Samuel Rivera

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Profile

Engineer with machine learning, computer vision and cognitive computational modeling experience.

Education

PhD, Electrical Engineering, *The Ohio State University*, Columbus, OH (GPA: 3.665/4.0) December 16, 2012
-Specialization: machine learning, pattern recognition, computer vision, eye tracking

MS, Electrical Engineering, *The Ohio State University*, Columbus, OH March 18, 2012
-Awarded upon becoming a PhD candidate

BE, Electrical Engineering, *University of Delaware*, Newark, DE (GPA: 3.480/4.0) May 15, 2007
-Minors: Math and Physics; Specialization: signal processing

Skills

- Languages: Python, Pandas, MATLAB, C/C++, LaTeX, OpenCV, R, Psychtoolbox, Linux
- Relevant Courses: computer vision, pattern recognition, applied regression analysis, numerical optimization, linear algebra, elements of statistical learning, nonparametric function estimation, random signal analysis and random processes
- Skills: Linux command line; Git version control; Image and video processing; Machine Learning; Eye-Tracking; EEG

Experience

Research Engineer, *Matrix Research* April 28,2016 - Present

- Machine learning, Deep Learning, statistical modeling, algorithm development and implementation.
- Tracking, recognition, and signal processing algorithm development and implementation for RF and visual domain.
- Involved in all aspects of research including but not limited to proposal writing, project planning and directing, statistical and mathematical algorithm derivation, implementation and technology demonstration, technical reporting, and delivery.

Postdoctoral Researcher, *The Ohio State University* September 15, 2013 - March 18, 2016

PI: Dr. Vladimir Sloutsky of the Cognitive Development Lab (CDL). CDL examines the development of cognition.

- Developed experiments to distinguish between competing theories of cognitive development
- Designed, implemented, and ran studies using neuroimaging (EEG) and eye-tracking with human participants
- Performed statistical analysis using ANOVA and mixed effects models in Python and R
- Processed and visualized data using Python, MATLAB, R, and Github in a Linux environment
- Modeled behavior and eye-tracking data using Kohonen networks (SOM) and hierarchical Bayesian models
- Managed, mentored, and trained students in conducting research
- Designed and taught programming course covering the basics of MATLAB and Python

Research Assistant, *The Ohio State University* December 15, 2007 - December 15, 2012

PI: Dr. Aleix Martinez of the Computational Biology and Cognitive Science Lab (CBCSL). The CBCSL applies pattern recognition to problems in computer vision, cognitive science, and developmental psychology to name a few.

- Designed and implemented novel shape detection algorithms using machine learning methods of kernel regression and probabilistic graphical models
- Applied methods of Discriminant Analysis and feature selection to modeling emotion perception from faces
- Developed software interfacing MATLAB with OpenCV to automatically process face image databases
- Drafted manuscripts, grant proposals, and technical documents to obtain new funding and document research
- Collaborated across disciplines and publicized work to enhance the impact of research

Center for Cognitive Sciences Fellow, *The Ohio State University* June 1, 2011 - September 1, 2011

PIs: Dr. Vladimir M. Sloutsky and Dr. Dirk B. Walther of the Department of Psychology, and Dr. Aleix Martinez of the Electrical and Computer Engineering department.

- Discovered relevant patterns in noisy high dimensional data using machine learning and pattern recognition methods
- Developed custom software to format and organize raw eye track data from several sources
- Implemented open source MATLAB toolbox with documentation for eye tracking analysis and visualization. Source available through github link on my website.

Publications

Rivera, S., Joel Klipfel, and Deborah Weeks (2020). Flexible deep transfer learning by separate feature embeddings and manifold alignment, *Proc. SPIE 11394, Automatic Target Recognition XXX*, 113940O (24 April 2020); https://doi.org/10.1117/12.2557063

Rivera, S., Olga Mendoza-Schrock, and Ashley Diehl (2019). Transfer learning for aided target recognition: comparing deep learning to other machine learning approaches, *Proc. SPIE 10988, Automatic Target Recognition XXIX*, 109880T (14 May 2019); https://doi.org/10.1117/12.2514753

Barnhart, W., Rivera, S., & Robinson, C.W. (2018). Effects of Linguistic Labels on Visual Attention in Children and Young Adults. *Frontiers in Psychology*, Mar. Vol. 9, Number 358.

Barnhart, W., Rivera, S., & Robinson, C.W. (2018). Different patterns of modality dominance across development. *Acta Psychologica*, Jan. 182, pp. 154-165.

Dunifon, C.M., Rivera, S., & Robinson, C.W. (2016). Auditory stimuli automatically grab attention: Evidence from eye tracking and attentional manipulations. *Journal of Experimental Psychology Human Perception & Performance*. 42 (12), 1947-1958.

Rivera, S. & Sloutsky, V. (2016). Salience versus prior knowledge - how do children learn rules?. *Proceedings of the 38th Annual Conference of the Cognitive Science Society*. In press.

