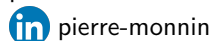


# Pierre Monnin

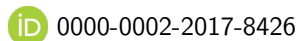
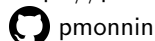
Techn Hom 3 - Orange Labs  
1, rue Maurice et Louis de Broglie  
90000 Belfort – France



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<https://pmonnin.github.io>



## Researcher in Artificial Intelligence

### Summary

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I am 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 knowledge discovery, matching, mining, and 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 am the Principal Investigator of the ECLADATTA French national project and Investigator of the AT2TA French national project (both funded by the French National Research Agency).

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## Current positions

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- Since Sept. 2020 **Researcher – Orange – Belfort, France**  
Permanent Contract  
Knowledge Engineering and Machine Learning for knowledge graph construction and refinement
- Nov. 2022 **Temporary lecturer – TELECOM Nancy – Nancy, France**  
8-hour class about knowledge-based systems

## Education

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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 [8])
  - Graph embedding and clustering-based approach with Graph Convolutional Networks (DL4KG@ESWC 2019 [2], Semantic Web Journal [16])
- Knowledge mining
  - Scalable mining of path patterns (ALGOS 2020 [7])
  - Extension of Formal Concept Analysis to refine ontology class hierarchies (ISMIS 2017 [9], BDA 2017 (poster) [26], FCA4AI@IJCAI-ECAI 2018 [18])
- 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 [3])
- 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 [4])
- 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 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	<b>Engineering Diploma (M.Sc. equivalent) – TELECOM Nancy – Nancy, France</b> Major in Software engineering – Valedictorian <a href="#">Engineering master thesis</a> <i>3D visualization applied to aircraft MRO.</i> <i>What purposes? What technologies? What developments?</i> Based on my internship at Swiss AviationSoftware – Graded 17/20
2010 – 2012	<b>Integrated preparatory class – ECE – Paris, France</b> Valedictorian
2010	<b>Scientific Baccalaureate – Lycée Stanislas – Villers-Lès-Nancy, France</b> Major in Mathematics – with distinction

## Previous professional positions

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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 <i>State of the art, software architecture, test driven development, and continuous integration</i>
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 <i>Technical development (image processing, video mapping), training (financing, legal, communication), client and shareholder meetings, market analysis</i>
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) <i>Software architecture, technical development, user support and training</i>
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 paper award [5]** at the 23rd International Conference on Knowledge Engineering and Knowledge Management (EKAW 2022)
- **Best paper award [23]** at the French Conference IC ("Ingénierie des connaissances" - Knowledge Engineering) 2022 co-located with PFIA 2022
- **Best thesis award [29]** 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 [14]** (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 [15]** 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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- ECLADATTA (2023 – 2026)    **Principal Investigator** – French National Research Agency (ANR) Generic Call 2022  
I lead this 42-month project which aims at proposing a joint pipeline for extracting and reconciling knowledge from texts, tables, and knowledge graphs.  
Funding for my institution (Orange): 196k€ – Total project funding: 601k€  
Partners: EURECOM, IRIT, Orange
- AT2TA (2023 – 2026)    **Investigator** – 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.  
Funding for my institution (Orange): 30k€ – Total project funding: 669k€  
Partners: LORIA (PI), IHU Imagine, IRIT, Inria, Infologic, Orange

## Community services

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### Event organization activities

- 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

- Journals
  - Journal of Web Semantics
  - Special Issue on Tools & Systems of the Semantic Web Journal (Guest Editorial Board member)
  - Discrete Mathematics & Theoretical Computer Science
  - Communications Medicine
- Conferences
  - 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 2022 (Program Committee member)
  - International workshop IARML, co-located with IJCAI-ECAI 2022 (Program Committee member)
- Funding agencies
  - French National Research Agency (Agence Nationale de la Recherche – ANR)

### Miscellaneous

- Member of the “Cognitive AI” W3C Community Group

## Student supervision

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### PhD students

- From Feb. 2023 **Lucas Jarnac – Orange / Université de Lorraine**  
Reconciliation of uncertain knowledge from heterogeneous sources for knowledge graph refinement  
Co-supervised with Miguel Couceiro
- 2021 – ongoing **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: [5, 11]

### Interns and student projects (11)

- 2022 – 2023 **Omar Abdelkader, 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
- 2022 – 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
- 2022 – 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
- 2022 **Lucas Jarnac, M.Sc. Year 2 (Bac+5)**  
6-month internship  
Creation of an Enterprise Knowledge Graph: bootstrapping and knowledge reconciliation  
Publication: [10]
- 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
- 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
- 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: [4]

### 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.7526244>)
- Code of 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, $\text{\LaTeX}$
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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### 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  $Sem@K$ , 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 1<sup>st</sup> 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] 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.
- [2] **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.
- [3] 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.
- [4] **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

- [5] 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.
- [6] 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>.
- [7] **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>.
- [8] **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.
- [9] **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

- [10] 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: <http://ceur-ws.org/Vol-3262/paper16.pdf>.
- [11] 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 (DL4KG2022) co-located with the 21st International Semantic Web Conference (ISWC 2022), Hangzhou, China, October 24, 2022, moved online (to appear)*. URL: <https://hal.archives-ouvertes.fr/hal-03787512>.



- [12] **Pierre Monnin** and Adrien Coulet. "Matching Pharmacogenomic Knowledge: Particularities, Results, and Perspectives". In: *Proceedings of the 17th International Workshop on Ontology Matching co-located with the 21st International Semantic Web Conference (ISWC 2022), Hangzhou, China, October 23, 2022, moved online (to appear)*. URL: <https://pmonnin.github.io/publications/monnin-om-2022.pdf>.
- [13] **Pierre Monnin** and Miguel Couceiro. "Interactions Between Knowledge Graph-Related Tasks and Analogical Reasoning: A Discussion". In: *Proceedings of ICCBR Analogies'22: Workshop on Analogies: from Theory to Applications at ICCBR 2022, September 12, 2022, Nancy, France (to appear)*.
- [14] 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>.
- [15] 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>.
- [16] **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](http://ceur-ws.org/Vol-2377/paper_6.pdf).
- [17] **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>.
- [18] **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>.
- [19] **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

- [20] 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

- [21] François-Élie Calvier, **Pierre Monnin**, Miguel Boland, Patryk Jarnot, Emmanuel Bresso, Malika Smail-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

- [22] **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

- [23] 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

- [24] **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

- [25] **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>.
- [26] **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

- [27] Emmanuel Bresso\*, **Pierre Monnin\***, Cédric Bousquet, François-Élie Calvier, Ndeye Coumba Ndiaye, Nadine Petitpain, Malika Smail-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

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

## Thesis

- [29] **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

- [30] 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.
- [31] 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

- [32] **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.
- [33] **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>.

## 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**. 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 graphs: construction, matching, and applications. CRIL seminar, January 12, 2023, Lens, France.
- **Pierre Monnin**. Knowledge graphs: construction, matching, and mining. 7th IJunior 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

- 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 <sup>(EN)</sup> were taught in English. Other classes were taught in French.

### Summary

Year	Class	Level	Lecture	Tutorial	Practical	Resp.
2022 – 2023	Knowledge-based systems	M.Sc. Year 2	4	4		×
2019 – 2020	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		
	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	
<b>Total</b>			<b>53h</b>	<b>263h</b>	<b>96h</b>	

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

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