

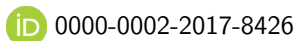
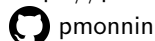
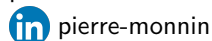
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Junior Fellow in Artificial Intelligence

Summary

I am a Junior Fellow in AI at Université Côte d'Azur, member of the Wimmics team. Previously, I was a researcher in Artificial Intelligence in the industry, with Orange, in Belfort, France. I received my Doctoral degree in Computer Science from Université de Lorraine, Nancy, France, in 2020.

My research focuses on the different steps of the knowledge graph lifecycle (construction, knowledge discovery, matching, refinement, mining), and their usage in various downstream applications (e.g., recommender systems, explainable AI). I am particularly interested in interactions between domain knowledge represented in knowledge graphs and different forms of reasoning in a neurosymbolic perspective (e.g., benefits of injecting domain knowledge in Machine Learning models, analogical reasoning). 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 positions

Since Sept. 2023 **Junior Fellow in AI – Université Côte d’Azur – Sophia Antipolis, France**

Research within the Wimmics team

Teaching within EFELIA Côte d’Azur (~ 128h of teaching)

2023 – 2024 **Temporary lecturer – TELECOM Nancy – Nancy, France**

18-hour class about artificial intelligence

Education

2016 – 2020 **PhD in Computer Science – Université de Lorraine – Nancy, France**

Matching and mining in knowledge graphs of the Web of data

Applications in pharmacogenomics

- Knowledge matching: identification of identical, more specific, or related knowledge units
 - Rule-based approach with ontology-based preorders (ICCS 2020 [12])
 - Graph embedding and clustering-based approach with Graph Convolutional Networks (DL4KG@ESWC 2019 [4], Semantic Web Journal [20])
- Knowledge mining
 - Scalable mining of path patterns (ALGOS 2020 [11])
 - Extension of Formal Concept Analysis to refine ontology class hierarchies (ISMIS 2017 [13], BDA 2017 (poster) [31], FCA4AI@IJCAI-ECAI 2018 [22])
- Explainable AI
 - Interpretable features and models to reproduce expert classifications of drugs causing or not side effects (post-hoc explanations) (BMC Medical Informatics and Decision Making [5])
- Throughout all works: importance of domain knowledge represented in ontologies
- Applications on real data in pharmacogenomics: more than 50k n -ary relationships linking sets of drugs, genetic factors, and phenotypes, from heterogeneous sources (different vocabularies, levels of granularity)
- Construction and maintenance of PGxLOD, a knowledge graph about pharmacogenomics (BMC Bioinformatics [6])
- Emphasis on Open Science
 - Codes on GitHub
 - Public knowledge graph and ontology
 - Deployability and reproducibility with Docker containers

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)

Directeurs de thèse :

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

Thesis written and defended in English on December 16th, 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

- 2020 – 2023 **Researcher – Orange – Belfort, France**
 Permanent contract
 Knowledge Engineering and Machine Learning for knowledge graph construction and refinement
- 2022 – 2023 **Temporary lecturer – TELECOM Nancy – Nancy, France**
 8-hour class about knowledge-based systems
- 2016 – 2020 **PhD student in Computer Science – LORIA / Université de Lorraine – Nancy, France**
- 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 **Temporary lecturer – TELECOM Nancy – Nancy, France**
 ~14h of teaching
- 2015 – 2016 **Software developer – Swiss AviationSoftware – R&D department – Basel, Switzerland**
 6-month internship; followed by a permanent contract
Development of a UI component to display animated 3D models from aircraft documentation
State of the art, software architecture, test driven development, and continuous integration
- 2010 – 2015 **Private teacher – Student tutoring associations**
 Private lessons or groups of 10 to 30 students
 Mathematics, programming, compiler theory, signal processing
- 2014 **Student Entrepreneurship Department (Peel) – Université de Lorraine – Nancy, France**
 3-month internship; entrepreneurial project
Technical development (image processing, video mapping), training (financing, legal, communication), client and shareholder meetings, market analysis
- 2013 **Caisse d'Epargne – Human Resources Information System – Metz, France**
 3-month fixed-term contract
 Development of a software analyzing HR databases to automatically produce organization charts (divisions, positions, people)
Software architecture, technical development, user support and training
- 2012 **Caisse d'Epargne – Human Resources Information System – Metz, France**
 9-week internship
 Agile development of a software for career management within a 3-person team

