la Société Informatique de France* 24 (Nov. 2024), pp. 177–188. DOI: 10.48556/SIF.1024.24.177.
- [55] **Pierre Monnin** and Adrien Coulet. "Projet ANR (2016-2021) " PractiKPharma " : extraction, comparaison et découverte de connaissances en pharmacogénomique". In: *1024 : Bulletin de la Société Informatique de France* 19 (Apr. 2022), pp. 109–120. DOI: 10.48556/sif.1024.19.109.
- [56] **Pierre Monnin** and Adrien Coulet. "Étudier les mécanismes des effets indésirables des médicaments avec l'IA explicative : expériences avec la fouille de graphes de connaissances". In: *Bulletin de l'Association Française pour l'Intelligence Artificielle* 116 (Apr. 2022), pp. 37–40. URL: <https://hal.inria.fr/hal-03669065>.

## Popularization oral presentations

- [57] **Pierre Monnin.** "Using Wikidata to bootstrap a new knowledge graph: selecting relevant entities using analogical pruning". Wikidata Modelling Days 2023, Virtual Event, November 30, December 1-2, 2023. URL: <https://www.youtube.com/watch?v=euXs8Jz4aeg>.

## Preprints

- [58] Pierre Maillot, Catherine Faron, Fabien Gandon, and Franck Michel **Pierre Monnin.** "Eat your own KR: a KR-based approach to index Semantic Web Endpoints and Knowledge Graphs". 2025. URL: <https://doi.org/10.48550/arXiv.2508.08713>.
- [59] Nicolas Hubert, **Pierre Monnin**, and Heiko Paulheim. "Beyond Transduction: A Survey on Inductive, Few Shot, and Zero Shot Link Prediction in Knowledge Graphs". 2023. URL: <https://arxiv.org/abs/2312.04997>.

## Invited talks

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### International workshops

- **Pierre Monnin.** Discovering alignment relations with Graph Convolutional Networks: a biomedical case study. ROCED workshop at KGC 2022, May 2, 2022, Remote.

### National conferences

- **Pierre Monnin.** Matching and mining in knowledge graphs of the Web of data - Applications in pharmacogenomics. EGC 2022 (best thesis award), January 24-28, 2022, Blois, France.

### National workshops

- **Pierre Monnin.** Matching and mining in knowledge graphs of the Web of data - Applications in pharmacogenomics. DECADE workshop at PFIA 2022, June 28, 2022, Saint-Etienne, France.
- Yoan Chabot, **Pierre Monnin.** DAGOBAH : Activités de recherche Orange autour de l'annotation sémantique de données tabulaires. TextMine'21 workshop at EGC 2021, January 26, 2021, Montpellier, France, Remote.

### Seminars, symposiums, and junior conferences

- **Pierre Monnin.** Aligning complex units in knowledge graphs – Symbolic and neuro-symbolic approaches for pharmacogenomics. SIMDAC 2025, MOBE, Université d'Orléans, June 24, 2025, Orléans, France.
- **Pierre Monnin.** Neuro-symbolic approaches for the knowledge graph lifecycle. DIG team seminar, LTCI, Télécom Paris, March 18, 2025, Paris, France.
- **Pierre Monnin.** The Schema Strikes Back: Refining Knowledge Graphs with Neuro-Symbolic AI. Università degli Studi di Bari Aldo Moro – Seminar of the PhD Program in Computer Science and Mathematics, January 27, 2025, Bari, Italy.
- **Pierre Monnin.** Neuro-symbolic approaches for the knowledge graph lifecycle. INESC-ID, Universidade de Lisboa – Seminar of the Language & Speech working group, November 22, 2024, Lisbon, Portugal.
- **Pierre Monnin.** Aligning complex units in knowledge graphs - Symbolic and neuro-symbolic approaches for pharmacogenomics. ANR AGGREGY meeting, June 4, 2024, Sophia-Antipolis, France.
- **Pierre Monnin.** Neuro-symbolic approaches for the knowledge graph lifecycle. Università degli Studi di Bari Aldo Moro – Seminar of the PhD Program in Computer Science and Mathematics, January 30, 2024, Bari, Italy.
- **Pierre Monnin.** Neuro-symbolic approaches for the knowledge graph lifecycle. MALOTEC seminar, LORIA, December 18, 2023, Nancy, France.
- **Pierre Monnin.** Knowledge graphs and analogical reasoning: from the example of zero-shot KG bootstrapping to perspectives. Workshop on analogies : from learning to explainability (GT MHylA & EXPLICON – GdR RADIA), November 27–28, 2023, Arras, France.
- **Pierre Monnin.** Knowledge graph construction, refinement, and applications, with a neuro-symbolic perspective. GT MHylA meeting, March 29, 2023, Lens, France.

