Joaquim Campos

Personal data

Place and date of birth:	Lisbon, Portugal, on 10 February 1996
Home address:	Travessa da Cruz da Rocha 3, 1200-642, Lisbon, Portugal
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Work experience

2021 Sep – 2020 Apr — Research 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.

University 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**. (Class Ranking: Top 3 out of 31 students)

Focus on signal processing and artificial intelligence, and their applications to imaging and audio. Master's thesis: *Higher-Order Regularization Methods for Supervised Learning*. Biomedical Imaging Group.

2016 Jul – 2013 Sep — BSc in **Electrical and Computer Engineering**.

Universidade de Lisboa, *Instituto Superior Técnico*, Lisbon, Portugal.

Grade: **16.4/20.0** (Academic Merit Diploma)

Teaching experience

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". Access at http://bigwww.epfl.ch/teaching/projects/subject.html#id_2540.

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.

Approximate numbers per semester: 250 students; 65 h of guidance of exercise sessions and interaction with students on the course forum; 60 h of class preparation; and 40 h of exam supervision and grading.

Publications

[1] A. Goujon, J. Campos, and M. Unser, "Stable Parametrization of Continuous and Piecewise-Linear Functions," *arXiv:2203.05261*, Mar. 2022.

[2] 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, Jan. 2022.

[3] S. Aziznejad, J. Campos, and M. Unser, "Measuring Complexity of Learning Schemes Using Hessian-Schatten Total-Variation," *arXiv:2112.06209*, 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 IEEE/CVF International Conference on Computer Vision (ICCV)*, Oct. 2019, pp. 6420–6428.

[7] J. Campos, S. Meierhans, A. Djelouah, and C. Schroers, "Content adaptive optimization for neural image compression," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, Jun. 2019.

Patents

[1] C. Schroers, S. Meierhans, J. Campos, J. Mcphillen, A. Djelouah, E. Varis Doggett, S. Labrozzi, and X. Yuanyi, "Content adaptive optimization for neural data compression," US Patent 11 057 634, Jul., 2021, type: Patent Application. Access at https://patents.google.com/patent/US11057634B2/en

[2] C. Schroers, J. Campos, A. Djelouah, X. Yuanyi, E. Varis Doggett, J. Mcphillen, and S. Labrozzi, "Systems and methods for generating a latent space residual," US Patent 11 012 718, May, 2021, type: Patent Application. Access at https://patents.google.com/patent/US11012718B2/en

[3] C. Schroers, J. Campos, A. Djelouah, X. Yuanyi, E. Varis Doggett, J. Mcphillen, and S. Labrozzi, "Systems and methods for reconstructing frames," US Patent 10 972 749, Apr., 2021, type: Patent Application. Access at https://patents.google.com/patent/US10972749B2/en

Languages

Mother tongue:	Portuguese
Professional (C2):	English
Advanced (B2):	Spanish
Conversational (B1):	French

Other skills

Primary technical skills:	Knowledge of both theoretical and practical aspects of signal processing; experience with neural networks.
Programming:	C, Python, PyTorch, HTML, CSS, JavaScript, Bash, LaTeX, Matlab