Joaquim Campos

Personal data

Location: Lisbon, Portugal
Links: Website | Email | Google Scholar | Linkedin | Github

In Brief

I am an engineer and researcher specializing in signal processing and artificial intelligence, as well as a Python developer. In academia, my focus has been on deep learning, learning theory, image and video compression, and inverse problems. Additionally, I am Co-Founder of Radiobooks, a startup that assists independent authors and self-learners in automatically converting their books into audiobooks using AI. Through this venture, I am gaining knowledge in product development and Python DevOps.

Highlights:

- 7 publications with over 300 citations in top-tier venues, and 3 patents.
- Contributed to the development of pioneering methods in neural compression.
- Crafted novel algorithms for learning the activation functions of a neural network.
- Created the "Deep Splines" PyTorch package.
- Co-Founded Radiobooks—a startup that makes AI text-to-speech technology.
- Built the back-end of a complex text-to-speech app.

Please note that I will be attending a course in philosophy and meditation at the Tergar Institute in Nepal between mid-September and mid-December in both 2024 and 2025. As a result, I will be available to work from now until the beginning of the course and then again three months later.

Education

2020 Feb – 2016 Sep

MSc in Communication Systems.
Specialization: Signals, Images and Interfaces.

EPFL (École Polytechnique Fédérale de Lausanne), Lausanne, Switzerland.
School: School of Computer and Communication Sciences.

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, Lisbon, Portugal.
School: Instituto Superior Técnico.

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 built an app for revising AI-generated audio.
- Our tech stack included Python, FastAPI, MongoDB, Pytest, Docker, GitHub Actions, Codecov, Fly.io, AWS S3, and Better Stack.

2021 Sep – 2020 Apr
Research and Teaching Assistant
Supervised Learning with Sparsity-Promoting Regularization
Biomedical Imaging Group, EPFL, Lausanne, Switzerland.
- 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
Image and Video Compression using Deep Learning
Disney Research Studios, Zurich, Switzerland.
- 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
EPFL (École Polytechnique 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
EPFL (École Polytechnique Fédérale de Lausanne), Lausanne, Switzerland.
Co-supervisor of two Master semester projects on lipschitz-constrained GANs.

Skills

Expertise:	Theoretical and practical aspects of machine learning, deep learning, and signal processing; Python development.
DevOps Experience:	Python, C, FastAPI, Pytest, PyTorch, CI/CD, Bash, Linux, MongoDB, Docker, Github Actions, Codecov, AWS, Fly.io, Better Stack
Other skills:	During my academic years, I developed valuable presentation, writing, and teaching skills, much of which I owe to Prof. Michael Unser.

Languages

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

The publications can be consulted here.

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.