- **Pierre Monnin.** Knowledge graph construction, refinement, and applications, with a neuro-symbolic perspective. WIMMICS seminar, March 23, 2023, Sophia-Antipolis, France.
- **Pierre Monnin.** Knowledge graphs: construction, matching, and applications. CRIL seminar, January 12, 2023, Lens, France.
- **Pierre Monnin.** Knowledge graphs: construction, matching, and mining. 7th Junior Conference on Data Science and Engineering (JDSE 2022), September 15, 2022, Palaiseau, France.
- **Pierre Monnin.** Matching and mining in knowledge graphs of the Web of data - Applications in pharmacogenomics. 4th GdR MaDICS symposium, July 11, 2022, Lyon, France.
- **Pierre Monnin.** DAGOBAL - An End-to-End Context-Free Semantic Annotation System for Tabular Data. MALOTEC seminar, LORIA, February 4, 2021, Nancy, France, Remote.

## Non-academic talks / popularization activities

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- Ndeye-Emilie Mbengue, **Pierre Monnin.** Knowledge Graphs & Analogical Reasoning. Visit of students from EURECOM to the Centre Inria d'Université Côte d'Azur. November 5, 2025. Sophia-Antipolis, France (~50 people)
- Ndeye-Emilie Mbengue, **Pierre Monnin.** Knowledge Graphs & Analogical Reasoning. Visit of students from ENS Lyon to the I3S Laboratory. November 5, 2025. Sophia-Antipolis, France (~30 people)
- **Pierre Monnin.** Knowledge graphs: construction, refinement, and applications, with a neuro-symbolic perspective. Language & Cognition seminar, IDMC, Université de Lorraine, February 1, 2023, Nancy, France (~30 people).
- Mathieu d'Aquin, Miguel Couceiro, **Pierre Monnin.** From machine learning to knowledge and back: A (de)tour over reasoning, analogies and knowledge graphs. Panel discussion. Cognitive Science and NLP forum of IDMC, Université de Lorraine, November 23, 2022, Nancy, France (~30 people).
- **Pierre Monnin.** Presentation of my career. TELECOM Nancy career day, June 9, 2022, Nancy, France (~75 people).
- **Pierre Monnin.** Valedictorian speech. TELECOM Nancy graduation ceremony, November 28, 2015, Nancy, France (~300 people).

## Teaching

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Classes with (EN) were taught in English. Other classes were taught in French.

