Wilka Torrico De Carvalho, *Aspiring Brain Scientist*

Contact Information

Website: wcarvalho.github.io
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Google Scholar

Research Interests

I am interested in exploring what basic models and algorithms the brain may employ to solve the complex computational problems it faces. A major driving force for much of my research is a mechanistic and algorithmic understanding of why stereotyping-like behavior seems to emerge as we discover, structure, and learn to apply category representations. My research beliefs rest on the presumption that distributed, sub-symbolic representations (such as those learned by neural networks) play a key role in the flexibility and versatility of the brain's learning capabilities. As such, I plan to investigate stereotyping as a neural network-based inference and representation-learning problem.

Education

University of Michigan–Ann Arbor, Ann Arbor, Michigan USA — Sep 2018 - Present
School of Engineering, Ph.D. in Computer Science
Advisors: Honglak Lee, Richard Lewis, Satinder Singh

University of Southern California, Los Angeles, California USA — Aug 2015 - May 2017
Viterbi School of Engineering, M.S. in Computer Science
Advisor: Yan Liu

Stony Brook University, Stony Brook, New York USA — Aug 2011 - May 2015
College of Arts and Sciences, B.S. in Physics
Advisor: Axel Drees

Brooklyn Technical High School, Brooklyn, New York USA — May 2007 - May 2011
Diploma in Applied Physics

Honors & Awards

1/200 chosen internationally for Heidelberg Laureate Forum	2018
GEM National Fellowship sponsored by IBM, Adobe	2017, 2018
University of Michigan Rackham Merit Fellowship	2017
ICLR Travel Award	2017
NSF Graduate Research Fellowship (Neuroscience)	2015
Provost Award for Academic Excellence ($\sim$ 0.5% of graduates chosen)	2015
Stony Brook University Researcher of the Month	2014
HHMI Minority Undergraduate Research Fellowship	2014
ΣΠΣ Physics Honor Society (sponsored by Alfred Goldhaber)	2013
NSF Louis Stokes Alliance for Minority Participation Scholar	2011
Deans List	2011-2015

Conference Publications

Bryant Chen*, **Wilka Carvalho***, Benjamin Edwards, Taesung Lee, Ian Molloy, Heiko Ludwig, Jaehoon Safavi. *"Detecting Backdoor Attacks on Deep Neural Networks by Activation Clustering."* In Artificial Intelligence Safety Workshop at Association for the Advancement of Artificial Intelligence (AAAI), 2018 **(Best Paper)**

Sanjay Purushotham*, **Wilka Carvalho***, Tanachat Nilanon, Yan Liu. *"Variational Recurrent Adversarial Domain Adaptation."* In 5th International Conference on Learning Representations (ICLR), 2017

Sanjay Purushotham*, **Wilka Carvalho***, Yan Liu. *"Variational Adversarial Deep Domain Adaptation for Health Care Time Series Analysis."* In 29th Annual Conference on Neural Information

Processing Systems Workshop on Machine Learning for Healthcare (NIPS ML4HC), 2016 **(Spotlight)**

Wilka Carvalho. *"Modeling a Detection of internally reflected Cherenkov light (DIRC) Particle Detector for High-Multiplicity Collisions."* In State University of New York Undergraduate Research Conference (SURC), 2015

Patents

Wilka Carvalho, Bryant Chen, Benjamin Edwards, Taesung Lee, Ian Molloy, Jialong Zhang. *"Using Gradients to Detect Backdoors in Neural Networks."* 2018

Wilka Carvalho, Yan Liu, Tanachat Nilanon, Sanjay Purushotham. *"Effective Knowledge Transfer Among Patient Populations via Deep Learning."* 2017

Invited Talks

Machine Learning Lunch Seminar. University of Southern California. (April, 2017)

Symposium Presentations

"Variational Adversarial Deep Domain Adaptation for Healthcare Time Series." *Southern California Machine Learning Symposium. California Institute of Technology*, Pasadena, CA, 2016. **Runnerup, Best Poster. Worth $1000 in Amazon AWS credit.**

"Modeling a DIRC Particle Detector for High-Multiplicity Collisions." *23rd Annual CSTEP Statewide Student Conference*, Bolton Landing, NY, 2015. **2nd Place, Physics and Math.**

"Modeling the Cognitive Process of Attributing Traits to Others." *Summer Seminar Day. California Institute of Technology*, Pasadena, CA, 2014.

"Modeling Deep Brain Stimulation of Globus Palidus Internus." *22nd Annual CSTEP Statewide Student Conference*, Bolton Landing, NY, 2014.

