Alex Hernández-García

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CURRENT POSITION

DEC 2020–*currently*	**Postdoctoral researcher** at Mila - Quebec Artificial Intelligence Institute and the Université de Montréal. Advised by Prof. Yoshua Bengio. AI for good, climate change.

EDUCATION

FEB 2016–NOV 2020	**PhD** in Cognitive Science, Universität Osnabrück & EyeQuant. Dissertation: Data augmentation and image understanding (*summa cum laude*). Doctoral committee: Peter König (advisor), Konrad P. Kording, Graham W. Taylor, Jeffrey Bowers, Gordon Pipa (chair) Funded by the Marie Skłodowska-Curie Innovative Training Network NextGenVis project from the European Union H2020 Programme (H2020-MSCA-ITN-2014)
SEP 2014–SEP 2015	**M.Sc.** in Multimedia and Communications, Universidad Carlos III de Madrid. Coursed in English. GPA: 9,35/10 With a fellowship from Department of Signal Theory and Communications.
SEP 2009–MAR 2014	**B.Sc.** in Audiovisual Systems Engineering, Universidad Carlos III de Madrid. Coursed in English and Spanish. GPA: 7,8/10 (highest of group) Dissertation: Aesthetics assessment of videos through visual descriptors and automatic polarity annotation (highest grade with honors distinction)
SEP 2010–JUN 2014 *(unfinished, 72 ECTS)*	Degree in Audiovisual Communication, Universidad Carlos III de Madrid GPA: 8,3/10

Internships and research experience

OCT 2018–JANUARY 2019	Internship at the Cognitive and Brain Sciences Unit, Cambridge (UK) Biologically inspired data augmentation and computational neuroscience Advisor: Dr. Tim Kietzmann
JAN 2018–MARCH 2018	Internship at Spinoza Centre for Neuroimaging, Amsterdam Image identification from brain activity using the population receptive field model and image saliency models Advisor: Dr. Serge Dumoulin
OCT 2013–FEB 2016	Research assistant at the Department of Signal Theory and Communications, Universidad Carlos III de Madrid. Computer vision, machine learning and image processing. Advisors: Prof. Fernando Díaz de María and Dr. Fernando Fernández Martínez

Summer schools attended

- International Computer Vision Summer School (ICVSS), Sicily, July 2015
- Eastern European Machine Learning Summer School (EEML), ~~Krakow~~ online, July 2020
- Deep Learning + Reinforcement Learning Summer School (DLRL), ~~Montreal~~ online, August 2020
- Oxford | Berlin Summer School on Open Research, ~~Berlin~~ online, September 2020.

PUBLICATIONS AND OUTREACH

Broad research interests: machine learning, climate change, computational neuroscience, vision, open science.

For a more detailed list of all my publications see my Google Scholar page and my personal website. The following is a selection of representative articles:

- "GFlowNets for AI-driven scientific discovery". M. Jain, T. Deleu, J. Hartford, C. Liu, A. Hernandez-Garcia, Y. Bengio. Royal Society of Chemistry. 2023.

- "A theory of continuous generative flow networks". S. Lahlou, T. Deleu, P. Lemos, D. Zhang, A. Volokhova, A. Hernández-García, L. Néhale Ezzine, Y. Bengio, N. Malkin. ICML. 2023.

- "FAENet: Frame Averaging Equivariant GNN for materials modeling". A. Duval, V. Schmidt, A. Hernandez Garcia, S. Miret, F. D. Malliaros, Y. Bengio, D. Rolnick. ICML. 2023.

- "Multi-Objective GFlowNets". M. Jain, S. C. Raparthy, A. Hernandez-Garcia, J. Rector-Brooks, Y. Bengio, S. Miret, E. Bengio. ICML. 2023.

- "Biological sequence design with GFlowNets". M. Jain, E. Bengio, A. Hernandez-Garcia, J. Rector-Brooks, B. F. P. Dossou, C. Ekbote, J. Fu, T. Zhang, M. Kilgour, D. Zhang, L. Simine, P. Das, Y. Bengio. ICML. 2022.

- "ClimateGAN: Raising climate change awareness by generating images of floods". V. Schmidt, A. S. Luccioni, M. Teng, T. Zhang, A. Reynaud, S. Raghupathi, G. Cosne, A. Juraver, V. Vardanyan, A. Hernandez-Garcia, Y. Bengio. ICLR. 2022.

- "Data augmentation instead of explicit regularization". A. Hernandez-Garcia, P. König. arXiv:1806.03852. 2018.