## Summary

Year	Class	Level	Lecture	Tutorial	Practical	Resp.
2025 – 2026	AI for Adult Education	M.Sc. Year 1	24			×
	ML & Semantic Web	M.Sc. Year 2	1	1.5		×
	NoSQL Databases	M.Sc. Year 1	6	15		×
2024 – 2025	AI for Foreign Languages: Professional Approaches	M.Sc. Year 2	9	9		×
	AI for Applied Foreign Languages	M.Sc. Year 1	9	9		×
	AI for Adult Education	M.Sc. Year 1	24			×
	AI for preparatory classes for higher ed.	B.Sc. Year 1	3			×
	AI for manufacturing and service	B.Sc. Year 2		6		
	ML & Semantic Web	M.Sc. Year 2	1	1.5		×
	NoSQL Databases	M.Sc. Year 1	6	15		×
2023 – 2024	Internship academic supervision	M.Sc. Year 2		10		
	AI for Applied Foreign Languages	M.Sc. Year 1	12	12		×
	AI for Adult Education	M.Sc. Year 1	24			×
	AI for Marketing	B.Sc. Year 3	12			×
	AI for preparatory classes for higher ed.	B.Sc. Year 1	3			×
	ML & Semantic Web	M.Sc. Year 2	1	1.5		×
	XML technologies	M.Sc. Year 1		12.5		
	Machine learning tutoring	M.Sc. Year 2		10		×
	Research project supervision	M.Sc. Year 2		10		
	Internship academic supervision	M.Sc. Year 2		4		
2022 – 2023	Artificial Intelligence	M.Sc. Year 2	10	8		×
	Knowledge-based systems	M.Sc. Year 2	4	4		×
	Introduction to GNU/Linux and Git <sup>(EN)</sup>	M.Sc. Year 2		4		
	Ontologies <sup>(EN)</sup>	M.Sc. Year 2		6		
	Algorithms and programming	M.Sc. Year 1		15		
	Semantic Web <sup>(EN)</sup>	M.Sc. Year 1		15		
	Computability and Complexity <sup>(EN)</sup>	M.Sc. Year 1		10		
	Computational Complexity	B.Sc. Year 3	15	15		×
	Advanced Java Programming	B.Sc. Year 3		20		
	Java Programming	B.Sc. Year 2		20		
2019 – 2020	Web Programming	B.Sc. Year 1		14		
	Algorithmics	B.Sc. Year 1		22		
	Tools and Digital Culture	B.Sc. Year 1		20		
	Artificial Intelligence	M.Sc. Year 2		14	2	
	Knowledge-Based Systems	M.Sc. Year 2	16	16		×
	NoSQL Databases	M.Sc. Year 2			20	
	Compiler Implementation Project	M.Sc. Year 1			14	
	Artificial Intelligence	M.Sc. Year 2	2	14	2	
	Knowledge-Based Systems	M.Sc. Year 2	16	16		×
	Compiler Implementation Project	M.Sc. Year 1			14	
2017 – 2018	Theory of Compilation	M.Sc. Year 1		20		
	Compiler Implementation Project	M.Sc. Year 1			14	
	Computer Science Basics	B.Sc. Year 3		18	16	
	Compiler Implementation Project	M.Sc. Year 1			14	
2016 – 2017	Total	198h	388h	96h		

A × in column “Responsibilities” (Resp.) means that I was in charge of the class (scheduling sessions, preparing subjects and handouts for lectures, tutorials, practicals, exams, and projects, coordination with other teachers, participation in examination boards). Grayed lines correspond to academic supervision of activities such as research projects or internships.

## Class descriptions

2024 – 2025 **Temporary lecturer – Université Côte d’Azur – Nice, France**

[Introduction to AI for Adult Education – EFELIA Côte d’Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, associated tasks, impacts on society and environment

[Machine Learning & Semantic Web – Polytech Nice Sophia](#)

Introduction to graph machine learning for knowledge graph refinement, some knowledge graph embedding models, link prediction, and evaluation

[NoSQL Databases – Polytech Nice Sophia](#)

MongoDB, Elasticsearch, Redis, HBase, Neo4J, faiss

2024 – 2025 **Junior Fellow in AI – EFELIA Côte d'Azur – Nice, France**

[AI for Foreign Languages: Professional Approaches – EFELIA Côte d'Azur](#)

Focus on Natural Language Processing, tasks, (past to modern) models, limits, and applications in professional settings

[Introduction to AI for Applied Foreign Languages – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, associated tasks, impacts on society and environment

[Introduction to AI for Adult Education – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, associated tasks, impacts on society and environment

[Introduction to AI for preparatory classes for higher ed. \(namely, CPES\) – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, associated tasks, impacts on society and environment

[Introduction to AI for manufacturing and services \(namely, BUT2 QLIO\) – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Generative AI / LLMs, associated tasks and challenges, with applications in manufacturing and services

[Machine Learning & Semantic Web – Polytech Nice Sophia](#)

Introduction to graph machine learning for knowledge graph refinement, some knowledge graph embedding models, link prediction, and evaluation

[NoSQL Databases – Polytech Nice Sophia](#)

MongoDB, Elasticsearch, Redis, HBase, Neo4J, faiss

[Internship academic supervision – Polytech Nice Sophia / EUR DS4H](#)

Academic supervision of five M.Sc. Year 2 internships: monitoring interns' work in companies, report grading

2023 – 2024 **Junior Fellow in AI – EFELIA Côte d'Azur – Nice, France**

[Introduction to AI for Applied Foreign Languages – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, associated tasks, impacts on society and environment

[Introduction to AI for Adult Education – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, associated tasks, impacts on society and environment

[Introduction to AI for Marketing \(namely, BUT3 TC\) – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, Natural Language Processing, image generation, associated tasks, impacts on society and environment

