Miguel Espinosa

PhD Student

miguel.espinosa@ed.ac.uk | miquel-espinosa.github.io | miquel-espinosa | miguel-espinosa

My research lies in the intersection of Computer Vision and Earth Observation. Mainly, I am interested in diffusion models for EO. Other topics include: self-supervised methods for data fusion, representation learning, and adapting foundational models for large domain shifts.

Education

PhD in Deep Learning for Earth Observation
Edinburgh, UK

University of Edinburgh — *October 2022 - present*

- *Foundation Models for Earth Observation* (supervised by Elliot J. Crowley), part of SENSE CDT.

MSc in Artificial Intelligence
Madrid, Spain

Polytecnhic University of Madrid · 1st Class Honours (~ 93%) — *September 2021 - June 2022*

- ***Research*** in *Computer Vision and Aerial Robotics* department: "Facial landmarks detection with deep learning".

BSc in Computer Science (Bilingual)
Madrid, Spain

University Carlos III of Madrid · 1st Class Honours (~ 87%) — *September 2017 - May 2021*

- ***BSc project*:** "Self-awareness in a UAV swarm for the complete coverage of its surroundings" (97%)

Experience

European Space Agency, ESA
ESRIN, Rome

Visiting Researcher — *January 2025 - April 2025*

- *Research on multi-modal generative modelling of Copernicus data*
- Development of COP-GEN Beta, a generative diffusion model for zero-shot translation between optical, radar, and elevation data from the Major TOM dataset. Working on multi-modal representation learning and model evaluation.

Canon Medical Research Europe Ltd.
Edinburgh

AI Research Intern — *June 2022 - August 2022*

- *Research in NLP for Clinical Temporal Relation Extraction.*
- Data analysis, exploration, design and implementation of ML models for the extraction of temporal relations from non-structured clinical text.

MeVitae
Oxford (remote)

Algorithm Developer Intern — *July 2021 - September 2021*

- *Research in ML for natural language (NLP) to solve open-ended problems.*
- Optimisation of the address detection and redaction in the CV pipeline. From research to idea to efficient implementation in C# into production. Received close mentorship from experienced professionals.

Huawei Technologies R&D (UK) Ltd.
Edinburgh Research Center (remote)

Research Intern — *June 2020 - September 2020*

- *Responsible for analysis of the DL framework built on Julia programming language.*
- Contribution to MindSpore DL framework and its integration with Julia as front-end language. Working on source-to-source code generation for the forward and backwards pass with automatic differentiation.

Publications

COP-GEN: Latent Diffusion Transformer for Copernicus Earth Observation Data
[pdf] [code]

ArXiv Preprint

Miguel Espinosa*, Eva Gmelich Meijling, Valerio Marsocci, Elliot Crowley, Mikolaj Czerkawski

COP-GEN-Beta: Unified Generative Modelling of COPernicus Imagery Thumbnails
[pdf] [code]

CVPR MORSE Workshop 2025

Miguel Espinosa*, Valerio Marsocci, Yuru Jia, Elliot Crowley, Mikolaj Czerkawski

No time to train! Training-Free Reference-Based Instance Segmentation [pdf] [code]

ArXiv Preprint

Miguel Espinosa*, Chenhongyi Yang*, Linus Ericsson, Steven McDonagh, Elliot J Crowley

There is no samantics! exploring sam as a backbone for visual understanding tasks [pdf] [code]

ArXiv Preprint

Miguel Espinosa*, Chenhongyi Yang*, Linus Ericsson, Steven McDonagh, Elliot J Crowley

einspace: Searching for neural architectures from fundamental operations [pdf] [code]

NeurIPS 2024

Linus Ericsson*, **Miguel Espinosa**, Chenhongyi Yang, Antreas Antoniou, Amos J Storkey, Shay Cohen, Steven McDonagh, Elliot J Crowley

PlainMamba: Improving non-hierarchical mamba in visual recognition [pdf] [code]

BMVC 2024

Chenhongyi Yang*, Zehui Chen*, **Miguel Espinosa***, Linus Ericsson, Zhenyu Wang, Jiaming Liu, Elliot J Crowley

Generate Your Own Scotland: Satellite Image Generation Conditioned on Maps [pdf] [code]

NeurIPS 2023 Workshop on Diffusion Models

Miguel Espinosa*, Elliot J Crowley

Academic

Teaching

University of Edinburgh

- *Data Analysis and Machine Learning* (2024)
- *Programming Skills for Engineers* (2025)

Reviewing

- **Conferences:** ICML (2026), ICLR (2026), ICCV (2025), CVPR (2025), ICLR (2025), BMVC (2024), ECCV (2024), BMVC (2023)
- **Workshops:** ICML TerraBytes (2025), CVPR MORSE (2025), NeurIPS Diffusion Models (2023), BMVC ML for EO (2023)

Attended

- **Conferences:** EGU (2026), BMVC (2025), NeurIPS (2024), ICLR (2023)
- **Events:** ESA Science Hub Challenge September 2025 (Frascati 2025), ESA-NASA International Workshop on AI Foundation Model for Earth Observation (Frascati 2025), ESA Earth Observation and Remote Sensing Workshop (ESEC-Galaxia Belgium 2024), ELLIS Summer School on Probabilistic ML (Cambridge 2023), Data Study Group Alan Turing Institute (London 2023)
- **Talks:** IQ Capital tech talk (Advancing Large Vision and Generative Models for Visual Understanding & EO)

Awards

Jose Cuena Excellence Award *Madrid, Spain*

Polytechnic University of Madrid *April 2022*

Research Fellowship *Madrid, Spain*

Polytechnic University of Madrid *January 2022 - May 2022*

Excellence Grant (x2) *Madrid, Spain*

Comunidad de Madrid *2019-2020 | 2020-2021*

Languages

Spanish Native
Catalan Native
English Proficient, fluent, IELTS (7.5) [certificate]

Technical Skills

Languages Python (Numpy, Matplotlib, Scikit-learn, Pandas), Java, C++, Shell
Frameworks PyTorch, Tensorflow
Other Git version-control, Latex, Linux OS, HPC slurm