Alexander Joseph Andonian

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EDUCATION

Ph.D. in Electrical Engineering and Computer Science August 2019 -
Interests: Computer Vision, Deep Learning, Artificial Intelligence
Awarded 2019 *Great Educators* Fellowship
Massachusetts Institute of Technology

B.S. Neuroscience, Physics, Mathematics August 2013 - May 2017
Joint Neuroscience-Physics Honors Thesis
Summa Cum Laude, Phi Beta Kappa, Sigma Xi
Bates College, Lewiston ME
GPA 3.98/4.00

EXPERIENCE

Principal Research Assistant - Dr. Aude Oliva, Ph.D. 2017-2019
Computational Perception and Cognition Group
Computer Science and Artificial Intelligence Laboratory (CSAIL), MIT

- Designed, implemented, and evaluated deep learning models for action recognition, temporal reasoning and visual set abstraction in videos.
- Devised and applied models for the novel task of cross-view semantic segmentation to improve spatial understanding and navigation skills of embodied agents in simulated and real 3D environments such as House3D and Matterport3D.
- Developed and maintained the Moments in Time Dataset infrastructure (website, evaluation server, etc.) responsible for showcasing and distributing the video dataset.
- Coordinated and ran the Moments in Time Recognition Challenge at CVPR'18, which was jointly held with the ActivityNet Challenge 2018.
- Co-mentored two visiting students and supervised their introduction to vision research.
- Provided software design, programming and system administration support to ongoing research projects and resources across the lab.

Visiting Student in NeuroAI Lab - Dr. Dan Yamins, Ph.D. Summer, 2017
Affiliated with Stanford Artificial Intelligence Lab (SAIL)
Department of Computer Science and Psychology, Stanford University

- Acquired comprehensive knowledge of popular deep learning frameworks, particularly TensorFlow and PyTorch, through one-on-one code reviews with PI.
- Developed two python packages now actively used by all members of the lab to run and record highly reproducible deep learning experiments.
- Attended SDL reading group talks and participated in weekly lab meetings.

Student in TECBio REU - Dr. Chakra Chennubhotla, Ph.D. Summer, 2016
Department of Computational and Systems Biology, University of Pittsburgh

- Developed bioimage informatics tools for quantifying intratumor heterogeneity in multiplexed fluorescence tissue data.
- Mentored high school student attending DiSCoBio summer academy.
- Led journal club discussions and weekly lab meetings.
- Presented work at undergraduate research symposiums.
- Participated in a mentored team-based ethics forum.

Peer Tutor in the Sciences 2015 - 2017
Academic Resource Commons, Bates College

- Worked directly with students seeking additional academic support, particularly in the neuroscience department.
- Attended and participated in training sessions on various aspects of pedagogy and learning support.

Neurology Assistant - Dr. Diana Apetauerova, M.D. Summer, 2015
Movement Disorders Department, Lahey Hospital, Burlington, MA

- Observed movement disorders clinic, deep brain stimulation, grand rounds and attended teaching conferences and lectures.

Research Assistant - Dr. Vicki Rosen, Ph.D., Chair Summer, 2013
Department of Developmental Biology, Harvard University School of Dental Medicine

- Studied a novel regulatory mechanism in the BMP signaling pathway, presented findings at weekly lab meetings and co-authored publication.

Research Assistant - Dr. Barbara Corkey, Ph.D., Director Summer, 2012
Evans Biomedical Research Lab
Boston Medical Center

- Conducted experiments on the redox state's effect on gluconeogenesis, presented findings at weekly meetings and contributed to potential scientific publications.

PUBLICATIONS & PRESENTATIONS

Spatially organized genomic and physiological heterogeneity of the olfactory bulb mitral cell layer. Daniel Paseltiner, Henry Loeffler, **Alex Andonian**, Abigail Leberman, Travis J. Gould, and Jason B. Castro. *bioRXiv preprint* https://doi.org/10.1101/2020.01.13.903823. 2020.

GANalyze: Toward Visual Definitions of Cognitive Image Properties. Alex Andonian*, Lore Goetschalckx*, Aude Oliva, Phillip Isola. *International Conf. on Computer Vision* (**ICCV'19**). 2019.

Unsupervised Learning from Video with Deep Neural Embeddings, Chengxu Zhuang, **Alex Andonian**, Daniel Yamins. Under review of *Computer Vision and Pattern Recognition* (**CVPR'20**). 2019.

Semantic Relational Set Abstraction for Event Understanding. Alex Andonian, Camilo Fosco, Mathew Monfort, Rogerio Feris, Allen Lee, Bolei Zhou, Carl Vondrick, Aude Oliva. Under review of *Computer Vision and Pattern Recognition* (**CVPR'20**). 2019.

Multi-Moments in Time: Learning and Interpreting Models for Multi-Action Video Understanding Mathew Monfort, Kandan Ramakrishnan, **Alex Andonian**, Barry A McNamara, Alex Lascelles, Bowen Pan, Dan Gutfreund, Rogerio Feris, Aude Oliva. arXiv preprint arXiv:1911.00232. 2019.

