JULIA B. NAKHLEH

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EDUCATION

Arizona State University, Tempe AZ *August 2015 - May 2019*
B.S. in Computer Science, B.A. in Spanish
Cumulative GPA: 4.00 / 4.00
Honors and awards: summa cum laude, Marshall Scholarship Finalist, Fulbright Scholarship Semi-Finalist (study/research - Spain), Phi Beta Kappa, Dean's List (Fall 2015 - Spring 2019), Moeur Award (for 4.0 GPA), Barrett Honors College graduate, National Merit Scholar, New American University Scholar

Senior Honors thesis: *Learning Generalized Heuristics using Deep Neural Networks* [pdf] [slides]
Advisor: Dr. Siddharth Srivastava (ASU)

Relevant coursework: Introduction to Artificial Intelligence, Introduction to Robotics, Algorithm Design and Analysis, Linear Algebra, Statistics and Probability Theory, Discrete Math, Calculus I-III, Algorithms and Data Structures, Theoretical Computer Science, Principles of Programming Languages, Advanced Object-Oriented Programming, Operating Systems, Database Management, Human Computer Interaction, Computing Ethics, Software Engineering, Digital Circuit Design, Computer Architectures & Assembly Language Programming

RESEARCH INTERESTS

Machine learning theory and scientific applications; high performance and scientific computing; uncertainty quantification; optimization; computational physics; natural language processing.

JOURNAL ARTICLES

[1] **Nakhleh, J.**, Fernández-Godino, M., Grosskopf, M., Wilson, B., Kline, J. and Srinivasan, G. (2020). "Exploring Sensitivity of ICF Outputs to Design Parameters in Experiments Using Machine Learning." Paper submitted to *IEEE Transactions on Plasma Science*. Available at arXiv:2010.04254.

CONFERENCE PRESENTATIONS

[1] **Nakhleh, J.**, Fernández-Godino, M., Grosskopf, M., Wilson, B., Kline, J. and Srinivasan, G. (2020). "ICF Design Analysis using Machine Learning." Lightning talk given at *New York Summit on Data Science*.

[2] **Nakhleh, J.**, Fernández-Godino, M., Grosskopf, M., Wilson, B., Kline, J. and Srinivasan, G. (2020). "Using Machine Learning to Identify Physical Relationships and Quantify Uncertainties in ICF." Poster session presented at *ASME V&V Verification and Validation Symposium* (conference held virtually due to COVID-19; presented as short talk due to virtual format). [slides]

- Student Presentation Award Winner (2^{nd} place)

RESEARCH EXPERIENCE

Post-baccalaureate research assistant, Applied Computer Science (CCS-7) group
Los Alamos National Laboratory, *July 2020 - present*

- Ongoing research project investigating the use of ML methods to improve automated mapping for high-performance computing architectures.

Post-baccalaureate research assistant, Verification and Analysis (XCP-8) group
Los Alamos National Laboratory, *November 2019 - July 2020*

- Designed random forest (RF) models capable of learning and predicting on data from inertial confinement fusion (ICF) experiments with high accuracy.
- Performed feature importance analysis on ICF data using Accumulated Local Effects (ALE) and Mean Decrease in Impurity (MDI), demonstrating that both metrics provide feature importance results that (i) corroborate known physical properties of ICF implosions and (ii) indicate input-output relationships of interest for future ICF design.
- Future work will employ PCA, SPCA and SCCA to further examine relationships between controllable design inputs and will combine these techniques with RF regression to analyze discrepancies between ICF simulations and experiments.

Undergraduate researcher, Automated Agents and Intelligent Robotics (AAIR) lab
Arizona State University, *August 2018 - May 2019*

- Designed and trained neural networks 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, Virtualized Infrastructures, Systems, and Applications (VISA) lab
Arizona State University, *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 a CPUs and GPUs, Intel Aria 10 FPGAs, and Android OS smartphones.

Undergraduate research assistant, Information Sciences (CCS-3) group
Los Alamos National Laboratory, *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

Undergraduate teaching assistant, Arizona State University *August 2018 - December 2018*

- Undergraduate TA for CSE 310 (Data Structures and Algorithms). Attended class meetings, held bi-weekly office hours, coordinated and led pre-exam review sessions.

Undergraduate teaching assistant, Arizona State University *January 2018 - May 2018*

- Undergraduate TA for CSE 100 (Introduction to C++). Attended class meetings, held bi-weekly office hours, coordinated and led pre-exam review sessions.

Mathematics tutor, Arizona State University *August 2016 - December 2016*

- Tutored students in linear algebra, statistics, calculus I-III, discrete math, and college algebra through the Undergraduate Academic Success Program (UASP) at ASU.

SKILLS

Programming Languages
Python, C, C++, MATLAB, Java, SQL
Machine Learning Toolboxes
TensorFlow, Keras, Scikit-learn
Languages
English (native), Spanish (fluent - C1 DELE diploma), Portuguese (advanced)