

SRIVATHSAN BADRINARAYANAN

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EDUCATION

Carnegie Mellon University (GPA - 4.0)

Pittsburgh, PA

Master of Science in Artificial Intelligence Engineering - Chemical Engineering

December 2024

Coursework: Generative AI, Large Language Models, Deep Learning, Scientific Software Engineering, Trustworthy AI

Indian Institute of Technology Madras

Chennai, India

Bachelor of Technology in Chemical Engineering (Minor in Bioprocess Engineering)

July 2023

Coursework: Data-driven Modeling and Optimization of Bioprocesses, Mathematical Foundations of Data Science

EXPERIENCE

Graduate Research Assistant

Jan 2024 - Present

Mechanical and AI Lab (MAIL), Carnegie Mellon University

Pittsburgh, PA

Project: Multimodal Language and Graph Learning of Adsorption Configuration in Catalysis

- Developed a novel generative-predictive pipeline integrating large language models and graph-assisted multimodal pretraining, significantly enhancing adsorption energy prediction accuracy for catalyst screening.
- Achieved a 10% reduction in MAE by introducing a transferable model that aligns with domain knowledge, predicting adsorption configurations without reliance on atomic spatial coordinates, leading to a publication.

Project: Multi-Peptide - Multimodality Leveraged Language-Graph Learning of Peptide Properties

- Developed a multimodal model, combining transformer-based language models and GNNs to enhance protein property prediction for applications in drug development and bioinformatics.
- Achieved state-of-the-art results by implementing a contrastive learning framework (CLIP) between protein sequence data (transformer) and AlphaFold generated structures (GNN), culminating in a publication.

Project: Generative AI Podcasts (hosted on Spotify @dreampods) and automated lectures

- Led the development of an innovative prompt-to-audioform generative AI pipeline by integrating Large Language Models with Text-to-Speech models, enhancing public knowledge accessibility through automated podcast creation.
- Leading a cross-functional team in the development and pilot of a pdf-to-lecture video automated ML pipeline, assisting universities and professors in creating educational content with 50% reduced preparation time.

MITACS Globalink Research Intern

May 2022 - August 2022

University of Alberta

Edmonton, Canada

Project: Data-Driven Optimization of Refinery Process Operations

- Developed deep multivariate models with 97% accuracy to predict process outputs in a hydro-processing plant, using time-series models on real-time refinery data to optimize parameters and improve operational efficiency.

Machine Learning Intern

June 2021 - July 2021

Tirios AI

Chennai, India (Remote)

- Engineered a robust machine learning pipeline for object recognition, deployed using AWS Sagemaker, for accurately identifying home appliances needing repair from photos, reducing service wait time by 50%.

SKILLS

Programming Languages: Advanced - Python, C++, MATLAB; Basic - R, Julia, SQL

Machine Learning & Data Science: PyTorch, TensorFlow, Keras, sklearn, SparkML, PySpark, HuggingFace, Transformers

Data & Image Processing: Pandas, Numpy, Seaborn, Matplotlib, Scipy, BeautifulSoup, OpenCV, Pillow

Chemoinformatics & Bioinformatics: RDKit, ASE, Pymol, Biopython, AlphaFold

Simulation, Cloud & DevOps: COMSOL, Aspen Plus, Simulink, Fusion360, SuperPro Designer, AWS, GCP, Docker, CUDA, PostgreSQL, DynamoDB, Apache Kafka **Version Control:** Git

PUBLICATIONS

Multi-Peptide: Multimodality Leveraged Language-Graph Learning of Peptide Properties, S. Badrinarayanan et al.

(Under review in ACS JCI, arXiv preprint: <https://doi.org/10.48550/arXiv.2407.03380>)

Multimodal Language and Graph Learning of Adsorption Configuration in Catalysis, J. Ock et al.

(Accepted in Nature Machine Intelligence, arXiv preprint: <https://doi.org/10.48550/arXiv.2401.07408>)