Awards

- **Best paper award [9]** at the 23rd International Conference on Knowledge Engineering and Knowledge Management (EKAW 2022)
- **Best paper award [28]** at the French Conference IC ("Ingénierie des connaissances" - Knowledge Engineering) 2022 co-located with PFIA 2022

- **Best thesis award [35]** at French Conference EGC 2022, awarded by the French Association EGC ("Extraction et Gestion des Connaissances" - Knowledge Extraction and Engineering)
- **1st prize [18]** (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)
- **3rd prize [19]** 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

ECLADATTA (2023 – 2026)	<p>Principal Investigator (2023); Associate Member (2023 – 2026) French National Research Agency (ANR) Generic Call 2022</p> <p>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 associated member.</p> <p>Funding for my institution (Orange): 196k€ Total project funding: 601k€ Partners: EURECOM, IRIT, Orange (PI)</p>
AT2TA (2023 – 2026)	<p>Investigator French National Research Agency (ANR) Generic Call 2022</p> <p>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.</p> <p>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</p>

Community services

Event organization activities

Neuro-symbolic AI 2023	<p>Co-general chair with Zied Bouraoui International workshop supported by AFIA and GDR RADIA Co-located with the international conference ECSQARU 2023 ~ 80 attendees</p>
PGx Track	<p>Co-organizer with Adrien Coulet Within the Ontology Alignment Evaluation Initiative 2023 (OAEI 2023)</p>
ATA 2023	<p>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</p>
ISWC 2022	<p>Proceedings & Metadata co-chair with Giuseppe Pirrò 21st International Semantic Web Conference ~ 500 attendees</p>
ATA 2022	<p>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</p>
ALGOS 2020	<p>General co-chair with Miguel Couceiro and Amedeo Napoli International conference on ALgebras, Graphs and Ordered Sets ~ 200 attendees</p>

Reviewing activities

- 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 on Tools & Systems of the Semantic Web Journal (Guest Editorial Board member)
 - Semantic Web Journal
 - Journal of Web Semantics
 - AI Communications
 - International Journal of Approximate Reasoning
 - Discrete Mathematics & Theoretical Computer Science
 - Communications Medicine
 - SoftwareX
- Conferences
 - International conference ISWC 2023 (Research Track Program Committee member)
 - International conference ECML-PKDD 2023 (Research Track Program Committee member)
 - International conference EKAW 2022 (additional reviewer)
 - International conference MedInfo 2021 (reviewer)
 - International conference IJCAI 2019 (assistant reviewer)
- Workshops
 - International workshop DL4KG, co-located with ISWC 2023 (Program Committee member)
 - International workshop AIMLAI, co-located with ECML-PKDD 2023 (subreviewer)
 - International workshop IARML, co-located with IJCAI 2023 (Program Committee member)
 - International workshop DL4KG, co-located with ISWC 2022 (Program Committee member)
 - International workshop IARML, co-located with IJCAI-ECAI 2022 (Program Committee member)
- Funding agencies
 - Région Normandie – WINNINGNormandy Fellowship Program (2022)

Miscellaneous

- 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)

Student supervision

PhD students (2)

- Mar. 2023 – Mar. 2026 **Lucas Jarnac – Orange / Université de Lorraine**
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)
Publication: [8, 14, 26, 32]
- Sept. 2021 – Sept. 2024 **Nicolas Hubert – Université de Lorraine**
Even though I am not his supervisor, I have the chance of working with Nicolas and his supervisors (Armelle Brun and Davy Monticolo) on his thesis about knowledge graphs and explainable recommender systems for education
Publications: [2, 7, 9, 15]

Interns and student projects (17)

