

Jesse Thomas Palma

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AMBITIONS & EXPERTISE

I am an experienced machine learning scientist who enjoys building and improving systems aimed at temporal analysis, human language representation and uncertainty understanding. I cultivate a diverse set of methods that includes attentional networks, recurrent neural networks, linguistic theory, dynamical systems, graphical models and mathematics of learning in the brain.

My strength is the ability to recombine, redesign and repurpose previously successful approaches to create novel and effective systems.

NLP/ NLU	OpenAI Models, CLIP, LSTM, Recurrent Neural Networks, Word2vec, Statistics & Bayes Semantic Parsers, Combinatory Categorical Grammars, Lambda Calculus, Conversation Models
Machine Learning	Deep/Convolutional Nets, Transformers, GANs, Fast learning, Hierarchical Methods, Clustering Quantile Regression, Bayesian Belief Nets, Reinforcement Learning, Genetic Algorithms Learning Theory, Sparse Coding, Non-negative Matrix Factorization, Adaptive Resonance Theory

EDUCATION

Boston University *Sep 2006 - May 2012*

Ph.D. in Cognitive and Neural Systems Specialty: **Memory Systems**

Title: **Sigmoid Signaling & Pattern Processing by Spiking Cortical Networks**

I studied how signals functions can control pattern formation and stability in cortical circuits for STM

Advisor: Stephen Grossberg

Select Courses: Computational Models of Planning and Temporal Structure

Memory and Attention, Visual Perception, Computational Neuroscience

University of Pennsylvania

Sep 1999 - May 2003

B.A. in Cognitive Science Minors: **Linguistics, Computer Science, Physics**

Thesis: **Evolving Minds: *Genetic evolution of pulsed neural network agents***

in a simulated survival environment (C++, OpenGL)

Select Courses: Syntax (X-Bar Theory), Semantics, Learning Theory, Cognitive Neuroscience, Logic

Lambda Calculus, Neuroscience of Vision, Computer Graphics, Artificial Intelligence

SOFTWARE & SKILLS

Code	Python, PyTorch, TensorFlow, Scikit-learn, Pandas, AWS (EC2, S3), Spark, MATLAB, C/C++, SQL, R, Java, OpenGL, Prolog
Math	Statistical analysis, Dynamical systems, Dimensional analysis, Linear algebra, Point processes
Neuro	Attentional modulation, Object Recognition, Neural plasticity, Spiking nets, Cortical circuitry
Design	Game design, Language creation, Inkscape, Web design, Illustrator, LaTeX
Language	Hobby in syntax & historical linguistics, semi-proficiency in German & Italian Basic phrases of Vietnamese, Japanese, Russian, Chinese, Turkish, Finnish, Hebrew, etc
Team	Organizer, weekly Deep Learning journal club, <i>Neuromorphics Lab</i> , 2012 - 2014 Mentoring of undergraduate, <i>Research on Models of Neural Plasticity</i>

EXPERIENCE

EcoCart

Principal Machine Learning Engineer

Nov 2022 - Aug 2023

Remote

- I introduced **OpenAI models** into the EcoCart core calculations
- I supplemented these models to build a system to identify products in a **hierarchical taxonomy**
- I single-handedly improved performance from 20% to 70% accuracy, and setup as 6ms response API

Salient Predictions

Head of Machine Learning

Jul 2020 - Aug 2022

Remote / Boston

- I helped build models that **successfully predicting global long-term weather the MOST ACCURATELY in the world**: including precipitation, temperature, and hurricanes **1-12 months in the future**
- Also, worked on **uncertainty measurement**, calibration and visualization

Turvo Inc.

