# **Miguel Espinosa**

#### PHD STUDENT

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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

• Diffusion 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-Beta: Unified Generative Modelling of COPernicus Imagery Thumbnails

[pdf] [<u>code</u>]

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

ARXIV PREPRINT

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

## einspace: Searching for neural architectures from fundamental operations

[pdf] [code]

[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

## Self-awareness for complete coverage metrology using autonomous systems

[pdf] [code]

2022 IEEE INTERNATIONAL WORKSHOP ON METROLOGY FOR AEROSPACE

Miguel Espinosa\*, Pablo Flores Peña, Zhuoyao He, David Martín Gómez

# Academic \_\_\_\_\_

#### **Teaching**

University of Edinburgh

• Data Analysis and Machine Learning (2024)

#### Reviewing

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

#### Other

• Events: 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)

## 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 (Overall Band Score)

[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