Joaquim Campos

Personal data

Place and date of birth:	Lisbon, Portugal, on 10 February 1996
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In Brief

I am an engineer, programmer, and researcher specialized in signal processing and artificial intelligence. Professionally, I have engaged with deep learning, learning theory, image and video compression, and inverse problems. The joint research that I have conducted with my colleagues at Disney and EPFL has resulted in the publication of seven scientific papers with over 300 citations.

Outside the scope of my scientific expertise, I dedicate my time to exploring philosophy, psychology, meditation, ethics, and social systems. I find joy in tackling problems holistically, drawing inspiration from both ancient and modern wisdom, and considering the entire pipeline from philosophical and scientific inquiry to practical application. I appreciate engaging in thoughtful discussions, being exposed to different points of view, and—when suitable—sharing the little I know with others.

Education

2020 Feb – 2016 Sep | MSc in **Communication Systems**.
Specialization: **Signals, Images and Interfaces**.
École Polytechnique Fédérale de Lausanne, School of Computer Science and Communication Sciences, Lausanne, Switzerland.
Grade: **5.67/6.00**. – Ranking: 2nd/31
Focus on signal processing and artificial intelligence. Master's thesis: *Higher-Order Regularization Methods for Supervised Learning*.

2016 Jul – 2013 Sep | BSc in **Electrical and Computer Engineering**.
Universidade de Lisboa, *Instituto Superior Técnico*, Lisbon, Portugal.
Grade: **16.4/20.0**

Work experience

2023 Dec – 2022 Aug
Co-Founder at Radiobooks.
Converting books into audiobooks automatically using Artificial Intelligence
- Designed and created an app for revising AI-generated audio.

2021 Sep – 2020 Apr
Research and Teaching Assistant
Topic: *Supervised Learning with Sparsity-Promoting Regularization*
Biomedical Imaging Group, **École Polytéchnique Fédérale de Lausanne**, Lausanne, Switzerland. Supervisor: **Prof. Michael Unser**.
- Developed a novel framework to learn the activation functions of a neural network;
- Designed a spline-based supervised learning method which constructs piecewise-linear models with few regions (sparse).

2018 Aug – 2019 Mar
Research Intern
Topic: *Image and Video Compression using Deep Learning*
Disney Research, Zurich, Switzerland. Supervisors: **Dr. Christopher Schoers and Dr. Abdelaziz Djelouah**.
- Developed the first content-adaptive neural image compression scheme;
- Aided in the construction of a state-of-the-art neural video compression framework.

Teaching experience

Current – 2020 Sep
Teaching assistance in the courses **MICRO-310/11: Signals and Systems I/II**
École Polytéchnique Fédérale de Lausanne, Lausanne, Switzerland
Taught by **Prof. Michael Unser** to the *Life Sciences* and *Microenginneering* sections.

Current – 2020 Sep
Supervision of Master semester projects
École Polytéchnique Fédérale de Lausanne, Lausanne, Switzerland
Co-supervisor of two Master semester projects on lipschitz-constrained generative adversarial networks (GANs).

Languages

Mother tongue:	Portuguese
Professional (C1):	English
Advanced (B2):	Spanish
Conversational (B1):	French

Other skills

Primary technical skills:	Knowledge of both theoretical and practical aspects of signal processing, machine learning, and deep learning.
Programming:	C, Python, FastAPI, PyTorch, Bash, Matlab, LaTeX, Backend development and deployment
Other skills:	During my academic years, I developed valuable presentation, writing, and teaching skills, much of which I owe to Prof. Michael Unser.

The publications can be consulted here: https://joaquimcampos.com/pubs.html.

Publications: Science

[1] A. Goujon, J. Campos, and M. Unser, "Stable parameterization of continuous and piecewise-linear functions," *Applied and Computational Harmonic Analysis*, vol. 67, p. 101581, Nov. 2023.

[2] S. Aziznejad, J. Campos, and M. Unser, "Measuring Complexity of Learning Schemes Using Hessian-Schatten Total Variation," *SIAM Journal on Mathematics of Data Science*, vol. 5, no. 2, pp. 422–445, Jun. 2023.

[3] J. Campos, S. Aziznejad, and M. Unser, "Learning of Continuous and Piecewise-Linear Functions With Hessian Total-Variation Regularization," *IEEE Open Journal of Signal Processing*, vol. 3, pp. 36–48, Dec. 2021.

[4] P. Bohra, J. Campos, H. Gupta, S. Aziznejad, and M. Unser, "Learning Activation Functions in Deep (Spline) Neural Networks," *IEEE Open Journal of Signal Processing*, vol. 1, pp. 295–309, Nov. 2020.

[5] S. Aziznejad, H. Gupta, J. Campos, and M. Unser, "Deep Neural Networks With Trainable Activations and Controlled Lipschitz Constant," *IEEE Transactions on Signal Processing*, vol. 68, pp. 4688–4699, Aug. 2020.

[6] A. Djelouah, J. Campos, S. Schaub-Meyer, and C. Schroers, "Neural Inter-Frame Compression for Video Coding," in *Proceedings of the Proceedings of the 2019 IEEE/CVF International Conference on Computer Vision (ICCV)*, Oct. 2019.

[7] J. Campos, S. Meierhans, A. Djelouah, and C. Schroers, "Content Adaptive Optimization for Neural Image Compression," in *Proceedings of the 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, Jun. 2019.

Publications: Philosophy

[1] J. Campos, "Mahayana Buddhist Ethics: Deontological, Virtue-Based or Consequentialist? An Optimization Theory Perspective."

[2] J. Campos, "On the Wrongness of Killing Non-Human Animals," Course Thesis, École Polytéchnique Fédérale de Lausanne, May 2018.

Patents

[1] C. Schroers, S. Meierhans, J. Campos, J. Mcphillen, A. Djelouah, E. Varis Doggett, S. Labrozzi, and Y. Xue, "Content Adaptive Optimization for Neural Data Compression," US Patent 11,057,634, Nov., 2020.

[2] C. Schroers, J. Campos, A. Djelouah, Y. Xue, E. Varis Doggett, J. Mcphillen, and S. Labrozzi, "Systems and Methods for Reconstructing Frames," US Patent 10,972,749, Mar., 2021.

[3] C. Schroers, J. Campos, A. Djelouah, Y. Xue, E. Varis Doggett, J. Mcphillen, and S. Labrozzi, "Systems and Methods for Generating a Latent Space Residual," US Patent 11,012,718, Mar., 2021.