



# JOAQUIM CAMPOS

## PERSONAL DATA

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PLACE AND DATE OF BIRTH: LISBON, PORTUGAL, ON 10 FEBRUARY 1996  
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## WORK EXPERIENCE

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2021 SEP 2020 APR	<b>RESEARCH ASSISTANT</b> <i>TOPIC: Supervised Learning with Sparsity-Promoting Regularization</i> BIOMEDICAL IMAGING GROUP, École Polytechnique Fédérale de Lausanne, LAUSANNE, SWITZERLAND. SUPERVISOR: Prof. Michael Unser. <ul style="list-style-type: none"><li>• DEVELOPED A NOVEL FRAMEWORK TO LEARN THE ACTIVATION FUNCTIONS OF A NEURAL NETWORK;</li><li>• DESIGNED A SPLINE-BASED SUPERVISED LEARNING METHOD WHICH CONSTRUCTS PIECEWISE-LINEAR MODELS WITH FEW REGIONS (SPARSE).</li></ul>
2018 AUG 2019 MAR	<b>RESEARCH INTERN</b> <i>TOPIC: Image and Video Compression using Deep Learning</i> Disney Research, ZURICH, SWITZERLAND. SUPERVISORS: Dr. Christopher Schoers and Dr. Abdelaziz Djelouah. <ul style="list-style-type: none"><li>• DEVELOPED THE FIRST CONTENT-ADAPTIVE NEURAL IMAGE COMPRESSION SCHEME;</li><li>• AIDED IN THE CONSTRUCTION OF A STATE-OF-THE-ART NEURAL VIDEO COMPRESSION FRAMEWORK.</li></ul>

## UNIVERSITY EDUCATION

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2020 FEB 2016 SEP	<b>MSC IN Communication Systems</b> , SPECIALIZATION: <b>Signals, Images and Interfaces.</b> 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: <i>Higher-Order Regularization Methods for Supervised Learning</i> . BIOMEDICAL IMAGING GROUP.
2016 JUL 2013 SEP	<b>BSc IN Electrical and Computer Engineering.</b> Universidade de Lisboa, Instituto Superior Técnico, LISBON, PORTUGAL. GRADE: 16.4/20.0 (ACADEMIC MERIT DIPLOMA)

## TEACHING EXPERIENCE

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CURRENT 2020 SEP	<p>SUPERVISION OF MASTER SEMESTER PROJECTS</p> <p>École Polytechnique Fédérale de Lausanne, LAUSANNE, SWITZERLAND</p> <p>CO-SUPERVISOR OF TWO MASTER SEMESTER PROJECTS ON "LIPSCHITZ CONSTRAINED GENERATIVE ADVERSARIAL NETWORKS". ACCESS AT <a href="http://bigwww.epfl.ch/teaching/projects/subject.html#id_2540">http://bigwww.epfl.ch/teaching/projects/subject.html#id_2540</a>.</p>
CURRENT 2020 SEP	<p>TEACHING ASSISTANCE IN THE COURSES <b>MICRO-310/11: Signals and Systems I/II</b></p> <p>École Polytechnique Fédérale de Lausanne, LAUSANNE, SWITZERLAND</p> <p>TAUGHT BY Prof. Michael Unser TO THE <i>Life Sciences</i> AND <i>Microengineering</i> SECTIONS.</p> <p>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.</p>

## PUBLICATIONS

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- [1] A. GOJON, 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

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- [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](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](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](https://patents.google.com/patent/US10972749B2/en)

LANGUAGES

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MOTHER TONGUE: PORTUGUESE  
PROFESSIONAL (C2): ENGLISH  
ADVANCED (B2): SPANISH  
CONVERSATIONAL (B1): FRENCH

OTHER SKILLS

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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,  $\text{\LaTeX}$ , MATLAB