

Luis Carlos Rivera Monroy

Machine Learning Researcher in
Computational Pathology | Biomedical
Engineer

* 06 June 1995

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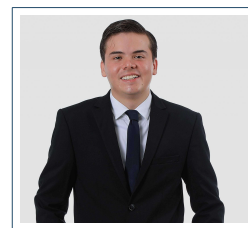
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Professional Experience

- 09/2024 – Present **Senior Machine Learning Scientist**, MIRA Vision GmbH, Germany
- Research and development of machine learning methods for digital pathology applications.
 - Development of cloud-based infrastructure for large-scale synthetic medical image generation.
 - Design and implementation of simulation pipelines for synthetic pathology datasets.
- 12/2020 – Present **Academic Researcher**, Pattern Recognition Lab, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen, Germany
- Research in deep learning for computational pathology and medical image analysis.
 - Development of deep learning models and analysis pipelines using PyTorch, NumPy, and OpenCV.
 - Supervision of Bachelor's and Master's theses in medical image analysis.
 - Teaching assistant for *Medical Image Processing for Interventional Applications* and *Medical Image Processing for Diagnostic Applications*.
- 12/2017 – 09/2020 **Working Student**, HMG Systems Engineering, Fürth, Germany
- Development of automated testing pipelines for mobile applications on iOS and Android.
 - Quality assurance and testing for medical software applications.
- 04/2017 – 06/2018 **Undergraduate Research Assistant**, Biomedical Computer Vision, Universidad de los Andes, Bogotá, Colombia
- Research on segmentation and classification of brain tumors in magnetic resonance imaging (MRI).

Education

- 12/2020 – Present **PhD Candidate**, Pattern Recognition Lab, FAU, Erlangen, Germany
- Research on graph-based frameworks for multimodal histopathology analysis.
 - Development of multimodal deep learning models using Transformers, CNNs, LSTMs, and Graph Neural Networks.
- 10/2017 – 06/2020 **M. Sc. in Medical Engineering**, FAU, Erlangen, Germany
- Emphasis on medical image and data processing.
 - Master's thesis: *Emotion Recognition Guided by Gaze and Context on Images*.
- 01/2013 – 05/2017 **B. Eng. in Biomedical Engineering**, Universidad de los Andes, Bogotá, Colombia

Research Interests

Computational pathology, medical image analysis, multimodal learning, vision transformers, graph neural networks, synthetic medical data generation

Awards and Honors

- 2025 **Winner — BraTS Pathology Challenge**, MICCAI 2025

Technical Skills

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|---------------|---------------------|
| Programming | Python, MATLAB, C++ |
| Deep Learning | PyTorch, TensorFlow |

Libraries NumPy, SciPy, Pandas, OpenCV, Matplotlib
Tools Git, Linux, HPC clusters, AWS, DVC, Ray, $\text{\LaTeX}$

Languages

Spanish — Native
English — C1 (IELTS 7.0)
German — B1 (TELC)

Selected Publications

Journal Articles

- 2026 **L. Rivera**, A. Petzold, M. Sari, K. Breininger, A. Maier, J. Vera-Gonzalez, et al. “Vision transformer-based diagnosis of psoriasis and eczema in whole-slide histology”. In: *Virchows Archiv : an international journal of pathology*.
- 2025 **L. Rivera**, L. Rist, C. Ostalecki, A. Bauer, J. Vera, K. Breininger, and A. Maier. “Graph neural networks in multi-stained pathological imaging: extended comparative analysis of Radiomic features”. en. In: *Int. J. Comput. Assist. Radiol. Surg.* 20.3, pp. 497–505.
- A. Petzold, A. Wessely, M. Erdmann, S. Schliep, S. Schreml, **L. Rivera**, J. Vera, K. Drexler, D. Niebel, K. M. Hayani, et al. “An artificial intelligence model of whole-slide pathology specimens differentiating cutaneous high-grade squamous proliferations”. In: *Virchows Archiv : an international journal of pathology* 487.5.
- F. Wilm, **L. Rivera**, M. Öttl, L. Mürdter, L. Mill, and A. Maier. “A COCO-Formatted Instance-Level Dataset for Plasmodium Falciparum Detection in Giemsa-Stained Blood Smears”. In: *Machine Learning for Biomedical Imaging* 3, pp. 849–855.
- 2024 **L. Rivera**, L. Rist, F. Wilm, C. Ostalecki, A. Baur, J. Vera, K. Breininger, and A. Maier. “Multi-level cancer profiling through joint cell-graph representations”. In: *Smart Health* 32.
- 2020 J. Maier, **L. Rivera**, C. Syben, Y. Jeon, J.-H. Choi, M. Hall, M. Levenston, G. Gold, R. Fahrig, and A. Maier. “Multi-Channel Volumetric Neural Network for Knee Cartilage Segmentation in Cone-Beam CT”. In: *Bildverarbeitung für die Medizin* 1, pp. 67–72.
- 2018 S. Bakas, M. Reyes, A. Jakab, and et al. “Identifying the Best Machine Learning Algorithms for Brain Tumor Segmentation, Progression Assessment, and Overall Survival Prediction in the BRATS Challenge”. In: arXiv: 1811.02629.
- 2017 L. Castillo, L. Daza, **L. Rivera**, and P. Arbeláez. “Volumetric multimodality neural network for brain tumor segmentation”. In: *Proc.SPIE* 10572.

Conference Proceedings

- 2025 **L. Rivera**, L. Pfaff, T. Wang, N. Kleuser, and A. Maier. “Graph-Aided Diffusion Models for Precision Segmentation of Challenging Tumor Areas in MRI”. In: *ISMRM 2025 Abstracts, International Society for Magnetic Resonance in Medicine*. Conference dates: May 10–15, 2025. Honolulu, Hawaii, USA.
- 2024 **L. Rivera**, L. Rist, M. Eberhardt, C. Ostalecki, A. Bauer, J. Vera, K. Breininger, and A. Maier. “Comparative Analysis of Radiomic Features and Gene Expression Profiles in Histopathology Data using Graph Neural Networks”. In: *Bildverarbeitung für die Medizin 2024*. Wiesbaden: Springer Fachmedien Wiesbaden, pp. 160–165.
- 2018 L. Castillo, L. Daza, **L. Rivera**, and P. Arbeláez. “Brain Tumor Segmentation and Parsing on MRIs Using Multiresolution Neural Networks”. In: *Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries*. Cham: Springer International Publishing, pp. 332–343.
- 2017 L. Castillo, L. Daza, **L. Rivera**, and P. Arbeláez. “Volumetric Multimodality Neural Network For Brain Tumor Segmentation”. In: *MICCAI 2017. BraTS 2017 Challenge*.
- L. Castillo, L. Daza, **L. Rivera**, and P. Arbeláez. “Volumetric Multimodality Neural Network For Ischemic Stroke Segmentation”. In: *MICCAI 2017. MICCAI Challenge Abstracts*.