Jesús M. Rodríguez-de-Vera

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My research asks what knowledge a model is actually missing to succeed at a given task, then builds whatever closes that gap. That question took me from fine-grained recognition under long-tailed data (Dining on Details, LOFI) to generating the domain-specific data models were missing in the first place (Precision at Scale, with NVIDIA's AI Technology Center). I'm now extending it into generative and multimodal representation learning.

Education

- **PhD in Mathematics & Computer Science (FPU Fellow)** — *Oct 2023 - Jan 2028 (Expected)*
  Supervisors: Prof. Petia Radeva [] & Dr. Bhalaji Nagarajan [] — University of Barcelona
- **M.S. in Artificial Intelligence (GPA: 9.51/10)** — *Sep 2021 - Jan 2023*
  Universitat Politècnica de Catalunya
- **B.S. in Computer Science (GPA: 9.15/10, Award for Academic Excellence)** — *Sep 2015 - Jul 2020*
  Achieved the #2 academic rank in a graduating class of 96 students — University of Murcia
- **B.S. in Mathematics (GPA: 8.38/10)** — *Sep 2015 - Jul 2020*
  University of Murcia

Publications

C=Conference, CO=Conference (Oral), J=Journal, S=In Submission, †=Equal Contribution

[C.1] Estepa, I. G., **Rodríguez-de-Vera, J.M.**, Nagarajan, B., & Radeva, P. (2026). Learning from Semantic Dictionaries: Discriminative Codebook Contrastive Learning for Unified Visual Representation and Generation. *CVPR 2026*.

[C.2] Estepa, I. G.†, **Rodríguez-de-Vera, J.M.**†, Sarasúa, I., Nagarajan, B., & Radeva, P. (2026). Conjuring Positive Pairs for Efficient Unification of Representation Learning and Image Synthesis. *WACV 2026 (Round 1 Early Accept)*.

Contribution: *Developed a unified SSL framework (Sorcen) that is 60.8% more training-efficient than prior SOTA.*

[J.1] **Rodríguez-de-Vera, J.M.**†, Estepa, I. G.†, Sarasúa, I., Nagarajan, B., & Radeva, P. (2026). Precision at scale: Domain-specific datasets on-demand. *Pattern Recognition*, 171, 112236.

Contribution: ***[Awarded Best Paper at RES 2025]*** *Created a data-centric AI framework (PaS) to generate high-fidelity datasets on-demand, showing models pretrained on our data outperform ImageNet-1K by up to 21% on downstream tasks, directly addressing the data scaling and quality challenge.*

[C.3] **Rodríguez-de-Vera, J.M.**, Estepa, I. G., Nagarajan, B., & Radeva, P. (2025). CLIP-DoRA: Weight-Decomposed Low-Rank Adaptation for Efficient Vision-Language Models. In *Deep Learning Innovations and Applications Workshop at International Joint Conference on Neural Networks (IJCNN 2025)*.

Contribution: *Designed a parameter-efficient fine-tuning method (CLIP-DORA) that achieves state-of-the-art results by fine-tuning only 1.5% of a VLM's parameters, crucial for adapting large models on resource-constrained hardware.*

[CO.4] **Rodríguez-de-Vera, J.M.**, Estepa, I. G., Bolaños, M., I., Nagarajan, B., & Radeva, P. (2024). LOFI: LOng-tailed FIne-Grained Network for Food Recognition. In *1st MetaFood Workshop at CVPR 2024*.

Contribution: *Designed a novel network (LOFI) that improved SOTA performance by 4.6% on a long-tailed recognition task, developing techniques directly applicable to solving the critical real-world long-tail problems.*

[CO.5] **Rodríguez-de-Vera, J.M.**, Villacorta, P., Estepa, I.G., Bolaños, M., Sarasúa, I., Nagarajan, B., & Radeva, P. (2023). Dining on Details: LLM-Guided Expert Networks for Fine-Grained Food Recognition. In *8th MADiMa Workshop at ACMMM 2023*.

Contribution: *Leveraged LLMs to guide expert sub-networks, achieving SOTA on Food-101 and demonstrating the value of multimodal priors for improving fine-grained reasoning.*

[C.6] Estepa, I. G., **Rodríguez-de-Vera, J.M.**, Nagarajan, B., & Radeva, P. (2023). Good Fences Make Good Neighbours. In *4th VIPriors Workshop at ICCV 2023*.

[J.2] **Rodríguez-de-Vera, J.M.**, Bernabé, G., García, J.M., Saura, D., & González-Carrillo, J. (2022). Left ventricular non-compaction cardiomyopathy automatic diagnosis using a deep learning approach. *Computer Methods and Programs in Biomedicine*.