Oct. 2023 – Mar. 2024	Lynda Attouche, M.Sc. Year 2 (Bac+5) 6-month research project Improving automatic text classification by leveraging class hierarchies Co-supervised with Catherine Faron and Molka Dhouib
Oct. 2023 – Mar. 2024	Guillaume Mérroué, M.Sc. Year 2 (Bac+5) 6-month research project Analogical Reasoning for Link Prediction in Knowledge Graphs Co-supervised with Miguel Couceiro
Oct. 2023 – Jun. 2024	Mohammad Al Takach, Abbas Awarkeh, Bassem Jaber, M.Sc. Year 1 (Bac+4) 8-month research project Analogical Reasoning for Link Prediction in Knowledge Graphs Co-supervised with Miguel Couceiro
Jun. 2023 – Aug. 2023	Adrien Chassaing-Monjou, M.Sc. Year 1 (Bac+4) 3-month internship Exploring analogical proportions to align Knowledge Graphs Co-supervised with Miguel Couceiro and Esteban Marquer
Oct. 2022 – Jun. 2023	Omar Abedelkader, Juba Ait-Abdelmalek, Ekaterina Kozachenko, M.Sc. Year 1 (Bac+4) 8-month research project Exploring analogies for automatic semantic annotation taking into account context Co-supervised with Stergos Afantenos, Miguel Couceiro, and Esteban Marquer
Oct. 2022 – Jun. 2023	Adrien Chassaing-Monjou, Chadi Hani, M.Sc. Year 1 (Bac+4) 8-month research project Exploring analogical proportions between and within Knowledge Graphs Co-supervised with Miguel Couceiro and Esteban Marquer
Sept. 2022 – Feb. 2023	Li-Fan Zhao, M.Sc. Year 2 (Bac+5) 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	Lucas Jarnac, M.Sc. Year 2 (Bac+5) 6-month internship Creation of an Enterprise Knowledge Graph: bootstrapping and knowledge reconciliation Publication: [14]
Jun. 2019 – Aug. 2019	Melvin Moreau, B.Sc. Year 2 (IUT Bac+2) 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	Benoît Frapiccini, Gabi Portelli, M.Sc. Year 1 (Bac+4) 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	Graziella Husson, M.Sc. Year 1 (Bac+4) 3-month internship Refining PGxLOD (integrating Linked Open Data sets, transforming PharmGKB data into RDF) Co-supervised with Adrien Coulet Publication: [6]

Available software and data

- 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.7526244>
- 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>
- 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>
- Code of other experiments on GitHub
<https://github.com/pmonnin>

Technical skills

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, \LaTeX
Operating systems	Windows, macOS, Linux (bash scripting)
Project management	Agile methods (Scrum), Test Driven Development

Languages

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

Miscellaneous

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

Publications

6 selected publications

- **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), 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 considering 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 corresponds 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.

- Emmanuel Bresso*, **Pierre Monnin***, Cédric Bousquet, François-Élie Calvier, Ndeye Coumba Ndiaye, Nadine Petitpain, Malika Smâil-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), p. 171. DOI: 10.1186/s12911-021-01518-6

This journal paper proposes to mine features from knowledge graphs and use them in white-box models (here, decision trees) to generate post-hoc explanations for binary classifications representing human knowledge. Here, we mine PGxLOD and reproduce expert classifications of drugs causing or not two types of side effects. We showed that features from knowledge graphs and decision trees allow to reproduce expert classifications with a fair fidelity. Additionally, a manual evaluation by 3 experts of the most discriminative features showed that they may provide molecular explanations to the occurrence of drug side effects.

- **Pierre Monnin**, Joël Legrand, Graziella Husson, Patrice Ringot, Andon Tchechmedjiev, 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), 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.

- Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. “New Strategies for Learning Knowledge Graph Embeddings: The Recommendation Case”. In: *Knowledge Engineering and Knowledge Management - 23rd International Conference, EKAW 2022, Bolzano, Italy, September 26-29, 2022, Proceedings*. Vol. 13514. Lecture Notes in Computer Science. Springer, 2022, pp. 66–80. DOI: 10.1007/978-3-031-17105-5_5

This conference paper investigates whether graph embedding approaches for link prediction can be used for recommendation tasks. Specifically, we view the recommendation task as predicting links with a specific relation. Two specialized training strategies are proposed and evaluated. For each model, a baseline training phase is performed considering the whole knowledge graph, followed by a specialized training phase only considering triples with the relation of interest. The two proposed strategies differ on the generation of negative triples during this specialized phase. One strategy generates random negative triples whereas the other constrains negatives with the types of the original entities in the positive triple. To evaluate models, beside traditional link prediction metrics, we introduce $\text{Sem}@K$, a new metric that captures the ability of models to predict/recommend entities that are of the expected type w.r.t. domain and range of relations. This metric constitutes an original contribution in a neuro-symbolic perspective since it considers domain knowledge during the evaluation of models. This, in turn, allows to precisely qualify the nature of the models errors.