"Modeling a Detection of internally reflected Cherenkov light (DIRC) Particle Detector for High-Multiplicity Collisions." *URECA Celebration of Undergraduate Research & Creativity. Stony Brook University*, Stony Brook, NY, 2014.

"Modeling Deep Brain Stimulation of Globus Palidus Internus." *Poster Symposium. University of Minnesota*, Minneapolis, MN, 2013.

"Testing Theories in Fluid Dynamics." *Global Lab Poster Symposium. Suny Oswego*, Oswego, NY, 2012.

Research Experience

University of Michigan–Ann Arbor, Ann Arbor, Michigan USA
AI Lab, *August 2018 – Present*
Advisors: Satinder Singh, Honglak Lee, Richard Lewis

Microsoft Research, Redmond, Washington USA
Medical Devices Group, *June 2018 – August 2018*
Advisor: Sumit Basu
Project: Predicting clinical measures from physiological signals measured by a wearable device

IBM Research, San Jose, California USA
AI Platform Research Group, *September 2017 – December 2017*
Advisor: Heiko Ludwig
Project: Detecting Backdoor Attacks on Deep Neural Networks by Activation Clustering

Visa Research, Palo Alto, California USA

Data Analytics Group, *June 2017 – August 2017*
Advisor: Hao Yang
Project: Learning latent language models for improved machine reading comprehension

University of Southern California, Los Angeles, California USA
Melady Machine Learning Lab, *November 2015 – May 2017*
Advisor: Yan Liu
Samsung and NSF funded project: "Variational Adversarial Deep Domain Adaptation for Health Care Time Series Analysis"

Stony Brook Univeristy, Stony Brook, New York USA
Heavy Ion Research Group, *January 2013 – August 2015*
Advisor: Axel Drees
DOE funded project: "Modeling a Detection of internally reflected Cherenkov light Particle Detector for High-Multiplicity Collisions"

Stony Brook Univeristy, Stony Brook, New York USA
Computational Neuroscience Group, *Fall 2014*
Advisor: Giancarlo La Camera
NSF LSAMP funded project: "Spectral Analysis of Rodent Neural Data"

California Institute of Technology, Pasadena, California USA
Emotion and Social Cognition Laboratory, *Summer 2014*
Advisor: Ralph Adolphs
HHMI funded project: "Modeling the Cognitive Process of Attributing Traits to Others"

University of Minnesota, Minneapolis, Minnesota USA
Neuromodulation Research and Technology Laboratory, *Summer 2013*
Advisor: Matthew Johnson
NIH funded project: "Modeling Deep Brain Stimulation of Globus Palidus Internus"

National Central University, Jhongli City, Taiwan
Turbulent Combustion Laboratory, *Summer 2012*
Advisor: Shenqyang Shy
"Empricial Analysis of Theories from Fluid Dynamics"

Teaching Experience

Stony Brook University, Stony Brook, NY
Calculus Instructor, *Spring 2015*
Worked with two math professors to develop and teach a supplementary calculus curriculum that promoted minority representation in stem majors.

Stony Brook University, Stony Brook, NY
Educational Opportunity Program Personal Tutor, *Spring 2013 - Fall 2014*
Tutored marginalized students in introductory physics and math courses

Service

Student Volunteer, ICLR, 2017

Outreach

Research and Fellowships Week NSF Panel, Los Angeles, CA, 2016
National Society of Black Engineers Grad Panel, Los Angeles, CA, 2016
Graduate School External Fellowship Boot Camp, Los Angeles, CA, 2016
Mentored marginalized high school youth through the Pullias Center for Higher Education, Los An-

geles, CA, 2016
Engineering Graduate Diversity Symposium, Los Angeles, CA, 2015
Black Student Association: What it takes to go to Graduate School, Los Angeles, CA, 2015
Collegiate Science and Technology Entry Program Undergraduate Research Panel, Stony Brook, CA, 2014

Skills

Machine Learning Software: Pytorch, TensorFlow, Theano, Keras
Neuroscience Software: Neuron
Languages: Python, C++, C, Java
Systems: Unix, Linux, OSX

Press

Exploring the source of social stereotypes
Black History Month: Why a career in science?
Research Feature by the USC Graduate School
2015 NSF Graduate Research Fellow Wilka Carvalho
Biomath Learning Center Launches Modified Supplemental Instruction Program
URECA Research of the Month: Wilka Carvalho
Student Feature by Stony Brook University

Interests

• traveling • chess • software development • improvisational dance • deadpan humor