

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 AI & the brain. My strength is the ability to recombine, redesign and repurpose cutting-edge approaches to create and deploy novel effective systems.

NLP/NLU OpenAI Models, CLIP, Llama, LSTM, Recurrent Neural Nets, Retrieval Augmented Generation, Semantic Parsers, Combinatory Categorical Grammars, Lambda Calculus, Word2vec, Tokenizers

Machine Learning Deep/Convolutional Nets, Transformers, GANs, Fast learning, Hierarchical Methods, Quantile Regression, Genetic Algorithms, Evolutionary Methods, Ensembles, Statistics, Bayesian, Graphical Models, Clustering, Reinforcement Learning, Learning Theory, 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, TaskFlow, Scikit-learn, Pandas, Cloud (AWS, GCP), Spark, MATLAB, C/C++, SQL, Java, Javascript, OpenGL, Prolog

Math Statistics, Dynamical systems, Linear algebra, Point processes, Number & Knot theory

Neuro Attentional modulation, Object recognition, Neural plasticity, Spiking nets, Cortical circuitry

Design Game design, Language creation, Inkscape, Web design, LaTeX

Language Hobby in syntax & historical linguistics, semi-proficiency in German & Italian
Basic of Vietnamese, Japanese, Russian, Chinese, Turkish, Finnish, Hebrew, etc

Team Organizer, weekly Deep Learning journal club, *Neuromorphics Lab*, 2012 - 2014
Mentoring of undergraduate, *Research on Models of Neural Plasticity*

EXPERIENCE

Fishtail

Technical Advisor

Nov 2021 - Present

- I provide expertise in AI methods for maritime logistics & trade finance

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 as a **hierarchical taxonomy**
- Single-handedly **improved performance from 20% to 75%** 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 built models that uncovered logistical insights: predicting transport rates and risks, temporal drift correction, **spatio-temporal interpolation from tracking data, bottleneck detection and reliability statistics**

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
- **Used AWS clusters to train ML on years of minute-by-minute global vessel movements (terabytes)**
- **I combined NLP techniques and classifiers to identify hidden commodities of 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 start-up called LineVision**

Sportsmanias

Machine Learning 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

Cambridge, MA

- I led research and development of methods for optimization, predictive analytics, and machine learning that enable smarter and more effective logistics, such as multiple indices of port performance
- **Projects used big data lambda arch, statistics, Markov probabilities, hierarchical clustering, modified back-propagation, neural networks and uncertainty modeling**

Neuromorphics Lab, Boston University
Postdoctoral Research Fellow, Principal Investigator

May 2012 - Dec 2014
Boston, MA

- I researched cortical circuitry to develop neural learning systems for dynamic robotic environments.
- **Conceived and developed a neural system that exhibits both fast and slow learning**
- Completed a **Machine Learning Patent** for this novel type of deep learning
- Combines Adaptive Resonance Theory (fast learning) and Deep Learning/sparse coding (slow learning)
- Also created a new metric for compositionality of representations
- **Outperformed common sparse method**, Non-negative Matrix Factorization on visual & MNIST benchmark

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.