Benjamin M. Lahner

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA 2019-Present
PhD Student, Electrical Engineering and Computer Science Department

Massachusetts Institute of Technology, Cambridge, MA 2019-2022
Master of Science in Electrical Engineering and Computer Science

Boston University, Boston, MA 2015-2019
Bachelor of Science in Biomedical Engineering, Magna Cum Laude

SELECTED EXPERIENCE

Computer Science and A.I. Lab (CSAIL), MIT, Cambridge, MA September 2019-Present
***Computational Neuroscience Researcher* with Dr. Aude Oliva**

- Research objective: Explain how humans perceive and understand natural videos.
- Use deep neural networks and machine learning techniques to model the human visual system.
- Interdisciplinary expertise in cognitive neuroscience, computer vision, and machine learning.
- Regularly communicate research results via journal publications and conference abstracts.

Microsoft Corporation, Redmond, WA Summer 2022
***Computer Vision Researcher*, Azure Cognitive AI**

- Train large transformer models to unite vision and language tasks.
- Project contributes towards deployment in Microsoft's Azure AI platform.

Regeneron Pharmaceuticals, Tarrytown, NY Summer 2021
***Machine Learning PhD Intern*, Early Clinical Development Team**

- Analyzed clinical time-series data collected from biosensors on a wearable device in order to obtain FDA approval.
- Trained and implemented various machine learning models, such as support vector machines, convolutional neural networks, and regression models, to predict clinically relevant Patient Reported Outcomes, such as pain.
- Presented results to senior management, which heavily influenced critical investment decisions in the emerging field of wearable healthcare technologies.

Department of Biomedical Engineering, Boston University, Boston, MA September 2018-May 2019
***Undergraduate Senior Thesis Researcher* with Dr. John White**

- Developed and deployed a real-time algorithm (latency of ~20ms) in C++ that interfaced with neural signals from a mouse's hippocampus to manipulate memory encoding and retrieval.

LEADERSHIP AND INVOLVEMENT

***Reviewer* for the Journal "Expert Systems with Applications"** January 2021-Present

***Education Volunteer*, The Educational Justice Institute (TEJI) at MIT** August 2020-Present

- Teach MIT's "Introduction to Programming and Computer Science" course to people who are incarcerated.
- Design and instruct computer education courses while taking into account the logistical concerns of internet and electronics in correctional facilities.

***Mentor*, Project SHORT** August 2020-Present

- Offer one-on-one assistance in personal statements, research proposals, mock interviews, and general advice to underrepresented applicants to graduate programs.

SELECTED GRADUATE COURSEWORK

Theory of Computation Fall 2021

- Proof-based course studying Language Theory, Computability Theory (e.g. Turing Machines, reducibility, recursion), and Complexity Theory (P vs NP, time and space complexity, interactive proof systems).

Hardware for Deep Learning Spring 2021

- Exploited properties of deep neural network computations, such as matrix sparsity and data reuse in convolutions, to optimize computer hardware accelerators, such as GPUs, FPGAs, and ASICs.
- Course project: developed an automated platform for pruning 3D Deep Neural Networks (e.g. for video inputs) based on energy consumption of each layer. My team and I used a 3D MobileNetV2 neural network implemented on the Eyeriss architecture to evaluate the platform.

Computer Vision Fall 2019

- Course project: used motion magnification algorithms to exploit glitches and temporal inconsistencies in deep-faked videos for easier detection.

Natural Language Processing Spring 2020

- Course project: explored LSTM, attention-based, and transformer models for video to text captioning tasks.

SELECTED PUBLICATIONS

- **Benjamin Lahner**, Kshitij Dwivedi, Polina Iamshchinina, Monika Graumann, Alex Lascelles, Gemma Roig, Alessandro Thomas Gifford, Bowen Pan, SouYoung Jin, N. Apurva Ratan Murty, Kendrick Kay, Aude Oliva, Radoslaw Cichy. BOLD Moments: modeling short visual events through a video fMRI dataset and metadata. bioRxiv 2023.03.12.530887; doi: https://doi.org/10.1101/2023.03.12.530887
- **Benjamin Lahner**, Santani Teng, Matthew X. Lowe, Ian Charest, Aude Oliva, Yalda Mohsenzadeh. The Emergence of Early Sound Categorical Responses in the Human Brain. NeurIPS SVRHM Workshop, Vancouver, Canada (2019)
- **Benjamin Lahner*,** Caitlin Mullin*, Yalda Mohsenzadeh*, Dimitrios Pantazis, and Aude Oliva. Tracking the Spatio-Temporal Neural Trace of Memorability. Submitted
- Yalda Mohsenzadeh*, Caitlin Mullin*, **Benjamin Lahner**, Radoslaw Cichy, and Aude Oliva. Reliability and generalizability of similarity-based fusion of fMRI and MEG data in the ventral and dorsal visual streams. *Vision* 2019, 3, 8; doi:10.3390/vision3010008
- Matthew F. Wipperman*, Allen Z. Lin*, Kaitlyn Gayvert*, **Benjamin Lahner**, …, Olivier Harari. Machine-learning analysis of a wearable digital insole versus gold standard clinical gait assessments for digital endpoint development. Submitted

SELECTED PERSONAL PROJECTS

March Madness Bracket Generator Spring 2023

- Created a bracket generator website for the men's and women's NCAA college basketball tournament using JavaScript. Gained experience in website design, SEO, and backtesting analyses.

Internet of Things Environmental Sensor Fall 2022

- Designed and deployed a solar-powered temperature, humidity, and VOC sensing device using Arduino.

Neural Network Tutorial Series Spring 2023-Ongoing

- Comprehensive neural network (NN) tutorial series for students with no GPU or internet access, specifically intended for incarcerated students. Details NN training, mathematics of back-propagation, coding of a multi-layer perceptron (MLP) in NumPy, coding of a MLP in PyTorch, and coding of a convolutional NN in PyTorch.

3D Printed Brain Summer 2019

- Converted MRI scans of my brain to an STL file and used an FDM printer to 3D print my brain in real size.

AWARDS

MIT Open Data Competition – Runner Up Fall 2022

- Runner up (out of 70 projects across MIT) in the Open Data competition that recognizes open and publicly accessible data with strong potential for large scientific impact.

EECS Mathworks Fellowship Fall 2022

- Awarded full financial support for one academic year for using MATLAB in novel and impactful scientific research.

Best Biomedical Engineering Senior Design Project Spring 2019

- Awarded best project out of 42 other projects in biomedical engineering by engineering faculty.

Dean's List 2015-2019

- Recognition of top 10% of engineering students per semester

SKILLS AND INTERESTS

Computer Languages: Python, Matlab, bash, HTML, CSS, JavaScript, C++
Python Packages: PyTorch, Scikit-Learn, Pandas, SciPy, Matplotlib, Jupyter, BeautifulSoup, Selenium
Foreign Languages: English (native), Spanish (intermediate)
Interests: Investing, Backpacking, Snowboarding, Volleyball, Finance, Magic