Aurélien Vannieuwenhuyze

AI Researcher in Healthcare Data Science
Temporal Neuro-Symbolic Systems and Explainable AI

18 years of professional experience

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RESEARCH INTERESTS

I am interested in interdisciplinary research at the intersection of machine learning, knowledge representation, and healthcare data.

My work focuses on temporal modeling of clinical events, explainable AI, and hybrid (neuro-symbolic) approaches for extracting knowledge from complex medical data.

I am open to research collaborations and international opportunities, including postdoctoral positions.

PROFILE

With 18 years of experience in IT and digital transformation, I have spent the past 6 years specializing in clinical data science and higher education (undergraduate and graduate levels).

I am currently conducting PhD research at CNAM (ISID Laboratory), focusing on neuro-symbolic AI applied to intensive care clinical data. My work specifically targets the detection of catheter-associated urinary tract infections (CAUTI).

My profile combines strong operational experience in complex environments, rigorous scientific methodology, and a proven ability to deliver advanced technical knowledge.

My work is driven by the goal of bridging data-driven AI and the understanding of underlying clinical and biological processes.

EDUCATION

PhD in Artificial Intelligence — CNAM (ISID Laboratory) **Since 2024**
Thesis: "Neuro-symbolic extraction of causal rules in multimodal temporal knowledge graphs applied to intensive care."

University Diploma in Intensive Care — University of Lille **Ongoing**
Focus on ICU physiology, healthcare-associated infections, and clinical decision-making.

Engineering Degree (AI and Optimization) — CNAM **2024**
Specialization in data architectures and optimization algorithms.

Executive Certificates — HEC Paris **2014 – 2016**
Digital transformation and innovation strategy.

Higher Technical Degree (DEST) — CNAM Valenciennes **2004**
Information systems design and implementation.

RESEARCH

My research focuses on neuro-symbolic temporal AI, at the intersection of deep learning and logical reasoning, for knowledge extraction from heterogeneous data.

Key Topics:

- Causality & Graphs: Extraction of causal rules from evolving knowledge graphs.
- Explainable AI (XAI): Modeling complex temporal event sequences.
- Hybrid AI: Neural learning constrained by expert knowledge (expert-in-the-loop).
- Modeling patient trajectories and healthcare pathways from longitudinal data.

Clinical Application: Automated detection of healthcare-associated infections in ICU, with a focus on catheter-associated urinary tract infections (CAUTI).

Scientific Objective: Move beyond black-box models by extracting interpretable temporal logical rules to support clinical decision-making in critical care, and more broadly to move from predictive models to structured representations of clinical processes.

PUBLICATIONS

Artificial Intelligence Publications

- Vannieuwenhuyze, A., Mimouni, N., Du Mouza, C. (2025). *A Conceptual Model for Discovering Implicit Temporal Knowledge in Clinical Data*. International Conference on Conceptual Modeling (ER 2025), Springer.

Medical Publications (Co-author)

- Adrie, C. et al. (2017). Attributable mortality of ICU-acquired bloodstream infections. *Journal of Infection*.
- Barbier, F. et al. (2016). Colonization and infection with ESBL-producing Enterobacteriaceae in ICU patients. *Journal of Antimicrobial Chemotherapy*.
- Adrie, C. et al. (2017). Persistent lymphopenia as a risk factor in ICU patients. *Annals of Intensive Care*.

Books

- Vannieuwenhuyze, A. (2019). *Artificial Intelligence Made Simple*. ENI Editions.
- Vannieuwenhuyze, A. (2020). *Inteligencia Artificial Fácil*. ENI Editions.
- Subra, J.-P., Vannieuwenhuyze, A. (2019). *Scrum: Agile Project Management*. ENI Editions.

TEACHING EXPERIENCE

Independent Lecturer (Undergraduate & Graduate). Total: +230 hours.
Responsible for course design, assessment, and pedagogical consistency.

Catholic University of Lille (FGES) — MSc Data & AI — BSc Digital Studies
MSc Year 2: Advanced NLP (28h), Advanced Machine Learning (34h), Time Series (28h).
MSc Year 1: Statistical Modeling (40h), NLP (34h).
BSc Year 1: Mathematical Analysis Tools (28h).

Junia — Bachelor Year 3
Introduction to Artificial Intelligence (40h).

PROFESSIONAL EXPERIENCE

Healthcare and Clinical Research

PhD Researcher in Artificial Intelligence **Since 2024**
CNAM – ISID Laboratory *Paris*

Research topic: Neuro-symbolic AI applied to ICU clinical data, focusing on CAUTI detection.

- Analysis and modeling of longitudinal clinical data from ICU units.
- Development of hybrid models combining machine learning and symbolic reasoning.
- Application of biostatistics and temporal modeling to clinical event analysis.
- Construction and exploitation of clinical knowledge graphs integrating structured and textual data.
- Research on explainability of AI models in critical care environments.

Data Scientist – Deep Learning in Clinical Research **2022 – 2025**
ICUREsearch *France*

- DeepCath Project: Computer vision models for catheter infection detection.
- Antibiotherapy Project: Predictive modeling for antibiotic adequacy.
- Multimodal Data: Integration and modeling of heterogeneous clinical datasets.
- Clinical Interface: Close collaboration with medical research teams.

Clinical Data Engineering (ICU) **2012**
Outcomerea – E-Rhea Project *France*

- Development of ICU clinical databases.
- Data quality control and normalization.

- Participation in epidemiological analyses.
- Collaboration with INSERM research teams.
- Implementation of automated data validation mechanisms.

Previous Experience

IT Project Management and Organizational Transformation **2006 – 2021**
Retail Sector *France*

- Information systems design and deployment.
- Management of multidisciplinary teams.
- Agile methodologies and continuous improvement.