Marlon Sebastián Rodríguez Flor

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Education

Ph.D. Student in Computer Vision and AI — *Autonomous University of Madrid (UAM)*
Video Processing and Understanding Lab (VPULab) — *Sep 2025 – Present*
Advisors: Dr. Juan Carlos San Miguel Avedillo and Dr. Fernando Díaz de María.
Thesis: Open-World Semantic Segmentation for Driving Scenes.

Master of Science in Data Science — *Autonomous University of Madrid (UAM)*
GPA: 8.03 out of 10 — *Sep 2023 - Feb 2025*
Thesis: Multimodal Extreme Multi-Label Classification under Resource Limitations (Grade: 9.5/10).

Bachelor of Engineering in Computer Science — *San Francisco de Quito University (USFQ)*
GPA: 2.94 out of 4 — *Aug 2017 - Jun 2021*
Thesis: Path Planning Optimization in SDN Using Machine Learning Techniques (Grade: A).

Publications

- D. Ortego, **M. Rodríguez**, M. Almagro, K. Dahiya, D. Jimenez-Cabello, and J. C. SanMiguel, "Large Language Models Meet Extreme Multi-label Classification: Scaling and Multi-modal Framework," in *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI-26)*, Poster Presentation. (Acceptance rate: 17.6%; work done in collaboration with NielsenIQ.) https://arxiv.org/abs/2511.13189
- **M. Rodríguez**, R. F. Moyano, N. Pérez, D. Riofrío and D. Benítez, "Path Planning Optimization in SDN Using Machine Learning Techniques," 2021 IEEE Fifth Ecuador Technical Chapters Meeting (ETCM), Cuenca, Ecuador, 2021, pp. 1-6, doi: 10.1109/ETCM53643.2021.9590749.

Research Experience

Video Processing and Understanding Lab (VPULab) — *Sep 2025 - Present*
Ph.D. Researcher — *Madrid, Spain*

- Conducting early-stage research on Unsupervised Domain Adaptation (UDA) and Self-Supervised Learning (SSL) for semantic segmentation in driving scenes.
- Studying and adapting SSL-based loss functions to improve domain alignment and enhance spatial feature consistency across domains.
- Performing literature review and experimental analysis to integrate consistency-based regularization within UDA frameworks such as DAFormer.

Relevant Projects

- **Multimodal Extreme Multi-Label Classification under Resource Limitations [Master's Thesis]:** Designed a resource-efficient transformer-based architecture for Extreme Multi-Label Classification (XMC) that fuses visual and textual information at the token level. The model uses a frozen vision encoder to extract contextualized image embeddings, which are then injected into a transformer-based text encoder, enabling early cross-modal interaction. The architecture remains compatible with XMC frameworks such as DEXA and NGAME, and was evaluated on the MM-AmazonTitles-300K benchmark, achieving state-of-the-art precision while maintaining computational scalability. **Technologies:** *PyTorch, HuggingFace Transformers.*

- **Semantic Segmentation with U-Net and DeepLabV3:** Implemented a semantic segmentation pipeline using U-Net and DeepLabV3 on CUB-200-2011 and Pascal VOC2012 datasets. For bird segmentation, trained a U-Net model from scratch for binary mask prediction. For multiclass segmentation, integrated DeepLabV3 with a ResNet-34 backbone, applying data augmentation, loss balancing (Cross-Entropy + Dice), and learning rate scheduling to enhance generalization and robustness. **Technologies:** *PyTorch, Albumentations, torchvision.*
- **Multiple Object Tracking for Video Sequences:** Developed a real-time pedestrian tracking system integrating YOLOv5 for object detection with the Hungarian Algorithm for data association. Trained and benchmarked the system on the MOT16 dataset, achieving robust tracking in crowded and occluded environments. The pipeline incorporated confidence-based filtering, temporal consistency, and trajectory smoothing to mitigate identity switches and false positives. **Technologies:** *PyTorch, Deep Learning, Object Detection and Tracking, Computer Vision.*
- **Analysis of Emotions in Classic Novels:** Analyzed emotional patterns in classic novels using NLP techniques. Enhanced the NRC Emotion Lexicon with WordNet to expand semantic coverage and applied sentiment analysis to literary texts from Project Gutenberg. Preprocessing included lemmatization, POS tagging, and emotion frequency analysis. **Technologies:** *Python, BeautifulSoup, NLTK, NRC Emotion Lexicon, WordNet, NLP.*

Professional Experience

Banco Solidario S.A. *Jan 2022 - Aug 2023*
Data Analytics Officer *Quito, Ecuador*

- Increased the balance in savings accounts by USD 200,000 by identifying over 38,000 potential clients with an XGBoost model, of which 7% increased their balance by more than USD 260.
- Led and work closely with product owners to develop successful projects, communicating findings and results clearly and effectively to non-technical audiences.

Banco Solidario S.A. *Jul 2021 - Dec 2021*
Data Analytics Technician *Quito, Ecuador*

- Increased the number of downloads of Banco Solidario's mobile app by 30% and reduced the cost per download by 22% by implementing a Random Forest model to identify potential customers for digitalization, also improving customer segmentation.
- Enhanced customer experience and boosted sales by developing an interactive dashboard to monitor the sales and service times for commercial advisors at Banco Solidario, enabling targeted actions at each branch.

Skills

Programming Languages	Python, R, Java, SQL, Spark, C++, Dart, C#.
Machine Learning & AI	Extreme Multi-Label Classification, Contrastive Learning, Language Transformers (BERT, MiniLM), Vision Transformers (ViT, DeiT), Vision-Language Models (CLIP, SigLIP).
Computer Vision & NLP	Image Classification, Semantic Segmentation, Object Tracking, Vision & Text Embeddings, Sentiment Analysis.
Frameworks & Tools	PyTorch, TensorFlow, HuggingFace, Scikit-learn, OpenCV, Git.
Soft Skills	Analytical thinking, scientific writing, independent research, effective collaboration, adaptability, and clear technical communication.

Certifications

6.419x: Data Analysis: Statistical Modeling and Computation in Applications *Sep, 2022*
MITx

18.6501x: Fundamentals of Statistics *May, 2022*
MITx

6.86x: Machine Learning with Python-From Linear Models to Deep Learning *Nov, 2021*
MITx

6.431x: Probability - The Science of Uncertainty and Data *Sep, 2021*
MITx

Languages

Spanish	Native
English	IELTS 6.5, B2
German	GOETHE, A2