Daniel Franco-Barranco

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Personal Information

Last Name / First Name	Franco-Barranco, Daniel
Nationality	Spanish
Date of birth	June 1, 1993

Education

2019 – 2024 **PhD in Informatics Engineering,** Department of Computer Science and Artificial Intelligence, University of the Basque Country (UPV/EHU), Donostia-San Sebastián, Spain. Thesis title: *Deep Learning for Bioimage Analysis: novel user- and developer-oriented approaches*. Cum laude. Advised by Prof. Ignacio Arganda-Carreras and Prof. Arrate Muñoz-Barrutia.

2018 – 2019 **M.Sc. Computational Engineering and Intelligent Systems**, University of the Basque Country (UPV/EHU), Donostia-San Sebastián, Spain.
Thesis title: *Segmenting mitochondria in cells using Deep Learning*. Thesis grade: 10/10 – Average grade: 9.1/10

2011 – 2015 **B.Sc. Computer Engineering**, University of the Basque Country (UPV/EHU), Donostia-San Sebastián, Spain.
Thesis title: *Parallelization through OpenMP for the segmentation of images for the analysis of two-dimensional materials.*. Thesis grade: 9/10 – Average grade: 8/10

Employment History

2024 – present **Postdoctoral Scientist,** MRC Laboratory of Molecular Biology (LMB), Cambridge, UK.
Postdoctoral Scientist in Dr. Albert Cardona's group at the MRC Laboratory of Molecular Biology (LMB). My research focuses on developing automated techniques for mapping connectomes from volumetric electron microscopy data. This work aims to elucidate the neuronal basis of behavior by comparing connectomes across experimental conditions, developmental stages, and species. My role involves designing novel machine learning approaches for computer vision, applying these methods at scale across multiple brain volumes, and contributing to the scientific community through presentations, publications, and the mentorship of junior researchers.

2015 – 2024 **HPC Platform Specialist,** Donostia International Physics Center (DIPC), Donostia-San Sebastián, Spain.
As a HPC platform Specialist my duties include optimizing cluster performance, ensuring system stability, and providing technical assistance to users for high-performance computing tasks. I apply advanced knowledge in parallel computing architectures and system administration to maintain infrastructure reliability, manage resource allocation, and troubleshoot hardware and software issues. My focus is on enhancing computational efficiency and supporting scientific research through effective HPC platform management. *9 years, 1 month.*

Employment History (continued)

2022 – 2022 **Summer Internship,** Visual Computing Group, Harvard John A. Paulson School of Engineering and Applied Sciences, Boston, Massachusetts, USA.
Develop a new self-supervised deep learning model and a benchmark dataset for glia cell segmentation from EM images (Prof. Hanspeter Pfister & Prof. Donglai Wei)).
6 months.

2014 – 2014 **HPC Technician (company internship),** Donostia International Physics Center (DIPC), Donostia-San Sebastián, Spain.
Install and configure an HPC cluster for testing purposes and configure an advanced queue software configuration to schedule jobs.
6 months.

Skills

Languages English (C1 level) - Basque (C1 level) - Spanish (mother tongue)

Coding Python, Java, C, C++, R, ...

Sysadmin Bash, scripting, Linux, SLURM, Docker, GPU management, ...

Web Dev Html, css, JavaScript, Jinja, Jekyll, Sphinx, Qt, ...

Miscellaneous Experience

Specialization courses and seminars

2024 **International Symposium on Biomedical Imaging (ISBI)**. Oral presentation. Athens, Greece.

2023 **International Symposium on Biomedical Imaging (ISBI)**. Poster presentation. Cartagena de Indias, Colombia.

Navigating the scientific journey: career and societal impact. University of the Basque Country. Donostia-San Sebastián, Spain.

2020 **International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)** . Paper presentation. Remote.

Advanced methods in Biomedical Image Analysis. Autumn Course of Masaryk University. Remote.

Academic activities

2021 **MitoEM challenge set up and support**. International Symposium on Biomedical Imaging (ISBI).

Reviewer **JCR indexed journals**:

- IEEE Transactions on Medical Imaging and Biological Imaging.
- Biological Imaging.

