Phu Tran, Ph.D.
Authorized to work in the U.S.

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Summary

- 7+ years of experience in research and development of AI/ML predictive models and reinforcement learning in Python.
- Extensive experience in problem formulation, data collection, feature engineering, model selection and evaluation.
- Strong communication and collaboration skills with ability to effectively communicate with both technical and lay audiences.
- Developed computer vision model to estimate velocity fields of active materials purely from experimental videos, significantly outperform existing rule-based method.
- Developed deep reinforcement learning controller to drive active materials to an arbitrary desired state in real experiments.
- Achieved a 30% increase in aircraft trajectory prediction accuracy by time series data augmentation and advanced modeling.
- Deployed MySQL database server (up to 1.6 billion rows) serving 20 researchers.
- Successfully developed 01 AI/ML software prototype (reinforcement learning with graphical user interface), demonstrated in the prestigious Singapore Airshow 2020; presented to the Ministers of Transportation of Singapore and Malaysia.
- Ranked 8th in the Alcrowd Aircraft Localization Competition.

Knowledge & Skills

- Physics, Mathematics & Statistics | Data science | Machine learning | Deep learning (CNN, RNN, LSTM, Transformers) | Reinforcement learning
- Programming (Python, MATLAB, C++) | Database (SQL, MySQL) | Linux | CI/CD | Git
- Cloud environment (AWS), Frameworks (Scikit-learn, Ray, PyTorch, Weight and Bias, MLflow)
- Analytical and critical thinking, Strong communication and collaboration skills, Detail-oriented

Work Experience

Postdoctoral Associate   Feb 2022 – present
Department of Physics, Brandeis University, MA, United States

- Work closely with physicists and lead multiple research projects to develop machine learning and artificial intelligence models to forecast and control bio-inspired materials.
- Develop deep learning optical flow-based model to extract velocity fields from experimental data, significantly outperform existing rule-based method (i.e., particle image velocimetry – PIV), published 01 research article.
- Develop deep learning model to predict long-range dynamics of active materials without requiring physical knowledge about the dynamics. The model combines vector-quantized auto-encoder and transformer architectures.
- Develop reinforcement learning algorithm to control active materials in simulation and experiments. The reinforcement learning agent determines spatiotemporal intensity of light to be projected on light-activated materials and therefore drives the system to a desired state.

Research Fellow   May 2018 – Jan 2022
Air Traffic Management Research Institute, Nanyang Technological University, Singapore

- Transformed operational requirements to research questions, resulting in 01 high impact proposal with 04 major research questions, 02 large datasets collected.
- Performed data analysis, transforming raw data into meaningful features for machine learning algorithms, resulting in 30 percent increase in prediction accuracy.

- Initiated and deployed a large MySQL database (1.6 billion rows) of time series data, serving 20 researchers.
- Developed Human-AI (reinforcement learning for assisting human air traffic control) user interface software, resulting in 01 software prototype and 01 public demonstration in the prestigious Singapore Airshow 2020.
- Delivered 04 quarterly and 01 annual reports, and monthly technical presentations to stakeholders (technical and business audiences)
- Ranked 8th in the [Aicrowd competition for Aircraft Localization](#).

Volunteer & Service

Machine Learning Engineer at *Omdena.com*   **Jun – Aug 2021**
- Completed the 8-week project "*Using Satellite Imagery to Detect and Assess the Damage of Armyworms in Farming*" as a Machine Learning Engineer. ([online info](#))

Academic Services
- Publication Chair, The 1st International Conference on Artificial Intelligence and Data Analytics for Air Transportation (AIDA-AT 2020) (Online Proceedings)

Education

Doctor of Philosophy in Mechanical Engineering   **Aug 2012 – July 2016**
School of Mechanical and Aerospace Engineering,
Nanyang Technological University, Singapore

- Conducted experiments to capture 3000+ images of bacteria swimming in external flow.
- Performed image processing in MATLAB to extract and quantify the elastic response of bacteria's shape to external forces.
- Built mathematical models to predict bacteria's behavior at different external conditions based on the collected data.

Bachelor of Engineering, Mechanical Engineering   **Sep 2007 – Apr 2012**
Ho Chi Minh City University of Technologies, Vietnam

- Specialized in mechatronics
- Final year project: Design and Prototype of a Quadcopter (mechanical design and prototype manufacturing, electronic system and control algorithm design)