This paper won the best paper award at the EKAW 2022 international conference.

- **Pierre Monnin**, Miguel Couceiro, Amedeo Napoli, and Adrien Coulet. “Knowledge-Based Matching of n -ary Tuples”. In: *Ontologies and Concepts in Mind and Machine - 25th International Conference on Conceptual Structures, ICCS 2020, Bolzano, Italy, September 18-20, 2020, Proceedings*. Vol. 12277. Lecture Notes in Computer Science. Springer, 2020, pp. 48–56. DOI: 10.1007/978-3-030-57855-8_4

This conference paper presents a symbolic approach for the structure-based matching of instances. We enrich this task by not only detecting identical instances, but also more specific or weakly related ones. The proposed mathematical formalism is highly generic and adaptable. It considers n -ary tuples (without constraints on the arity) whose arguments are sets of individuals. The matching is performed with 5 rules concluding on 5 different relatedness levels. Domain knowledge represented within ontologies is leveraged in two preorders to compare arguments while facing their heterogeneous representations.

- Viet-Phi Huynh, Jixiong Liu, Yoan Chabot, Frédéric Deuzé, Thomas Labbé, **Pierre Monnin**, and Raphaël Troncy. “DAGOBAB: Table and Graph Contexts For Efficient Semantic Annotation Of Tabular Data”. In: *Proceedings of the Semantic Web Challenge on Tabular Data to Knowledge Graph Matching co-located with the 20th International Semantic Web Conference (ISWC 2021), Virtual conference, October 27, 2021*. Vol. 3103. CEUR Workshop Proceedings. CEUR-WS.org, 2021, pp. 19–31. URL: <http://ceur-ws.org/Vol-3103/paper2.pdf>

This workshop paper presents the latest version of the DAGOBAB system developed at Orange. DAGOBAB semantically annotates tabular data (e.g., cells, columns) with elements of a knowledge graph (e.g., entities, classes, properties). Annotations allow to semantically interpret tabular data content and can support various applications, e.g., data set indexing and recommendation, knowledge graph or table completion.

This system won the 1st prize in accuracy during the international challenge SemTab 2021 co-located with ISWC 2021. SemTab is the central venue of the Semantic Table Interpretation community.

List of publications

* equal contributions

International journals

- [1] Jiaoyan Chen, Hang Dong, Janna Hastings, Ernesto Jiménez-Ruiz, Vanessa López, **Pierre Monnin**, Catia Pesquita, Petr Škoda, and Valentina Tamma. “Knowledge Graphs for the Life Sciences: Recent Developments, Challenges and Opportunities”. In: *Transactions on Graph Data and Knowledge* (to appear). URL: <https://arxiv.org/pdf/2309.17255.pdf>.
- [2] Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. “Sem@K: Is my knowledge graph embedding model semantic-aware?”. In: *Semantic Web* (to appear). URL: <https://arxiv.org/pdf/2301.05601.pdf>.
- [3] 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), p. 100761. ISSN: 1570-8268. DOI: 10.1016/j.websem.2022.100761.
- [4] **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), pp. 379–398. DOI: 10.3233/SW-210452.
- [5] Emmanuel Bresso*, **Pierre Monnin***, Cédric Bousquet, François-Élie Calvier, Ndeye Coumba Ndiaye, Nadine Petitpain, Malika Smâil-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), p. 171. DOI: 10.1186/s12911-021-01518-6.
- [6] **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), 139:1–139:16. DOI: 10.1186/s12859-019-2693-9.

International conferences

- [7] Nicolas Hubert, Heiko Paulheim, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. “Schema First! Learn Versatile Knowledge Graph Embeddings by Capturing Semantics with MASCHInE”. In: *Proceedings of the 12th International Conference on Knowledge Capture, K-CAP 2023, Pensacola, Florida, USA, December 5-7, 2023*. URL: <https://arxiv.org/pdf/2306.03659.pdf>.
- [8] 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 & Knowledge Management, Birmingham, UK, October 21-25, 2023*. ACM, 2023. URL: <https://arxiv.org/pdf/2306.16296.pdf>.