[Introduction to AI for preparatory classes for higher ed. \(namely, CPES\) – EFELIA Côte d'Azur](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, training process, Neural Networks, evaluation, associated tasks, impacts on society and environment

[Machine Learning & Semantic Web – Polytech Nice Sophia](#)

Introduction to graph machine learning for knowledge graph refinement, some knowledge graph embedding models, link prediction, and evaluation

[XML technologies – Polytech Nice Sophia](#)

XML language, DTD, XQuery, XSLT

[Machine learning tutoring – Polytech Nice Sophia](#)

Basics of Machine Learning, supervised and unsupervised learning, neural networks (MLP, CNN), training process, evaluation

[Research project supervision – Polytech Nice Sophia](#)

Academic supervision of a M.Sc. Year 2 student for his research project (subject proposal, supervision, report and oral defense grading)

[Internship academic supervision – Polytech Nice Sophia](#)

Academic supervision of two M.Sc. Year 2 internships: monitoring interns' work in companies, report grading

**2023 – 2024    [Temporary lecturer – TELECOM Nancy – Nancy, France](#)**

[Artificial Intelligence](#)

Artificial Intelligence, supervised and unsupervised learning (e.g., decision trees, neural networks, backpropagation algorithm, multilayer perceptron, K-means, Kohonen maps), Markov decision processes, knowledge graphs and the Semantic Web (RDF, ontologies, OWL reasoning, SPARQL), introduction to advanced AI techniques (e.g., CNN, GNN), applications & limits of AI, eXplainable AI, neuro-symbolic AI

**2022 – 2023    [Temporary lecturer – TELECOM Nancy – Nancy, France](#)**

[Knowledge-based systems](#)

Semantic Web (RDF, ontologies, OWL reasoning, SPARQL)

**2019 – 2020    [Temporary teaching and research fellow – IDMC – Nancy, France](#)**

[Introduction to GNU/Linux and Git<sup>\(EN\)</sup>](#)

Basics of Linux and Git commands

[Ontologies<sup>\(EN\)</sup>](#)

Description Logics, SPARQL

[Algorithms and Programming](#)

Introduction to programming in Python (functional and object-oriented programming)

[Semantic Web<sup>\(EN\)</sup>](#)

First-order logic, Description Logics, Formal Concept Analysis, itemsets, association rules, Knowledge Graphs, Semantic Web (RDF, SPARQL) and applications

[Computability and Complexity<sup>\(EN\)</sup>](#)

Turing machines, uncomputability, undecidability, complexity (e.g., big O notation)

[Computational Complexity](#)

Best, worst, and average case complexity, sorting algorithms, recursion, de-recursion, randomized algorithms, greedy algorithms, dynamic programming, backtracking, data structures (stacks, queues, heaps, graphs)

[Advanced Java Programming](#)

Advanced concepts of the Java language (collections, threads, User Interface)

[Java Programming](#)

Basic concepts of the Java language and Object Oriented Programming

[Web Programming](#)

HTML, CSS, and an introduction to JavaScript

[Algorithmics](#)

Introduction to algorithms (variables, assignments, conditions, loops, subalgorithms)

[Tools and Digital Culture](#)

Proficient use of Word, Excel, and Internet Research

**2016 – 2019    [Teaching assistant – TELECOM Nancy – Nancy, France](#)**

[Artificial Intelligence](#)

Search algorithms (e.g., A\*, alpha-beta pruning), genetic algorithms, constraint satisfaction problems, Markov decision processes, supervised and unsupervised learning (e.g., decision trees, neural networks, backpropagation algorithm, multilayer perceptron, K-means, Kohonen map)

[Knowledge-Based Systems](#)

Semantic Web (RDF, ontologies, OWL, SPARQL), Prolog

[NoSQL Databases](#)

MongoDB, Elasticsearch, Redis, HBase, Neo4J

[Theory of Compilation](#)

LR(0), SLR(1), LR(1) and LALR(1) parsers, Symbol Tables, Abstract Syntax Trees, assembly code generation

[Compiler Implementation Project](#)

Implementation of a compiler with ANTLR, from grammar definition to assembly code generation

[Computer Science Basics](#)

Sorting algorithms, complexity, recursivity, back-tracking, Hoare logic

2015 – 2016 **Temporary lecturer – TELECOM Nancy – Nancy, France**

[Compiler Implementation Project](#)

Implementation of a compiler with ANTLR, from grammar definition to assembly code generation