Cédric Caruzzo

AI Research Scientist | Reliable Foundation Models

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Research focus. I study how biomedical foundation models adapt, generalize, and fail when their data, tasks, or evidence change. My work spans representation learning, post-training, retrieval, and evidence-grounded evaluation, with an emphasis on reliable systems under distribution shift.

Selected Publications and Research Outputs

Deceptive Grounding: Entity Attribution Failure in Clinical Retrieval-Augmented Generation 2026
C. Caruzzo, D. Yoo, T. S. Kim. *arXiv:2607.09349*. Paper | Project page
Conceived and led the study from benchmark design and software through formal analysis, production validation, visualization, and writing. Across 13 models and 740 production pairs, identified a clinical RAG failure missed by standard faithfulness checks; entity-attribution verification reached 97.0% precision and 98.7% recall.

CellPainTR: Generalizable Representation Learning for Cross-Dataset Cell Painting Analysis 2025
C. Caruzzo, J. C. Ye. *arXiv:2509.06986*. Paper | Code | Project page
Developed a Transformer with source-context tokens and a staged self-supervised and contrastive curriculum, enabling out-of-distribution generalization to an unseen Cell Painting dataset without target-dataset fine-tuning.

Wolbachia detection in Aedes aegypti using MALDI-TOF MS coupled to artificial intelligence 2021
A. Rakotonirina, **C. Caruzzo**, V. Ballan, et al. *Scientific Reports 11, 21355*. Paper
Developed machine-learning and interpretable feature-extraction methods for vector-control research using mass-spectrometry data.

Cellular Phenotypic Profiling: Combining Live Imaging and Cell Painting Techniques 2024
S. Park, **C. Caruzzo**, N. Lee, et al. Poster, *SLAS Europe*, Barcelona. Poster
Cross-institutional work on live-cell and endpoint morphological profiling for high-content drug discovery.

Education

Korea Advanced Institute of Science and Technology (KAIST) **Daejeon, South Korea**
M.S. in Artificial Intelligence, Kim Jaechul Graduate School of AI Feb 2023 - Feb 2025

- Thesis: *Development of Foundation Models in the Context of Cell Painting*. Advisor: Prof. Jong Chul Ye.
- KAIST Global Presidential Scholarship, full tuition and stipend, 2023-2025.

Université de la Nouvelle-Calédonie **Nouméa, New Caledonia**
B.S. in Computer Science Feb 2019 - Feb 2021

- Undergraduate research with the Institute of Exact and Applied Sciences and Institut Pasteur New Caledonia; advisor: Prof. Nazha Selmaoui-Folcher.

Research Experience

Lunit **Seoul, South Korea**
AI Research Scientist Mar 2025 - Present

- Own post-training and evaluation pipelines for large medical language models in the Chain of Evidence program, including training-data design, benchmark construction, retrieval, and knowledge-grounded reasoning.
- Led the comparative evaluation and production adoption of self-distillation fine-tuning for medical-model adaptation, with an emphasis on acquiring new knowledge while retaining existing capabilities.
- Develop self-supervised Vision Transformers for whole-slide pathology, studying positional encoding, optimization, and transfer at scale; built fault-tolerant distributed inference orchestration for clinical-scale image collections.
- Led *Deceptive Grounding* end to end, turning an observed production failure into a controlled factorial benchmark, causal ablation, human-validated production study, and practical verification method.

Research Experience (continued)

KAIST, Bio Imaging, Signal Processing and Learning Lab — **Daejeon, South Korea**

Graduate Researcher, advisor: Prof. Jong Chul Ye — Feb 2023 - Feb 2025

- Developed CellPainTR for batch-robust biological representation learning across heterogeneous Cell Painting datasets, with explicit evaluation under dataset, batch, and feature shift.
- Developed ChemPainTR, a dual-encoder framework for bidirectional chemical-to-phenotype translation.

Institut Pasteur Korea, Pasteur International Unit AI3D — **Seongnam, South Korea**

Consultant, Data Science — Feb 2023 - Nov 2024

Research Scientist Intern — Oct 2021 - Feb 2023

- Designed the institute's primary analysis pipeline for high-content screening and extended Cell Painting workflows for phenotypic drug discovery, batch harmonization, and scalable experiment analysis.
- Collaborated with biologists, chemists, and data scientists across Institut Pasteur Korea and Paris; contributed to the SLAS Europe 2024 live-cell phenotypic-profiling poster.

Institut Pasteur New Caledonia and ISEA — **Nouméa, New Caledonia**

Research Intern, Machine Learning for Infectious Disease — Oct 2020 - Oct 2021

- Built classification and interpretable deconvolution methods for MALDI-TOF mass spectrometry, supporting Wolbachia, mosquito-species, and leptospirosis studies with public-health and hospital collaborators.

Research Leadership and Communication

- Revived and lead a recurring research-paper study program for Lunit's AI organization, preparing technical syntheses and presentations for cross-team discussion.
- Author long-form technical articles for Lunit's official technical publication on post-training, reasoning models, and model evaluation, including *You Could Have Invented Dr.GRPO Yourself*.

Methods and Technical Skills

Research methods: controlled experiment design, ablations, benchmark construction, human evaluation, statistical analysis, representation analysis.

Modeling: Transformers, self-supervised and contrastive learning, SFT, self-distillation, RL post-training, retrieval-augmented generation, knowledge graphs, agentic systems.

Engineering: Python, PyTorch, distributed multi-GPU training and inference, NCCL, vLLM, Docker, experiment tracking.

Languages: French (native), English (fluent).