- [9] Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. "New Strategies for Learning Knowledge Graph Embeddings: The Recommendation Case". In: *Knowledge Engineering and Knowledge Management - 23rd International Conference, EKAW 2022, Bolzano, Italy, September 26-29, 2022, Proceedings*. Vol. 13514. Lecture Notes in Computer Science. Springer, 2022, pp. 66–80. DOI: 10.1007/978-3-031-17105-5_5.
- [10] Yoan Chabot, **Pierre Monnin**, Frédéric Deuzé, Viet-Phi Huynh, Thomas Labbé, Jixiong Liu, and Raphaël Troncy. "A Framework for Automatically Interpreting Tabular Data at Orange". In: *Proceedings of the ISWC 2021 Posters, Demos and Industry Tracks: From Novel Ideas to Industrial Practice co-located with 20th International Semantic Web Conference (ISWC 2021), Virtual Conference, October 24-28, 2021*. Vol. 2980. CEUR Workshop Proceedings. CEUR-WS.org, 2021. URL: <http://ceur-ws.org/Vol-2980/paper413.pdf>.
- [11] **Pierre Monnin**, Emmanuel Bresso, Miguel Couceiro, Malika Smâil-Tabbone, Amedeo Napoli, and Adrien Coulet. "Tackling scalability issues in mining path patterns from knowledge graphs: a preliminary study". In: *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, 2020, pp. 123–137. URL: <http://ceur-ws.org/Vol-2925/paper5.pdf>.
- [12] **Pierre Monnin**, Miguel Couceiro, Amedeo Napoli, and Adrien Coulet. "Knowledge-Based Matching of n-ary Tuples". In: *Ontologies and Concepts in Mind and Machine - 25th International Conference on Conceptual Structures, ICCS 2020, Bolzano, Italy, September 18-20, 2020, Proceedings*. Vol. 12277. Lecture Notes in Computer Science. Springer, 2020, pp. 48–56. DOI: 10.1007/978-3-030-57855-8_4.
- [13] **Pierre Monnin**, Mario Lezoche, Amedeo Napoli, and Adrien Coulet. "Using Formal Concept Analysis for Checking the Structure of an Ontology in LOD: The Example of DBpedia". In: *Foundations of Intelligent Systems - 23rd International Symposium, ISMIS 2017, Warsaw, Poland, June 26-29, 2017, Proceedings*. Vol. 10352. Lecture Notes in Computer Science. Springer, 2017, pp. 674–683. DOI: 10.1007/978-3-319-60438-1_66.