- "Learning robust visual representations using data augmentation invariance". A. Hernandez-Garcia, P. König, Tim C. Kietzmann. Conference on Cognitive Computational Neuroscience (CCN), 2019.

- "Rethinking supervised learning: insights from biological learning and from calling it by its name". A. Hernandez-Garcia. Workshop on Shared visual representations between humans and machines (SVRHM), NeurIPS 2020.

- "Further advantages of data augmentation on convolutional neural networks". A. Hernandez-Garcia, P. König. International Conference on Artificial Neural Networks (ICANN), 2018. **Best Paper Award**

- "Deep neural networks trained with heavier data augmentation learn features closer to representations in hIT". A. Hernandez-Garcia, Johannes Mehrer, Nikolaus Kriegeskorte, P. König, Tim C. Kietzmann. Conference on Cognitive Computational Neuroscience (CCN), 2018.

- "Global visual salience of competing stimuli". A. Hernandez-Garcia, R. Ramos Gameiro, A. Grillini, P. König. PsyArXiv:z7qp5. 2019. Journal of Vision

- "Computational methods for continuous eye-tracking perimetry based on spatio-temporal integration and a deep recurrent neural network". A. Grillini, A. Hernandez-Garcia, R. Renken, G. Demaria, F. Cornelissen. Frontiers in Neuroscience, 2021.

- "Benchmark of data processing methods and machine learning models for gut microbiome-based diagnosis of inflammatory bowel disease". R. Kubinski, J.Y. Djamen-Kepaou, T. Zhanabaev, A. Hernandez-Garcia, S. Bauer, F. Hildebrand, T. Korcsmaros, S. Karam, P. Jantchou, K. Kafi, R. D. Martin. bioRxiv, 2021.

- "A machine learning pipeline to predict vegetation health". T. Lees, G. Tseng, A. Hernandez-Garcia, C. Atzberger, S. Dadson, S. Reece. Workhop on Tackling climate change with machine learning, International Conference on Learning Representations (ICLR), 2020.

- "Emotion and attention: predicting electrodermal activity through video visual descriptors". A. Hernandez-Garcia, F. Fernández-Martínez, F. Díaz de María. Int. Workshop on Affective Computing and Emotion Recognition (ACER), 2017.

- "Comparing visual descriptors and automatic rating strategies for video aesthetics prediction". A. Hernandez-Garcia, F. Fernández-Martínez, F. Díaz de María. Journal Signal Processing: Image Communication, 2016.

- "ThisClimateDoesNotExist.com: AI to visualise climate change impacts on street photos". Intelligent Machines, Emotions, and our Planet. January 2022.

- "ThisClimateDoesNotExist.com: Visualising climate change impacts on street photos". GIS Day, McGill University. November 2021.

- "Deep active learning for DNA aptamer design". Samsung-Mila-NYU Workshop. November 2021.

- "Global visual salience of competing stimuli". European Conference on Visual Perception (ECVP) (online presentation). August 2021.

- "ML and DS to fight the climate emergency". Women in Machine Learning & Data Science, Yaoundé (online presentation). July 2021.

- "Rethinking (un-, semi-, self-, ...)supervised learning: Insights from biological learning and from calling it by its name". Kietzmann Lab, Donders Institute for Brain Cognition and Behaviour (online presentation). June 2021.

- "Global visual salience of competing stimuli.". AFC Lab Talk Series, hosted by Meike Ramon (online presentation). December 2020.

- "More than more data: Insights from data augmentation for deep learning and computational neuroscience". Brain & Cognitive Society, IIT Kanpur (online presentation). November 2020.

- "Data augmentation and image understanding". Machine Learning Research Group, University of Guelph (online presentation). November 2020.

- "Data augmentation invariance for learning robust visual representations". Neuromatch, The Internet (online presentation). March 2020.

- "Learning representational invariance instead of categorization". International Conference on Computer Vision, Workshop on pre-registration in Computer Vision, Seoul (Republic of Korea). November 2019.

- Data augmentation for improved regularization and invariance learning. Department of Brain and Cognitive Engineering, Korea University, Seoul (Republic of Korea). November 2019.

- "Learning robust visual representations using data augmentation invariance". Computational Cognition, Osnabrück (Germany). October 2019.

- "More than more data: undervalued advantages of data augmentation for deep learning and computational neuroscience". Neural Information Processing Group, University of Tübingen, Tübingen (Germany). July 2019.