Rivera, S. & Robinson, C.W. (2016). Learning in the wild - how labels influence what we learn. *Proceedings of the 38th Annual Conference of the Cognitive Science Society*. In press.

Rivera, S. & Sloutsky, V. (2015). Development of selective attention in category learning. In D. C. Noelle, R. Dale, A. S. Warlaumont, J. Yoshimi, T. Matlock, C. D. Jennings, & P. P. Maglio (Eds.), *Proceedings of the 37th Annual Conference of the Cognitive Science Society* (pp. 2003-2008). Austin, TX: Cognitive Science Society.

Robinson, C.W., Barnhart, W., & Rivera, S. (2015). Auditory stimuli slow down responses and first fixations: Support for auditory dominance in adults. In D. C. Noelle, R. Dale, A. S. Warlaumont, J. Yoshimi, T. Matlock, C. D. Jennings, & P. P. Maglio (Eds.), *Proceedings of the 37th Annual Conference of the Cognitive Science Society* (pp. 2009-2014). Austin, TX: Cognitive Science Society.

Rivera, S., & Martinez, A. (2014). Precise Fiducial Detection. In S. Z. Li & A. K. Jain (Eds.), *Encyclopedia of Biometrics* (pp. 1–5). Springer US.

Benitez-Quiroz, C.F., Rivera, S., Gotardo, P., & Martinez, A. (2014). Salient and Non-Salient Fiducial Detection using a Probabilistic Graphical Model. *Pattern Recognition*, Vol. 47, pp. 208-215.

Rivera, S. (2012). Computational Methods for the Study of Face Perception. (Doctoral dissertation). *Retrieved from ProQuest Dissertations and Theses*. (Accession Order No. AAT 3535204)

Rivera, S., Best, C., Yim, H., Martinez, A., Sloutsky, V., & Walther, D. (2012). Automatic selection of eye tracking variables in visual categorization for adults and infants. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Conference of the Cognitive Science Society* (pp. 2240-2245). Austin, TX: Cognitive Science Society.

Rivera, S. & Martinez, A.M. (2012). Learning Deformable Shape Manifolds. *Pattern Recognition*, Vol. 45, No. 4, pp. 1792-1801.

Talks and Presentations

Modeling Dynamics of Infant Category Learning
Presented at ICIS 2016, New Orleans, LA, USA May 26, 2016

Development of Selective Attention in Category Learning
Presented at CDS 2015, Columbus, OH, USA Oct 9, 2015

Development of selective attention in category learning
Talk given at COGSCI 2015, Pasadena, CA, USA July 25, 2015

Attention and the development of category learning
Presented at SRCD 2015, Philadelphia, PA, USA March 21, 2015

Anticipatory Looking Paradigm for Visual Categorization in Infants
Presented at VSS 2014, Naples, FL, USA May 17, 2014

The emotion category of expressive faces becomes more influential over development
Presented as SRCD 2013, Seattle, WA, USA April 19, 2013
Automatic selection of eye tracking variables uncovers similar mechanisms for visual categorization in adults and infants *Talk given at VSS 2012, Naples, FL, USA* May 7, 2012
Biologically-Inspired Face Shape Detection, with Dr. Aleix Martinez
John D. and Alice Nelson Kraus Memorial Student Poster Contest September 12, 2009
Deformable Shape Detection, with Dr. Aleix Martinez
Ohio State Biomedical Engineering Conference, Hosted by OSU Department of Biomedical Engineering May 15, 2009

Honors and Awards

- AFRL LabHack Hackathon, 1^{st} place team for Upshot Challenge on field translation of handwritten documents, 2016
- Research Assistantship, The Ohio State University, September 2008 to December 2012
- Center for Cognitive Science fellowship, The Ohio State University, June to August 2011
- Awarded 1^{st} place at John D. and Alice Nelson Kraus Memorial poster competition, The Ohio State University, 2009
- University Fellow, The Ohio State University, September 2007 to August 2008
- President of Caribbean Student Alliance, University of Delaware, 2006
- Vice President of Eta Kappa Nu, University of Delaware, 2006
- Awarded 2^{nd} place at 9th Annual Philadelphia AMP Research Symposium, University of Delaware, November 5, 2006
- Ronald E. McNair Leadership Award, University of Delaware, in August 2006
- Ronald E. McNair Scholar, University of Delaware, June 2005 to August 2007
- Liston A. Houston Scholarship, University of Delaware, Fall 2004
- Latino Student of Distinction, University of Delaware, May 2004 to May 2007

Society Memberships

Cognitive Science Society
Vision Sciences Society (VSS)
Institute of Electrical and Electronics Engineers (IEEE) Graduate Student Member, 2008 - 2012
Alpha Psi Lambda, Inc. March 2008
Tau Beta Pi, Engineering Honor Society December 2006
Eta Kappa Nu, Electrical Engineering Honor Society April 2006