
JULIA B. NAKHLEH

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EDUCATION

University of Wisconsin-Madison

September 2021 - present

Ph.D. in Computer Sciences (*in progress*)

- Advisor: Robert Nowak

Arizona State University

August 2015 - May 2019

B.S. in Computer Science, B.A. in Spanish

- GPA: 4.0 / 4.0
- Honors thesis: *Learning Generalized Heuristics using Deep Neural Networks*
- Advisor: Siddharth Srivastava

RESEARCH INTERESTS

Theoretical and statistical foundations of machine learning (ML); robustness, uncertainty quantification, and interpretability/explainability in ML.

JOURNAL ARTICLES

- [1] **J. B. Nakhleh**, M. G. Fernández-Godino, M. J. Grosskopf, B. M. Wilson, J. Kline and G. Srinivasan, “Exploring Sensitivity of ICF Outputs to Design Parameters in Experiments Using Machine Learning,” in *IEEE Transactions on Plasma Science*, vol. 49, no. 7, pp. 2238-2246, July 2021, doi: 10.1109/TPS.2021.3090299.
- [2] M. G. Fernández-Godino, M. J. Grosskopf, **J. B. Nakhleh**, B.M. Wilson., J. L. Kline and G. Srinivasan, “Identifying Entangled Physics Relationships through Sparse Matrix Decomposition to Inform Plasma Fusion Design,” in *IEEE Transactions on Plasma Science*, vol. 49, no. 8, pp. 2410-2419, Aug. 2021, doi: 10.1109/TPS.2021.3098482.

RESEARCH EXPERIENCE

Post-baccalaureate researcher, Los Alamos National Laboratory *November 2019 - August 2021*

Applied Computer Science (CCS-7) and Verification & Analysis (XCP-8) groups

- Developed a reinforcement learning (RL) paradigm for learning optimized task mappings on distributed computing architectures.
- Designed and implemented a Variational Autoencoder (VAE)-based model to learn a causal graph from observational data given constraints on relationships between variables.
- Implemented random forest (RF) models to analyze data and quantify uncertainties in inertial confinement fusion (ICF) experiments, and performed sensitivity analyses using feature importance techniques (ALE, MDI, SHAP) to analyze experimental relationships.

Undergraduate researcher, Arizona State University

August 2018 - May 2019

Autonomous Agents and Intelligent Robots (AAIR) lab

- Designed and trained deep neural networks (DNNs) capable of predicting optimal actions from “generalized” problem states, generating generalized plans capable of solving multiple problem instances.
- Developed code to automatically extract abstract/generalized problem states from concrete/standard states generated by the Fast-Forward (FF) planner.
- Demonstrated that neural networks, provided with only abstract states rather than concrete states, are capable of predicting optimal actions with high accuracy across a variety of planning domains.

Undergraduate researcher, Arizona State University
Virtualized Infrastructures, Systems, and Applications (VISA) lab

August 2018 - May 2019

- Implemented neural networks that offload intermediate computations onto Field-Programmable Gate Arrays (FPGAs) using TVM, yielding up to 200x speedup on these computations.
- Developed and tested code in TVM to perform optimized matrix multiplications and other neural network computations on CPUs and GPUs, Intel Aria 10 FPGAs, and Android OS smartphones.

Undergraduate researcher, Los Alamos National Laboratory
Information Sciences (CCS-3) group

May 2016 - August 2017

- Applied neural-based sparse coding algorithms to the analysis of EEG (Electroencephalography) data using the PetaVision neural simulation toolbox.
- Demonstrated that sparse coding is able to identify a dictionary of base waveforms necessary for reconstructing and classifying noisy EEG data, indicating a potential new method of EEG analysis for cognitive research and diagnosis.

TEACHING EXPERIENCE

Teaching assistant for CSE 310 (Data Structures & Algorithms), ASU

Fall 2018

Teaching assistant for CSE 100 (Intro to C++), ASU

Spring 2018

Math tutor (calculus I-III, linear algebra, discrete math, statistics), ASU

Fall 2016

ACADEMIC SERVICE

Reviewer, Review of Scientific Instruments (RSI) Online

2021

AWARDS & SCHOLARSHIPS

NSF Graduate Research Fellowship Program (GRFP), Honorable Mention

2021

ASME Student Presentation Award Winner, 2nd place

2020

Phi Beta Kappa Honor Society

2019

Fulbright Scholarship (Spain - Study/Research), Semi-Finalist

2019

Marshall Scholarship, Finalist

2018

National Merit Scholar

2015 - 2019

New American University Scholar, Arizona State University

2015 - 2019

SKILLS

Programming Languages: Python, C, C++, MATLAB, Java, SQL

Machine Learning Toolboxes: TensorFlow, PyTorch, Keras, Scikit-learn

Languages: English (native), Spanish (fluent - C1 DELE diploma), Portuguese (advanced)