- Data augmentation: undervalued advantages for deep learning and computational neuroscience. Cognitive Neuroscience Center, University Medical Center Groningen, Groningen (Netherlands). June 2019

- On the advantages of data augmentation for deep learning and computational neuroscience. Neural Dynamics of Visual Cognition Lab, Freie Universität Berlin, Berlin (Germany). February 2019

- "Data augmentation as a biologically plausible alternative to explicit regularization in CNNs". Institute of Informatics and Telecommunications, NCSR Demokritos, Athens (Greece). October 2018.

- Data augmentation instead of explicit regularization. Group of Multimedia Processing, University Carlos III of Madrid, Madrid (Spain). May 2018

OTHER COMMUNITY CONTRIBUTIONS AND EXPERIENCE

ICML 2020–2022, ICLR 2021–2022, NeurIPS 2021-2022, AISTATS 2022, CVPR 2021, ICCV 2021, SVRHM 2020, AI4SG 2021, CCN 2018–2020, AIAI 2019, ICANN 2018.

Jan 2023–April 2023	Main instructor of Projets (avancés) en apprentissage automatique, Université de Montréal.
Jan 2022–April 2022	Main instructor of Projets (avancés) en apprentissage automatique, Université de Montréal.
Sep 2022–Dec 2022	Teaching Assistant of Fundamentals of machine learning, Université de Montréal.
Jul 2021–Aug 2021 (3 weeks)	Lead teaching assistant at Neuromatch Academy Deep Learning.
Mar 2021–Apr 2021 (5 weeks)	Teaching assistant at the 6th IVADO/Mila Deep Learning School.
Sep 2014–Jun 2015	Laboratory teacher and supervisor of Bachelor theses in the Dept. of Signal Theory and Communications, Universidad Carlos III de Madrid. Multimedia Information Processing, Digital Television, Digital Image Processing

Mentorship

- Mentor (*0-Year Student*) at the Max Planck School of Cognition, Oct 2019–Dec 2020.

- Mentor of one intern of the UdeM's Prof MSc & DESS programs in Machine Learning, coordinated by Mila, May 2021–currently.

- Project mentor at Neuromatch Academy Computational Neuroscience, Jul 2021.

- Climate Change AI mentorship program: mentor at the CCAI workshops organised at ICLR 2020–2021 and NeurIPS 2021.

- LatinX in AI: mentor at the mentorship program of the CVPR/ICML 2021 LatinX in AI workshops.

- NeurIPS mentor (2020–2021): an informal pool of mentors to help underrepresented groups with their submissions, organised by Nicolas Le Roux.

Event organisation

- Member of the organisation committee of UNIQUE Student Symposium 2021

- Volunteer moderator of five sessions at neuromatch 3.0 2020 conference.

Awards and Scholarships

- **Best Paper Award** at the International Conference on Artificial Neural Networks (ICANN) 2018.

- Selected PhD candidate for the **Marie Skłodowska-Curie Innovative Training Network** NextGenVis, under the European Union H2020 Programme (H2020-MSCA-ITN-2014)

- FPU fellowship by the Spanish Ministry of Education for conducting doctoral studies (2015, unfinished due to change of program)

- **Excellence Grant of Comunidad de Madrid** for excellent results at high school and PAU (university entrance exam) **(Grade: 9,24/10)**. Year 2009/2010. Work of teaching support: "Analysis and Report of MATLAB Tutorials" — Director: Prof. Emilio Parrado Hernández

- Diploma from Universidad Carlos III de Madrid for getting the **32nd position at the university entrance exams**. 2009/2010.

Languages

Spanish:	Native
English:	Near-native. CPE 71/100 (C2) (2014), TOEFL (iBT) 103 (2014)
German:	High. C1, Volkshochschule Berlin (2017)
French:	High-intermediate. B2, Universität Stuttgart (2012)
Italian:	Basic-intermediate
Greek:	Basic

Additional Information and Technical Skills

- Programming Languages: Python, MATLAB, bash, C, Java.

- Deep learning frameworks: TensorFlow, Keras, PyTorch

- Web Development Technologies: HTML5, CSS, XML, Javascript, etc.

- Misc: git, vim, tmux, ssh, LaTeX, Markdown, Liquid, Jekyll, etc.

- Music education on violin. Orchestras: JORCAM, Orchestra of the Universidad Carlos III (concert master), Orchestra of the Universität Stuttgart, Symphonic Orchestra of the Humboldt University.

- Violinist of The Broken Jug Ramblers, bagpiper of Lume de Biqueira.