Cross-view Semantic Segmentation for Sensing Surroundings. Bowen Pan, **Alex Andonian**, Aude Oliva, Bolei Zhou. Under review of *Computer Vision and Pattern Recognition* (**CVPR'20**). 2019.

Examining Class Dependant Sub-Paths in Deep Neural Networks. Mathew Monfort, Kandan Ramakrishnan, Alex Andonian, Aude Oliva. *Journal of Vision*. 2019.

The Algonauts Project: A Platform for Communication between the Sciences of Biological and Artificial Intelligence. Radoslaw Martin Cichy, Gemma Roig, Alex Andonian, Kshitij Dwivedi, Benjamin Lahner, Alex Lascelles, Yalda Mohsenzadeh, Kandan Ramakrishnan, Aude Oliva. *arXiv preprint* arXiv:1905.05675. 2019.

A deep learning based method for large-scale classification, registration, and clustering of in-situ hybridization experiments in the mouse olfactory bulb. Alex Andonian, Dan Paseltiner, Travis Gould, Jason Castro. *Journal of Neuroscience Methods.* 2018

Temporal Relational Reasoning in Videos. Bolei Zhou, **Alex Andonian**, Aude Oliva, Antonio Torralba. *European Conference on Computer Vision* (**ECCV**). 2018.

Moments in Time Dataset: one million videos for event understanding. Mathew Monfort, **Alex Andonian**, Bolei Zhou, Sarah Adel Bargal, Tom Yan, Kandan Ramakrishnan, Lisa Brown, Quanfu Fan, Dan Gutfruend, Carl Vondrick, Aude Oliva. *IEEE transaction on Pattern Analysis and Machine Intelligence* (**TPAMI**), (doi:10.1109/TPAMI.2019.2901464). 2018.

Informatics Tools for Quantifying Intratumor Heterogeneity in Multiplexed Fluorescence Tissue Data. Alex Andonian. Presented at *Council on Undergraduate Research's Research Experiences for Undergraduates Symposium.* National Science Foundation's Atrium, Arlington, Virginia. October 2016.

N-linked glycosylation of the bone morphogenetic protein receptor type 2 (BMPR2) enhances ligand binding. Jonathan W. Lowery, Jose M. Amich, **Alex Andonian**, Vicki Rosen. *Cellular and Molecular Life Sciences.* 2013.

WORKSHOPS, TUTORIALS & CHALLENGES

Multi-Moments in Time: Multi-Label Action Detection Challenge at ICCV'19. 2019
The Algonauts Project: Explaining the Human Visual Brain. 2019
GANocracy: Theory, Practice and Artistry of Deep Generative Modeling. 2019
Moments in Time: Video Recognition Challenge held at CVPR'18. 2018

PRESS COVERAGE

MIT News:What makes an image memorable? Ask a computer. 2019
VentureBeat: Designing AI that can track objects over time. 2018
MIT News: Helping computers fill in the gaps between video frames. 2018
MIT Technology Review: The Next Big Step for AI? Understanding Video. 2017

AWARDS & DISTINCTIONS

Dana Scholar for Academic Excellence, Leadership, Service 2014 - 2017
- The program grants the Charles A. Dana Award to ten men and ten women from each first-year Bates class. These students, the Dana Scholars, are recognized with the award for their academic excellence and promise, their leadership potential, and their service to the College and the community.

The Judith Magyar Isaacson '65 Prize 2017
- Awarded annually to the senior who has demonstrated high academic achievement in digital and computational studies and mathematics.

Dean's List for Academic Excellence 2013 - 2017

Bates Dept. of Physics & Astronomy Distinguished Junior Prize 2016
- Awarded to junior physics majors with the highest GPA.

RELEVANT COURSEWORK

MIT: 6.867 - Machine Learning; 6.869 - Advances in Computer Vision — Fall 2019
Stanford (self-study): CS231n - CNNs for CV; CS224n NLP with DL — Summer 2019

TECHNOLOGY SKILLS

Programming Languages: Python, Javascript, C/C++, MATLAB, Java, Mathematica, Scheme, shell scripting.
Web Development: HTML/CSS/Javascript, Django/Flask, Angular, MySQL/PostgreSQL
Machine Learning: PyTorch, TensorFlow, Scikit-Learn, Numpy/SciPy/Pandas.
Software: Docker, Git, LaTeX, MS Office, Vim, Tmux, VirtualEnv, VirtualBox.

TEACHING & COMMUNITY SERVICE

STEM Lab Coordinator — May 2016 - 2017
Stephen Belleau, GT Teacher, NBCT
Farwell Elementary School and Geiger Elementary School, Lewiston, Maine.

- Developed and taught robotics and computer science curriculum.
- Organized and led "an hour of code" sessions sponsored by Code.org.

Big Brother Mentor — September 2014 - 2017
Big Brothers Big Sisters
Community Concepts, Lewiston, ME

- Mentored at-risk middle/high school student.

EXTRA-CURRICULAR ACTIVITIES

Bates College Orchestra: *Concertmaster* — 2013 - 2017
Bates College Weightlifting Club: *Co-founder, Competitive Powerlifter* — 2014 - 2017
Alpine Skiing, Downhill Mountain Biking, Endurance Challenges — 2002 - present
Violin and Chamber Music Studies — 1998 - present