Akash Venkateshwaran

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Research Engineer with 2+ years of experience in machine learning, computational optimization, and data engineering for applied science and engineering. Proven record in developing statistical models, automating data pipelines, and performing rigorous data analyses, supported by successful research projects, internships, and publications.

Technical Skills

Languages: Python, SQL, MATLAB
Tech Stack: Docker, Git, MLflow, Snowflake, Hex, Ray (Data/Train/Tune), Azure ML
Libraries & Frameworks: PyTorch, PyTorch Forecasting, Torchvision, scikit-learn, XGBoost, Keras, NumPy, Pandas, SciPy

Experience

Research Engineer September 2022 – March 2025
University of British Columbia, Vancouver, Canada *(Python · PyTorch · scikit-learn · MLflow · Ray)*

- **ML Research:**
  - Designed and implemented a data pipeline to preprocess and integrate 3D numerical acoustic propagation and GEBCO bathymetry datasets for model training
  - Implemented replay-based training to improve model generalizability
  - Developed a pioneering conditional CNN achieving **90% SSIM accuracy** for far-field acoustic modeling
  - Engineered data ingestion and feature-engineering pipelines for time-series meteorological data from NOAA stations
  - Developed an end-to-end DeepAR model for weather forecasting to compute ship resistance
  - Implemented backtesting framework and systematic hyperparameter optimization using Optuna
  - Performed all distributed model training and orchestration using Ray and MLflow on Sockeye HPC
- **Operations Research:**
  - Modeled a route and speed optimization problem focused on reducing ship noise signature
  - Investigated meta-heuristic, graph-based and sample-based search algorithms, Pareto pruning, and constraint-handling
  - Developed an interactive simulation environment featuring dynamic mammals and AIS-based ship voyages to analyze underwater noise footprints, demonstrating a **94% reduction** in noise exposure

Data Science Intern September 2024 – December 2024
IPEX Technologies Inc., Mississauga, Canada *(GPyTorch · SQL · Hex · Snowflake · scikit-learn)*

- Implemented GPR models within Hex's workspace integrated with Snowflake for polymer property prediction
- Developed robust data pipelines for EDA and feature engineering within Hex and made interactive display cells
- Improved predictive accuracy across various material properties surpassing baseline models offered by Uncountable
- For example, a **30% increase in accuracy** for modulus of elasticity predictions

Software Engineer September 2023 – September 2024
UBC Sailbot, Vancouver, Canada *(Python · ROS2 · Docker · Git)*

- Directed a cross-functional engineering team in developing optimization algorithms for autonomous navigation, emphasizing real-time data integration and operational effectiveness
- Deployed a sampling-based path planning algorithm integrated with real-time sensor data of the wind direction and speed

Research Intern September 2020 – March 2021
National Cheng Kung University, Tainan, Taiwan *(Python · Torchvision)*

- Proposed a method for cervical cell segmentation of the multicellular tumor spheroid dataset, employing Mask R-CNN
- The Mask R-CNN with ResNet-50, pretrained on the COCO dataset, was fine-tuned, achieving better performance

Publications

- A multi-objective optimization framework for reducing the impact of ship noise on marine mammals, *Ocean Engineering*, vol. 310, July 2024. **A. Venkateshwaran**, I. K. Deo, J. Jelovica, and R. K. Jaiman.
- Predicting transmission loss in underwater acoustics using continual learning with range-dependent conditional convolutional neural networks, *Journal of the Acoustical Society of America*, vol. 157, May 2025. I. K. Deo, **A. Venkateshwaran**, and R. K. Jaiman.

Education

University of British Columbia 2022 – 2025
M.A.Sc. in Mechanical Engineering, Grades: 90.2% *Vancouver, Canada*

- Thesis: A Decision-Support System for Minimizing Underwater Radiated Noise from Ships

Vellore Institute of Technology 2018 – 2022
B.Tech in Mechanical Engineering, Grades: 96.2% *Chennai, India*