International workshops

- [14] Lucas Jarnac and **Pierre Monnin**. "Wikidata to Bootstrap an Enterprise Knowledge Graph: How to Stay on Topic?" In: *Proceedings of the 3rd Wikidata Workshop 2022 co-located with the 21st International Semantic Web Conference (ISWC2022), Virtual Event, Hangzhou, China, October 2022*. Vol. 3262. CEUR Workshop Proceedings. CEUR-WS.org, 2022. URL: <https://ceur-ws.org/Vol-3262/paper16.pdf>.
- [15] Nicolas Hubert, **Pierre Monnin**, Armelle Brun, and Davy Monticolo. "Knowledge Graph Embeddings for Link Prediction: Beware of Semantics!" In: *Proceedings of the Workshop on Deep Learning for Knowledge Graphs (DL4KG 2022) co-located with the 21th International Semantic Web Conference (ISWC 2022), Virtual Conference, online, October 24, 2022*. Vol. 3342. CEUR Workshop Proceedings. CEUR-WS.org, 2022. URL: <https://ceur-ws.org/Vol-3342/paper-4.pdf>.
- [16] **Pierre Monnin** and Adrien Coulet. "Matching Pharmacogenomic Knowledge: Particularities, Results, and Perspectives". In: *Proceedings of the 17th International Workshop on Ontology Matching (OM 2022) co-located with the 21th International Semantic Web Conference (ISWC 2022), Hangzhou, China, held as a virtual conference, October 23, 2022*. Vol. 3324. CEUR Workshop Proceedings. CEUR-WS.org, 2022, pp. 79–83. URL: https://ceur-ws.org/Vol-3324/om2022_STpaper3.pdf.
- [17] **Pierre Monnin** and Miguel Couceiro. "Interactions Between Knowledge Graph-Related Tasks and Analogical Reasoning: A Discussion". In: *Workshop Proceedings of the 30th International Conference on Case-Based Reasoning co-located with the 30th International Conference on Case-Based Reasoning (ICCBR 2022), Nancy (France), September 12-15th, 2022*. Vol. 3389. CEUR Workshop Proceedings. CEUR-WS.org, 2022, pp. 57–67. URL: https://ceur-ws.org/Vol-3389/ICCBR_2022_Workshop_paper_75.pdf.
- [18] Viet-Phi Huynh, Jixiong Liu, Yoan Chabot, Frédéric Deuzé, Thomas Labbé, **Pierre Monnin**, and Raphaël Troncy. "DAGOBAB: Table and Graph Contexts For Efficient Semantic Annotation Of Tabular Data". In: *Proceedings of the Semantic Web Challenge on Tabular Data to Knowledge Graph Matching co-located with the 20th International Semantic Web Conference (ISWC 2021), Virtual conference, October 27, 2021*. Vol. 3103. CEUR Workshop Proceedings. CEUR-WS.org, 2021, pp. 19–31. URL: <http://ceur-ws.org/Vol-3103/paper2.pdf>.
- [19] Viet-Phi Huynh, Jixiong Liu, Yoan Chabot, Thomas Labbé, **Pierre Monnin**, and Raphaël Troncy. "DAGOBAB: Enhanced Scoring Algorithms for Scalable Annotations of Tabular Data". In: *Proceedings of the Semantic Web Challenge on Tabular Data to Knowledge Graph Matching (SemTab 2020) co-located with the 19th International Semantic Web Conference (ISWC 2020), Virtual conference (originally planned to be in Athens, Greece), November 5, 2020*. Vol. 2775. CEUR Workshop Proceedings. CEUR-WS.org, 2020, pp. 27–39. URL: <http://ceur-ws.org/Vol-2775/paper3.pdf>.

- [20] **Pierre Monnin**, Chedy Raïssi, Amedeo Napoli, and Adrien Coulet. "Knowledge Reconciliation with Graph Convolutional Networks: Preliminary Results". In: *Proceedings of the Workshop on Deep Learning for Knowledge Graphs (DL4KG2019) Co-located with the 16th Extended Semantic Web Conference 2019 (ESWC 2019)*, Portoroz, Slovenia, June 2, 2019. Vol. 2377. CEUR Workshop Proceedings. CEUR-WS.org, 2019, pp. 47–56. URL: http://ceur-ws.org/Vol-2377/paper_6.pdf.
- [21] **Pierre Monnin**. "Discovering and Comparing Relational Knowledge, the Example of Pharmacogenomics". In: *Proceedings of the EKAW Doctoral Consortium 2018 co-located with the 21st International Conference on Knowledge Engineering and Knowledge Management (EKAW 2018)*, Nancy, France, November 13, 2018. Vol. 2306. CEUR Workshop Proceedings. CEUR-WS.org, 2018. URL: <http://ceur-ws.org/Vol-2306/paper5.pdf>.
- [22] **Pierre Monnin**, Amedeo Napoli, and Adrien Coulet. "Combining Concept Annotation and Pattern Structures for Guiding Ontology Mapping". In: *Proceedings of the 6th International Workshop "What can FCA do for Artificial Intelligence" co-located with International Joint Conference on Artificial Intelligence and European Conference on Artificial Intelligence (IJCAI/ECAI 2018)*, Stockholm, Sweden, July 13, 2018. Vol. 2149. CEUR Workshop Proceedings. CEUR-WS.org, 2018, pp. 117–126. URL: <http://ceur-ws.org/Vol-2149/paper11.pdf>.
- [23] **Pierre Monnin**, Clément Jonquet, Joël Legrand, Amedeo Napoli, and Adrien Coulet. "PGxO: A very lite ontology to reconcile pharmacogenomic knowledge units". In: *Methods, tools & platforms for Personalized Medicine in the Big Data Era, NETTAB 2017, Palermo, Italy, October 16-18, 2017*. PeerJ Preprints, 2017. DOI: 10.7287/peerj.preprints.3140v1.

