zlaborde@iu.edu

Zachary Laborde

zacharylaborde.com

Self-motivated research scientist in Artificial Intelligence and Machine Learning with strong communication and teamwork skills in addition to problem-solving and analytical abilities looking to advance the field of machine learning and contribute to innovative solutions for complex problems.

Skills

Machine Learning, Information Theory, Quasistatic Approximation, Neural Networks, Simulated Annealing, Particle Swarm Optimization, Boids, Ant Colony Optimization, K-means++, Evolutionary Algorithms, Recurrent Neural Networks, Gradient Descent, Theta Sparse Grouping, Hierarchical Agglomerative Clustering, Graph Theory, Graph Embedding, Graph Clustering, Dynamical System Analysis, Cellular Automata, Hopfield Networks, Convolutional Neural Networks, Transformers, Level Set Method, Bootstrapping, Topological Data Analysis, Computational Topology, Lifetime Learning, Backpropagation

Software

PyTorch, TensorFlow, NumPy, SciPy, MongoDB, Hadoop, Spark, Matplotlib, Plotly, Git, SQL, Python, Scikit-learn, Pandas, Jupyter, LaTeX

Publications & Conferences

Laborde, Z., & Izquierdo, E. J. (2023). Spatial embedding of edges in a synaptic generative model of C. elegans. *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*, *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*(26). https://doi.org/10.1162/isal_a_00611

Severino, G. J., Laborde, Z., & Barwich, A.-S. (2023). The degeneracy of control architectures in cell lineages: Implications for tissue homeostasis. *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*, *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*(23). https://doi.org/10.1162/isal_a_00608

Laborde, Z., Toler, W., Velhal, K., Farag, T., & Chakra, A. (2019). Method and system for implementing a holistic umbrella drone. https://priorart.ip.com/IPCOM/000257353

Laborde, Z., Stephenson, D., Reiss, A., Beaton, E., & Cohen, J. (2017). Anterior-posterior insular cortex bisection plugin for mango [Poster presentation]. *Cognitive Neuroscience Society*.

Laborde, Z., & Cohen, J. (2016). Nostalgia and the perception of time. *XULAnEXUS*, *14*(1). https://digitalcommons.xula.edu/xulanexus/vol14/iss1/1

Education

Indiana University Bloomington Aug. 2021 - Present
Neuroscience & Cognitive Science Ph.D.*

Xavier University of Louisiana Aug. 2013 - May 2017
Psychology Bachelor of Science
Computer Science (minor)

Research Experience

Indiana University Bloomington Aug 2021 - Present
Dr. Eduardo Izquierdo & Dr. Justin Wood

- Pioneered the evolution of optimal sensorimotor configurations in simulated agents using neural networks that were simultaneously smaller and more performant than traditional neural networks
- Modeled development of the C. elegans connectome leading to improved accuracy versus existing models and new perspectives on its structure
- Discovered a new biologically-realistic dynamic control system for cellular lineages with potential applications in synthetic biology and regenerative medicine
- Developed and launched an online application for the dynamical analysis of cellular differentiation in multi-compartment systems integrating multiple control mechanisms (see https://nanohub.org/resources/dynsysregen)
- Conceived and implemented a novel level set approximation algorithm for high-dimensional manifolds significantly reducing computational complexity and resource usage by 90%.

Work Experience

IBM July 2017 - Aug 2021
Software Engineer

- Automated entire team saving IBM $1 000 000/year
- Automated event analysis and prediction for operation engineers using machine learning

* coursework complete