Hongrui (Steven) Guo

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Education

Duke University GPA: 3.5/4.0 08/2021 – 05/2023

Master of Engineering in Electrical and Computer Engineering NC, USA

Core courses: Data Structures and Algorithms, Random Signals and Noise, Machine Learning, Deep Learning, Image and Signal Processing, Data Science, Statistical Computation

Nipissing University GPA: 3.6/4.0 09/2017 – 06/2021

Bachelor of Science Honours in Computer Science (with distinction) ON, Canada

Minor: Physics, Certificate in Game Design and Development

Work and Research Experience

Duke University NC, USA

Research Assistant 06/2023 – Present

- Developing unsupervised federated source-free domain adaptation with client clustering for both IID and non-IID data distribution via distribution estimation using *PyTorch*, training models on remote computing cluster using *Slurm*
- Remotely collaborating with other colleagues asynchronously using *Git*

Mevion Medical Systems JS, China

Software Engineer Intern 05/2022 – 08/2022

- Developed a *MATLAB* prototype for X-ray image postprocessing including automatic contrast adjustment, automatic tone mapping, and edge enhancement by implementing methods used in research papers
- Implemented the prototype above using *Python* with *OpenCV* to replace the existing proprietary image processing toolkit

Nipissing University ON, Canada

Research Assistant 10/2018 – 06/2021

- Delivered a web app MVP for organizing information both geographically and temporally using *jQuery* and *Web WorldWind* for the English department to visualize historic events and historical maps
- Parallelized particle swarm optimization (PSO) for high dimensional models and functions using message passing interface (*MPICH*)
- Made the prototype for the PSO part of a *C++* toolkit for response surface surrogate models with GSL library using radial basis function approach for simplifying complex models
- Multi-agent simulation and agent-oriented programming in *Java* and AnyLogic to assign missions for disaster rescue with multiple UAVs using E-CARGO model
- Designed an algorithm using multi-objective optimization for Group Role Assignment in E-CARGO model
- Wrote technical documentations, literature review, tutorials, and proofreading

Research, Course, and Side Projects

- Developing a web application for generating personalized storybooks using OpenAI and Stability AI's API for text and image generation, using *React* for front-end, and *Django* for back-end, hosted on *AWS*
- Implemented a *MATLAB* program to detect watermelons in images using conventional computer vision methods
- Implemented the RetinaNet in *PyTorch* for pneumonia detection and localization with several improvements which are validated using ablation study
- Recover images from sparse random samples using compressed sensing by solving their discrete cosine transform (DCT) coefficients with orthogonal matching pursuit (OMP)
- Visualizing high-dimensional functions for analyzing surrogate models using *python VTK* and *ParaView*
- Lower-limb movement classification from multi-channel surface electromyography (sEMG) signals using *InceptionTime* neural network implemented in *Keras*
- Implemented thermal expansion for *MATLAB* laser irradiation simulation for optical phase change material

Scholarship and Awards

- J.W. Trusler Proficiency Award 2021
- Carl Sanders Scholarship 2017-2020

Skills

- *Programming Languages*: Python, MATLAB, C/C++, JavaScript, Java, C#
- 3 yr. experience of *High-Performance Computing/Machine Learning* on various computing clusters
- *Libraries and Tools*: Python, PyTorch, OpenCV, scikit-learn, Linux, Shell, Git, Keras, MPICH, ParaView, Valgrind, Unity game engine, LaTeX, Slurm, SQL, WebGL, React, SOLIDWORKS, Photoshop, Premiere Pro
- *Languages*: English, Chinese – native speaker
- *Other skills*: 3D printing, CAD, soldering, woodwork, and metalwork