Demos in international conferences

- [24] Christophe Sarthou-Camy, Guillaume Jourdain, Yoan Chabot, **Pierre Monnin**, Frédéric Deuzé, Viet-Phi Huynh, Jixiong Liu, Thomas Labbé, and Raphaël Troncy. "DAGOBAB UI: A New Hope for Semantic Table Interpretation". In: *The Semantic Web: ESWC 2022 Satellite Events - Hersonissos, Crete, Greece, May 29 - June 2, 2022, Proceedings*. Vol. 13384. Lecture Notes in Computer Science. Springer, 2022, pp. 107–111. DOI: 10.1007/978-3-031-11609-4_20.

Abstracts of oral presentations in international conferences

- [25] François-Élie Calvier, **Pierre Monnin**, Miguel Boland, Patryk Jarnot, Emmanuel Bresso, Malika Smaïl-Tabbone, Adrien Coulet, and Cedric Bousquet. "Providing Molecular Characterization for Unexplained Adverse Drug Reactions". Podium Abstract, MedInfo 2019, Lyon, France, August 26-30, 2019. URL: <https://hal.inria.fr/hal-02196134>.

Abstracts of oral presentations in international workshops

- [26] Lucas Jarnac and **Pierre Monnin**. "Wikidata to Bootstrap an Enterprise Knowledge Graph: How to Stay on Topic?" Wiki Workshop (10th edition), May 11, 2023. URL: <https://pmonnin.github.io/publications/jarnac-wikiworkshop-2023.pdf>.
- [27] **Pierre Monnin**, Amedeo Napoli, and Adrien Coulet. "Data-Interlinking: the Seed of Knowledge Reconciliation in Pharmacogenomics". Workshop Symbolic methods for data-interlinking co-located with the 21st International Conference on Knowledge Engineering and Knowledge Management (EKAW 2018), Nancy, France, November 13, 2018. URL: <https://hal.inria.fr/hal-01955262>.

National conferences

- [28] Viet-Phi Huynh, Jixiong Liu, Yoan Chabot, Frédéric Deuzé, Thomas Labbé, **Pierre Monnin**, and Raphaël Troncy. "DAGOBAB: Annotation sémantique de données tabulaires par comparaison du contexte des tables et d'un graphe de connaissances". In: *IC 2022 : 33es Journées francophones d'Ingénierie des Connaissances, Saint-Etienne, France, June 29 - July 1, 2022*. URL: <https://ci.mines-stetienne.fr/pfia2022/conferences/ic/Articles/S-1-Article-1.pdf>.

National workshops

- [29] **Pierre Monnin**, Chedy Raïssi, Amedeo Napoli, and Adrien Coulet. "Combiner plongements de graphes et clustering pour l'alignement de connaissances pharmacogénomiques". In: *Santé & IA 2022 - Journée Santé et Intelligence Artificielle (Evènement affilié à PFIA 2022)*, Saint-Etienne, France, June 28, 2022. URL: <https://hal.inria.fr/hal-03754776>.

Posters in national conferences

- [30] **Pierre Monnin**, Joël Legrand, and Adrien Coulet. *PGxCorpus and PGxLOD: two shared resources for knowledge management in pharmacogenomics*. JOBIM 2022 - Journées Ouvertes en Biologie, Informatique et Mathématiques, Proceedings - Posters, Démonstrations, Rennes, France, July 05-08, 2022. URL: <https://hal.inria.fr/hal-03754888>.
- [31] **Pierre Monnin**, Amedeo Napoli, and Adrien Coulet. *Discovering Subsumption Axioms with Concept Annotation*. BDA 2017 - 33ème Conférence sur la Gestion de Données - Principes, Technologies et Applications, Nancy, France, November 14-17, 2017. URL: <https://hal.inria.fr/hal-01671454>.

