Eder Santana

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github: https://github.com/edersantana

Projects

Research Scientist, Toyota Research Institute
Los Altos, CA — Starting September 2017 (current)

My current research is on Machine Learning for self driving cars. I'm investigating what is possible with end-to-end systems and pushing the limits further with innovative neural network architectures.

Deep Learning, Apple
Cupertino, CA — 2017 (Spring internship)

I worked on advanced Deep Learning techniques for the Video Engineering team. I was investigating data augmentation techniques for face recognition as part of FaceID.

Advanced Machine Learning Lead, comma.ai
San Francisco, CA — 2016 (Summer internship)

I helped to build Machine Learning systems for self driving cars. Specifically:
1) Wrote deep learning infrastructure using scalable off core message passing data pipeline.
2) Designed a spatio-temporal (CNN+RNN) model that improved the self-driving car AI and modeled the path prediction uncertainty.
3) Designed and trained an image segmentation system.
4) I wrote "Learning a Driving Simulator" research paper and released a driving dataset.

Open source developer
I contribute Tensorflow and Theano code to Keras: a deep learning library (Python). I published a Keras video course called Deep Learning with Python. I used to maintain Seya a library with advanced architectures for Keras such as the Deep Recurrent Attentive Writer (DRAW) and Neural Turing Machines.

Machine Learning, Paracosm.io
Gainesville, FL — 2014 (Summer internship)

I built deep learning based 3D object recognition models for a research project with Paracosm.io and Nielsen Corp.

PhD Research (University of Florida)

Gainesville, FL — 2014 - 2017

First I built neural networks for decoding brain waves from EEG for Brain Machine Interfaces. Afterwards, my research was focused on unsupervised video representation and prediction. My thesis title is "Long term temporal pattern consolidation for Cognitive Architectures" i.e. I want my neural networks to learn to snapshot relevant events in video to help them predict future frames.

Undergrad and Masters Research (University of Maranhao)

Sao Luis, MA, Brazil — before 2013

I worked in the Biological Information Processing Lab developing algorithms for cardiac signal filtering. My focus was on pregnant women signals and separating the signal of the fetus from the signal of the mother.

EDUCATION

PhD Electrical and Computer Engineering

University of Florida, Gainesville, FL — 2013-2017

MSc Electrical Engineering

Federal University of Maranhao, Sao Luis, Brazil — 2011-2012

BSc Electrical Engineering

Federal University of Maranhao, Sao Luis, Brazil — 2007-2011

PUBLICATIONS

SELECTED

[1] **Eder Santana**, George Hotz, "Learning a Driving Simulator". NIPS 2016 Deep Reinforcement Learning workshop.

JOURNALS

[2] **Eder Santana**, Matthew Emigh, Pablo Zegers, Jose Principe, "Exploiting Spatio-Temporal Structure with Winner-Take-All Networks", IEEE Trans. on Neural Networks (submitted).

[3] Mihael Cudic, Ryan Burt, **Eder Santana**, Jose Principe, "A flexible testing environment for visual question answering with performance evaluation", Neurocomputing (submitted).

[4] **Eder Santana**, Jose Principe, Ewaldo Santana, Allan K Barros, "Extraction of signals with higher order temporal structure using Correntropy", Signal Processing vol 92, 2012.

[5] **Eder Santana**, Jose Principe, Ewaldo Santana, RCS Freire, Allan K Barros, "Extraction of signals with specific temporal structure using kernel methods", IEEE Trans. on Signal Processing vol 58, 2010.

CONFERENCES

[6] **Eder Santana**, Jose Principe, "Perception Updating Networks: On Architectural Constraints for Video Generative Models". ICLR 2017 Workshop Track.

[7] **Eder Santana**, Jose Principe, "Perception Updating Networks: On Architectural Constraints for Video Generative Models". ICLR 2017 Workshop Track.

[8] Shujian Yu, Matthew Emigh, **Eder Santana**, Jose C. Principe, "AUTOENCODERS TRAINED WITH RELEVANT INFORMATION: BLENDING SHANNON AND WIENER'S PERSPECTIVES," Intl. Conf. on Acoustics, Speech, and Signal Processing, 2017.

[9] **Eder Santana**, Matt Emigh, Jose Principe, "Information Theoretic Learning Auto-encoders". Intl. Joint Conf. on Neural Networks 2016.

[10] **Eder Santana**, K Dockendorf, JC Principe, "Learning joint features for color and depth images with Convolutional Neural Networks for object classification," Intl. Conf. on Acoustics, Speech, and Signal Processing, 2015.

[11] **Eder Santana**, Brockmeier AJ, Principe JC., "Joint optimization of algorithmic suites for EEG analysis.", IEEE EMBS Neural Engineering Conference, Aug. 2014.

[12] **Eder Santana**, Goktug T. Cinar and Jose C. Principe, "Parallel flow in Deep Predictive Coding Networks," Intl. Joint Conf. on Neural Networks 2015.

[13] **Eder Santana**, JC Principe, EE Santana, AK Barros, "Mixed Generative and Supervised Learning Modes in Deep Predictive Coding Networks," Intl. Joint Conf. on Neural Networks, 2015.

[14] Ryan Burt, **Eder Santana**, Jose Principe, Nina Thigpen, Andreas Keil, "Predicting Visual Attention using Gamma Kernels", Intl. Conf. on Acoustics, Speech, and Signal Processing, pp. -, Mar. 2016

[15] Austin J. Brockmeier, Eder Santana, Luis G. Sanchez Giraldo, and Jose C. Principe, "Projentropy: Using entropy to optimize spatial projections", Intl. Conf. on Acoustics, Speech, and Signal Processing, pp. 4538-4542, May 2014.

TEACHING

Deep Learning with Python (video course)
Packt Publishing — 2016 (https://goo.gl/pExbnP)

EEL 5525 Fundamentals of Digital Signal Processing (TA)
University of Florida, Gainesville, FL — 2013

Stochastic Processes (substitute professor)
Federal University of Maranhao, Sao Luis, Brazil — 2012