Contribution: *Achieved 87% accuracy in automatic cardiomyopathy diagnosis using a U-Net, being the first fully deep-learning-based method to detect left-ventricular non-compaction disease.*

[J.3] **Rodríguez-de-Vera, J.M.**, González-Carrillo, J., García, J.M., & Bernabé, G. (2021). Deploying deep learning approaches to left ventricular non-compaction measurement. *The Journal of Supercomputing*.

Contribution: *Achieved real-time inference (<0.1s/study on an NVIDIA GPU) for cardiac MRI analysis, delivering a significant speedup over previous automatic methods and demonstrating a focus on deployment efficiency.*

Research Experience

- **Brown University, SCALE Group** *Sep 2025 - Nov 2025*
  Visiting Research Scholar - Fully funded research stay via the national FPU Fellowship Providence, RI, USA
  - Architecting agentic AI frameworks for autonomous driving, focusing on balancing advanced multimodal reasoning with strict real-time inference requirements of in-vehicle systems.
- **University of Barcelona, AIBA Research Group & Computer Vision Center** *Mar 2022 - Present*
  Deep Learning Researcher Barcelona, Spain
  - Primary contributor of the "Precision at Scale" project in direct collaboration with the **NVIDIA AI Technology Center (NVAITC)**, developing a data-centric pipeline that culminated in a top-tier journal publication.
  - Engineered novel weight-decomposed low-rank adaptation (LoRA) techniques for VLMs, reducing the memory footprint of fine-tuning by up to 70% while maintaining model performance in classification and dense tasks.
- **University of Murcia, Parallel Computing Architecture Group** *Sep 2019 - Jul 2021*
  Deep Learning Researcher Murcia, Spain
  - Developed and deployed deep learning models for cardiac image segmentation, achieving Dice coefficients of 0.96 (internal cavity), 0.89 (external wall), and 0.84 (trabeculae), with 99.5% of outputs rated clinically valid by expert cardiologists.
- **Biyectiva Technology - AI Startup** *Feb 2019 - Dec 2021*
  Computer Vision Developer (Part-time) Murcia, Spain
  - Built and shipped real-time object detection models for mobile devices (Android).
  - Designed and led development of the computer-vision-based analysis system for the Go5D biomechanical product (3D scanners and infrared cameras), in collaboration with a FIFA Medical Centre of Excellence.

Honors and Awards

- **RES Success Story Recognition and Best Paper Award (Precision at Scale)** *2025*
  Spanish Supercomputing Network
  - Selected from over 200 annual projects for research impact and effective use of national supercomputing resources, including **NVIDIA H100**, **A100**, and **V100** GPU clusters, for large-scale model training.
- **FPU Fellowship for PhD Studies** *2023*
  Spanish Ministry of Universities
  - **Ranked #1 nationwide**. A prestigious 4-year grant recognizing outstanding doctoral research potential.
- **Winner, Best Essay Competition - The Social Impact of Computer Vision** *2023*
  International Computer Vision Summer School
  - **#1 place** out of ∼25 teams at the prestigious summer school for the **world's top ∼100** computer vision PhD students.
- **Membership** *2021 - Present*
  Spanish Society for Academic Excellence
  - Formally accredits graduates ranked in the **top 1-2%** of their academic discipline in **Spain**.
- **Award for Excellence in Academic Career** *2020*
  University of Murcia
  - Achieved the **#2 academic rank** (GPA) in a graduating class of 96 students.
- **PRACE Summer of HPC Fellowship** *2020*
  SURFsara, The Dutch Supercomputer
  - One of ∼52 selected participants for the premier pan-European summer program on high-performance computing.

Technical Skills

- **ML Frameworks:** PyTorch, Hugging Face, Deepspeed (beginner).
- **High-Performance Computing:** Large-Scale Parallel Training on **NVIDIA H100/A100** clusters; Data-Centric AI with **RAPIDS cuML** & **FAISS**; SLURM; Singularity/Docker.
- **Model Optimization & Deployment:** Performance optimization with **TensorRT** & **FlashAttention v2** (**Hopper**); Custom PyTorch operators in C++, some contributed to open-source repository; **CUDA** fundamentals.
- **Languages:** Spanish (Native), English (C2 Proficient)

Teaching, Service & Outreach

- **Challenge Organizer, "Dishcovery: VLM MetaFood Challenge"** *2025*
  ***CVPR 2025** Workshop*
- **Organizer & Lecturer, "Generative AI" session** *2025*
  Demystifying AI Summer/Winter School, Barcelona
- **Lecturer in Computer Vision (BSc) and Guest Lecturer in Transformers (MSc)** *2024*
  University of Barcelona
- **Selected Presenter at Regional Avenues** *2025, 2024, 2023*
  Deep Learning Barcelona Symposium (DLBCN) & Annual Catalan Meeting on Computer Vision (ACMCV)
- **Reviewer:** NeurIPS, CVPR, ECCV, WACV, IEEE Transactions on Multimedia