Abstracts of oral presentations in national conferences

- [32] Lucas Jarnac, Miguel Couceiro, and **Pierre Monnin**. "Relevant Entity Selection: Knowledge Graph Bootstrapping via Zero-Shot Analogical Pruning". 32èmes Rencontres Francophones sur la Logique Floue et ses Applications (LFA 2023), Bourges, France, November 9-10, 2023.
- [33] 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*. JOBIM 2022 - Journées Ouvertes en Biologie, Informatique et Mathématiques, Proceedings - Keynotes, Contributed talks, Mini-Symposia, Rennes, France, July 05-08, 2022. URL: <https://hal.inria.fr/hal-03754898>.

Abstracts of oral presentations in national workshops

- [34] Yoan Chabot, Thomas Labbé, and **Pierre Monnin**. *DAGOBAH : Des outils pour l'interprétation automatique de données tabulaires*. SemWeb.Pro 2021, Remote, December 9, 2021. URL: <https://2021.semweb.pro/presentations/dagobah/>.

Thesis

- [35] **Pierre Monnin**. "Matching and mining in knowledge graphs of the Web of data - Applications in pharmacogenomics. (Appariement et fouille dans les graphes de connaissances du Web des données - Applications en pharmacogénomique)". PhD thesis. University of Lorraine, Nancy, France, 2020. URL: <https://tel.archives-ouvertes.fr/tel-03122326>.

Editorships

- [36] Ulrike Sattler, Aidan Hogan, Maria Keet, Valentina Presutti, João Paulo A. Almeida, Hideaki Takeda, **Pierre Monnin**, Giuseppe Pirrò, and Claudia d'Amato, eds. *The Semantic Web - ISWC 2022 - 21st International Semantic Web Conference, ISWC 2022, Virtual Event, October 23-27, 2022, Proceedings*. Lecture Notes in Computer Science. Springer, 2022. DOI: 10.1007/978-3-031-19433-7.
- [37] 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

- [38] **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.
- [39] **Pierre Monnin** and Adrien Coulet. "Étudier les mécanismes des effets indésirables des médicaments avec l'IA explicable : 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

- [40] **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.

Invited talks

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.** DAGOBAB : 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.** 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.** DAGOBAB - An End-to-End Context-Free Semantic Annotation System for Tabular Data. MALOTEC seminar, LORIA, February 4, 2021, Nancy, France, Remote.

Non-academic talks

- **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

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

Summary

Year	Class	Level	Lecture	Tutorial	Practical	Resp.
2023 – 2024	AI for Applied Foreign Languages	M.Sc. Year 1	12	12		×
	AI for Adult Education	M.Sc. Year 1	12	12		×
	Artificial Intelligence	M.Sc. Year 2	10	8		×
2022 – 2023	Knowledge-based systems	M.Sc. Year 2	4	4		×
2019 – 2020	Introduction to GNU/Linux and Git ^(EN)	M.Sc. Year 2		4		
	Ontologies ^(EN)	M.Sc. Year 2		6		
	Algorithms and programming	M.Sc. Year 1		15		
	Semantic Web ^(EN)	M.Sc. Year 1		15		
	Computability and Complexity ^(EN)	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		
	Web Programming	B.Sc. Year 1		14		
	Algorithmics	B.Sc. Year 1		22		
	Tools and Digital Culture	B.Sc. Year 1		20		
2018 – 2019	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	
2017 – 2018	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	
2016 – 2017	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	
2015 – 2016	Compiler Implementation Project	M.Sc. Year 1			14	
Total			87h	295h	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).

Class descriptions

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

[Introduction to Artificial Intelligence for Applied Foreign Languages](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, Training Process, Neural Networks, Evaluation, Natural Language Processing, and associated tasks

[Introduction to Artificial Intelligence for Adult Education](#)

Introduction to Artificial Intelligence, Machine Learning, Deep Learning, Training Process, Neural Networks, Evaluation, Natural Language Processing, and associated tasks

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, Stable Diffusion, Transformers, LLM), 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^{\(EN\)}](#)

Basics of Linux and Git commands

[Ontologies^{\(EN\)}](#)

Description Logics, SPARQL

[Algorithms and Programming](#)

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

[Semantic Web^{\(EN\)}](#)

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

[Computability and Complexity^{\(EN\)}](#)

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

[Algorithms](#)

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