Principal Data Scientist

Apr 2019 - Feb 2020

Boston, MA

- I build models which uncover insights usually lacking in logistics: **predicting future transport rates and risk distributions, temporal inference, interpolation of spatio-temporal movement from tracking device data, detection of supply chain bottlenecks and statistics of reliability**

Aligned Incentives

ML Researcher

Jun 2018 - Apr 2019

Remote

- **I extracted patterns from procurement transaction documents with NLP methods** in policy-impact model which discovers opportunities for companies to save financially & reduce environmentally

Genscape, Inc

Senior Data Scientist

Jun 2016 - May 2018

Boston, MA

- I conducted research and development of machine learning systems to understand the commodity space
- **Using big data cloud clusters (AWS) to train systems learning on years of minute-by-minute global vessel movements (terabytes)**
- **I combined NLP sequence techniques and neural classifiers into a fused system to identify hidden commodities of ports, facilities and vessels**
- **Wrote and Submitted Provisional Patent** for this novel maritime learning system
- Worked on similar methods to **discover unreported maritime behaviors and predict vessel arrivals**
- I developed statistical methods to evaluate historical uncertainty and predict future uncertainty in weather to calculate power line limits for use in power distribution, **now a startup called LineVision**

Sportsmanias

ML Researcher

Jan 2016 - Mar 2016

Remote (Miami, FL)

- Coworker and I built a system using LSTM and Word2Vec to identify sports references in streaming Twitter data

Weft (acquired by Genscape)

V.P., Data Sciences

Dec 2014 - Jun 2016

Boston, MA

- I led the research and development of methods for optimization, predictive analytics, and machine learning that enable smarter and more effective logistics.
- **Numerous projects that used big data lambda arch, statistics, Markov probabilities, hierarchical clustering, modified back-propagation, neural networks and uncertainty modeling**
- I devised and developed aggregate indices to provide clients with a more complete understanding of performance

Neuromorphics Lab, Boston University

Postdoctoral Research Fellow, Principal Investigator

May 2012 - Dec 2014

Boston, MA

- My role was to research cortical circuitry to develop neural learning systems for dynamic robotic environments.
- **I conceived and developed a neural system that exhibits both fast and slow learning**
- **Machine Learning Patent** for a novel type of deep learning system
- Combines Adaptive Resonance Theory (fast learning) and Deep Learning/sparse coding (slow learning)
- Developed a new learning metric for compositionality of representations
- **Outperforms known sparse system, Non-negative Matrix Factorization on letters & MNIST datasets**

The MITRE Corporation

Senior Software Systems Engineer

Aug 2003 - Sep 2007

Bedford, MA

- **I developed analytic and collaborative software, from target tracking to intelligence analysis**
- Developed collaborative systems with analysis and visualization of team interactions (Java, Python)
- Project lead for developing methods to use classified data in a tracking system (C/C++/xUML)

Institute for Research in Cognitive Science

Text Annotation NLP Researcher

Oct 2002 - Jul 2003

Philadelphia, PA

- Produced part of speech data and wrote revision of annotation manual for *Mining the Bibliome* NLP project

Enterprise Computing Institute

Software Engineer Internship

May 1999 - Aug 1999

Hopkinton, MA

- Coded a predictive system with fuzzy logic and genetic algorithm (Pascal)

PUBLICATIONS

Palma, J., Gorshechnikov, A., Luzanov, Y. & Versace, M. Hierarchical cortical circuits for symbiotic fast and slow deep learning. *Submitted*.

Grossberg, S., Versace, M., & Palma, J. (2016) Resonant cholinergic dynamics in cognitive and motor decision-making: Attention, category learning, and choice in temporal cortex and superior colliculus. *Frontiers in Neuroscience*.

Palma, J., Grossberg, S., & Versace, M. (2012). Persistence and storage of activity patterns in spiking recurrent cortical networks: modulation of sigmoid signals by after-hyperpolarization currents and acetylcholine. *Frontiers in Computational Neuroscience*, 6.

Palma, J., Versace, M., & Grossberg, S. (2012). After-hyperpolarization currents and acetylcholine control sigmoid transfer functions in a spiking cortical model. *Journal of Computational Neuroscience*, 32(2), 253-280.