Supervised students

2023 A. Morais, "Development of open-source computer vision tools for biomedical microscopy data". Summer research lab student from Universidad Nebrija.

Miscellaneous Experience (continued)

Volunteering

2015 – 2018 Helping researchers learn computing skills. Software Carpentry Workshops.

2013 – 2014 Lifeguard voluntary with Spanish Red Cross.

Research Publications

Journal Articles

1. D. Carnevali, L. Zhong, E. González-Almela, *et al.*, "A deep learning method that identifies cellular heterogeneity using nanoscale nuclear features," *Nature Machine Intelligence*, pp. 1–13, 2024.
2. D. Franco-Barranco, J. A. A.-S. Román, I. Hidalgo-Cenalmor, *et al.*, "Biapy: Accessible deep learning on bioimages," *bioRxiv*, 2024.
3. D. López-Cano, J. Stücker, M. P. Ibañez, R. E. Angulo, and D. Franco-Barranco, "Characterizing structure formation through instance segmentation," *Astronomy & Astrophysics*, vol. 685, A37, 2024.
4. J. A. Andres-San Roman, C. Gordillo-Vazquez, D. Franco-Barranco, *et al.*, "CartoCell, a high-content pipeline for 3D image analysis, unveils cell morphology patterns in epithelia," *Cell Reports Methods*, vol. 3, no. 10, 2023.
5. D. Franco-Barranco, Z. Lin, W.-D. Jang, *et al.*, "Current Progress and Challenges in Large-scale 3D Mitochondria Instance Segmentation," *IEEE transactions on medical imaging*, 2023.
6. D. Franco-Barranco, A. Muñoz-Barrutia, and I. Arganda-Carreras, "Stable deep neural network architectures for mitochondria segmentation on electron microscopy volumes," *Neuroinformatics*, vol. 20, no. 2, pp. 437–450, 2022.
7. D. Franco-Barranco, J. Pastor-Tronch, A. González-Marfil, A. Muñoz-Barrutia, and I. Arganda-Carreras, "Deep learning based domain adaptation for mitochondria segmentation on EM volumes," *Computer Methods and Programs in Biomedicine*, vol. 222, p. 106 949, 2022.
8. P. Gómez-Gálvez, P. Vicente-Munuera, S. Anbari, *et al.*, "A quantitative biophysical principle to explain the 3D cellular connectivity in curved epithelia," *Cell Systems*, vol. 13, no. 8, pp. 631–643, 2022.

Conference Proceedings

1. D. Franco-Barranco, A. Gonzalez-Marfil, and I. Arganda-Carreras, "Self-supervised vision transformers for image-to-image labeling: A biapy solution to the lightmycells challenge," in *2024 IEEE 21th International Symposium on Biomedical Imaging (ISBI)*, IEEE, 2024.
2. L. Backová, G. Bengoetxea, S. Rogalla, D. Franco-Barranco, J. Solon, and I. Arganda-Carreras, "Modeling Wound Healing Using Vector Quantized Variational Autoencoders and Transformers," in *2023 IEEE 20th International Symposium on Biomedical Imaging (ISBI)*, IEEE, 2023, pp. 1–5.
3. D. Franco-Barranco, J. A. Andrés-San Román, P. Gómez-Gálvez, L. M. Escudero, A. Muñoz-Barrutia, and I. Arganda-Carreras, "BiaPy: a ready-to-use library for Bioimage Analysis Pipelines," in *2023 IEEE 20th International Symposium on Biomedical Imaging (ISBI)*, IEEE, 2023, pp. 1–5.
4. D. Wei, Z. Lin, D. Franco-Barranco, *et al.*, "MitoEM Dataset: Large-scale 3D Mitochondria Instance Segmentation from EM Images," in *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, Springer, 2020, pp. 66–76.

Books and Chapters

1. E. Gómez-de-Mariscal, D. Franco-Barranco, A. Muñoz-Barrutia, and I. Arganda-Carreras, "Building a Bioimage Analysis Workflow Using Deep Learning," in *Bioimage Data Analysis Workflows–Advanced Components and Methods*, Springer International Publishing Cham, 2022, pp. 59–88.

References

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