Miralireza Nabavi Bavil

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SUMMARY

Innovation-driven Ph.D. candidate with more than 6 years of research background (with a focus on data science, machine/deep learning and computational science) and 2 years of industrial experience seeking a summer internship. Led numerous data science projects, published several machine-learning papers and developed skills in collaboration with cross-functional teams, leadership, project management, problem-solving, programming and large data management.

EDUCATION

Doctorate of Philosophy | *Mechanical Engineering*　　　　　　　　　　　　　　　　Sep 2023
Arizona State University, Tempe, AZ　　　　　　　　　　　　　　　　　　　　　GPA: 4.00/4.00

Master of Science | *Mechanical Engineering*　　　　　　　　　　　　　　　　　May 2018
University of Tabriz, Tabriz, Iran　　　　　　　　　　　　　　　　　　　　　　GPA: 3.76/4.00

Bachelor of Science | *Mechanical Engineering*　　　　　　　　　　　　　　　　　Sep 2015
University of Tabriz, Tabriz, Iran　　　　　　　　　　　　　　　　　　　　　　GPA: 3.97/4.00

Continued data science education:
Machine learning (Stanford Online), Deep learning (deeplearning.ai), Data science (IBM), Python

TECHNICAL SKILLS

Technical Skills: *Python, SQL, Scikit-learn, TensorFlow, Keras, Pandas, Jupyter notebook, NumPy, SciPy, MATLAB, Octave, Fortran*
Data science skills: *Deep/Machine learning, Data Visualization, Supervised/Unsupervised learning, Support vector machine, Logistic regression, Clustering, Classification, Convolutional/Residual neural networks, Image classification, High-performance computing (MPI)*
General Software: *Microsoft Office (Word, Excel, PowerPoint), LaTeX, Linux, Windows, Ubuntu, GitHub, Shell Scripting*

RESEARCH EXPERIENCE

Data Scientist & Machine Learning Engineer, Arizona State University, Tempe, AZ　　Sep 2018 – Present
Received the 2021-2022 Harold & Lucille Dunn Memorial Engineering Scholarship for extraordinary research accomplishments

❯ **Machine learning prediction of greenhouse gas capturability by ionic liquid**
- Led a data science project to predict the solubility of CO_2 using machine learning as an alternative to experimental method
- Extracted and organized 548 experimental datasets about the CO_2 solubility to perform the machine learning analysis
- Utilizing MATLAB and TensorFlow, developed, trained, and compared six learning models, (five artificial neural networks and one support vector machine) and chose the most accurate model, achieving 98.9 % accuracy on the test set
- Predicted the best condition to capture CO_2 using ionic liquid for pollution management, saving $300k experiment costs

❯ **Velocity prediction of Cu/water nanofluid using machine learning**
- Led a group of mechanical engineers to develop a novel data-driven method for complex flow simulation
- Utilizing *Fluent* simulated the flow of the nanofluid inside a pipe to create the necessary data for deep learning analysis
- Applied transfer learning to predict the velocity of nanofluid at complex geometries and decrease the cost of computations
- Utilizing this method, enhanced the accuracy/cost efficiency of computational physics solvers by 80 %

❯ **Machine learning analysis of the influence of alumina nanoparticles on heat exchangers**
- Led an innovative data science project to estimate the thermal coefficient of nano-suspensions by machine learning
- Gathered and organized 282 datasets of the thermal coefficient from 15 different experimental studies
- Applied support vector machine model, comparing the effects of several kernel functions on its performance and achieved a regression accuracy of 98.5 % on the test set
- Predicted the ideal properties of nano-particles, enhancing the performance of heat exchangers up to 50 % and saving $200k

❯ **Design and optimization of a novel energy plant**
- Led a team of mechanical engineers to provide green and affordable energy for residential houses
- Innovated and designed a novel smart energy system driven by hybrid solar-Hydrogen energies which provides power, heating, and cooling demands for a two-story building

- Conducted multivariate optimization on the plant by applying the genetic algorithm, obtaining a maximum power generation capacity of 19.92 kWh
- Analyzed the proposed plant economically, obtaining a payback period of 4.7 years
❯ **Passive check valve for patients with hydrocephalus**
  - Leading a bio-design project to design a novel valve to treat patients with hydrocephalus

PROFESSIONAL EXPERIENCE

Python Developer (Summer Internship), 2Unify Co., Ontario, Canada   May 2021 – Aug 2021
Worked as Python programmer on several projects
- Utilizing Keras and TensorFlow, developed codes for object detection using YOLO algorithm, ImageNet and Unet
- Utilizing Python and NumPy, developed codes to control the movement of robotic arms using Lobot Servo Control.
- Contributed to the development and design of novel guitar tuning robots for the automation of music schools

CEO and Designer, Atie Zarin Atlas Co., Tabriz, Iran   Sep 2015 – Dec 2017
Led a group of five engineers and technicians in the design and production of gas stove components, obtained funding
to invest in equipment, and managed negotiations, finance, and sale
- Designed a novel gas stove knob using aluminum sheets instead of die casting, decreasing the cost by 50 %
- Secured approval from the standard agency regarding the safety of the knob

OTHER WORK EXPERIENCE

Reviewer   Dec 2020 – Present
Elsevier
- Reviewed research papers regarding machine/deep learning applications in different engineering fields

Teaching Assistant, *Engineering Mathematics*   Feb 2015 – May 2015
University of Tabriz, Tabriz, Iran
- Assisted in educating students by providing individualized consultations, solving examples, and grading
- Mentored students on utilizing "*MATLAB*" for class assignments

LEADERSHIP EXPERIENCE

Treasurer and External Affairs Officer of Tau Beta Pi chapter   Jan 2020 – Present
Arizona State University, Tempe, AZ
- Accepted to the invitation-only engineering honor society, won the election for the executive positions, and participated in the weekly executive board meetings
- Oversaw finance and funding resources, doubling the budget of the organization by increasing its activities
- Managed weekly meetings with recruiters, industries, and experts, enhancing student engagement with external stakeholders

JOURNAL PUBLICATIONS

Modeling of CO2 capture ability of [Bmim][BF4] ionic liquid using connectionist smart paradigms
B. Daryayehsalameh, **M. Nabavi**, B. Vaferi, "*Environmental Technology & Innovation*", 2021

Velocity prediction of Cu/water nanofluid: Learning CFD data by differential evolution algorithm based fuzzy inference system
M. Nabavi et al., "*International Communications in Heat and Mass Transfer*", 2021

Smart tracking of the influence of alumina nanoparticles on the thermal coefficient of nanosuspensions
M. Nabavi et al., "*Applied Nanoscience*", 2021

Design and tri-objective optimization of an energy plant integrated with near-zero energy building including energy storage
F. Bahramian, A. Akbari, **M. Nabavi**, S. Esfandi, E. Naeiji, A. Issakhov, "*Sustainable Energy Technologies and Assessments*", 2021

Modulation of interphase, cross-scale momentum transfer of turbulent flows by preferentially concentrated inertial particles
M. Nabavi et al., "*Physical Review Fluids*", 2022

PRESENTATION

Wavelet analysis of spectral energy transfer in two-way coupled particle-laden turbulence   Nov 2019
M. Nabavi et al.,"*APS Division of Fluid Dynamics Meeting*", Seattle, WA