Yunfei **Luo**

Ph.D. Student in the Halıcıoğlu Data Science Institute at the University of California San Diego

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Yunfei's research focuses on applied machine learning in the field of ubiquitous health, signal processing, multimodal modeling, and multitask learning. He aims to develop a robust and well-generalized methodology that enhances intelligent monitoring, supports timely interventions, and is deployable on edge devices.

🎓 Education

09.2023 - present GPA : 3.75/4.0	**Ph.D. Student in the Halıcıoğlu Data Science Institute** University of California, San Diego, CA › Advisor : 🗗 Tauhidur Rahman › Research : Applied Machine Learning, Multimodal Learning, Multitask Learning, Digital Health
09.2021 - 05.2023 GPA : 3.92/4.0	**Master of Science in Computer Science** University of Massachusetts Amherst, Amherst, MA › Advisor : Ina Fiterau Brostean | 🗗 Information Fusion Lab › Courses Taken : Advanced Machine Learning, Neural Networks, Probabilistic Graphical Models, Reinforcement Learning, Advanced Natural Language Processing, Advanced IoT
09.2017 - 05.2021 GPA : 3.84/4.0	**Bachelor of Science in Computer Science | Bachelor of Science in Mathematics** University of Massachusetts Amherst, Amherst, MA › Machine Learning and Computing Specializations

✻ Fellowships, Scholarships, Awards, and Honors

2021 - 2023	Bay State Fellowship | Full Tuition Scholarship
2017 - 2021	Outstanding Undergraduate Course Assistant Award Chancellor's Award, UMass Amherst

⚗ Publications

2025 Under Review	**Toward Foundation Model for Multivariate Wearable Sensing of Physiological Signals, -, Conference** Yunfei Luo, Yuliang Chen, Asif Salekin, Tauhidur Rahman › Developed NormWear, a foundational model for wearable sensing physiological signals, achieving state-of-the-art performance across 18 healthcare applications spanning 11 public datasets by leveraging generalizable and informative representations. › Proposed a novel representation-alignment framework that aligns physiological and text embeddings, enabling zero-shot inference for previously unseen health applications in wearable sensing. › Conducted comprehensive nonlinear dynamic analysis of intermediate model representations, offering quantifiable insights into internal processes and fostering trust in healthcare-related inferences. Signal Processing Foundation Model Natural Language Processing Machine Learning Neural Networks Ubiquitous Health
2025 Under Review	**Opioid Misuse Risk Modeling with Semantic Representation of Health Record and Nonlinear Dynamics of Personalized Inferential Affective State Trajectories from Wearable Data, Nature Mental Health, Journal** Yunfei Luo, Iman Deznabi, Bhanu Gullapalli, Katrin Haensel, Mark Tuomenoksa, Eric Garland, Madalina Fiterau, Tauhidur Rahman › Leveraging transformer based time series model and dynamic branching to predict the stress, pain, and craving of Opioid users based on heart beat data collected from wearable sensor. › Leveraging topological features from trajectory of inferential affective states across days and natural language processing technique to predict the risk of having opioid misuse behavior. Signal Processing Natural Language Processing Heart Rate Variability Affective States Opioid Clinical Treatment Machine Learning Multimodal Fusion Ubiquitous Health

2025
Preparing

Real Time Intradialytic Hypotension Forecasting Leveraging Modern Deep Learning Method with Fusion of Physiological Data and Electronic Health Record, TBD, Journal

Yunfei Luo, Siwei Zhao, Subhasis Dasgupta, Rakesh Malhotra, Tauhidur Rahman

> Novel multimodal modeling on physiological data, dialysis machine parameter, and electronic health records. Aiming to accurately forecasting hypotension 1 hour ahead in dialysis patient, and to provide comprehensive insights to nurse for intervention recommendation.

Signal Processing | Nephrology | Clinical Treatment | Machine Learning | Multimodal Fusion | Ubiquitous Health

2024
Accepted

Start Simple : Progressive Difficulty Multitask Learning, NAACL 2024 SRW Proceedings, Conference

Yunfei Luo, Yuyang Liu, Rukai Cai, Tauhidur Rahman

> Introducing sub-tasks with progressive difficulties to improve the performance on main task. Inspired by how people learn. Experimented on text classification, sentiment analysis, and argument mining

Natural Language Processing | Multi-task Learning | Machine Learning | Neural Networks

2024

Accepted

Dynamic Clustering via Branched Deep Learning Enhances Personalization of Stress Prediction from Mobile Sensor Data, Nature Scientific Report, Journal

Yunfei Luo, Iman Deznabi, Abhinav Shaw, Tauhidur Rahman, Madalina Fiterau Brostean

> Proposed a novel approach to modeling the Multimodal data, got results that outperform SOTA
> Modeled personalized and populational characteristics with Multitask Learning and Dynamic Clustering Method respectively
> Evaluated the performance under cold-start setting, to support the robustness of our method

Multi-modal | Fusion Methods | Mental Health | Machine Learning | Neural Networks | Time Series

2023

Accepted

Agent Performing Autonomous Stock Trading under Good and Bad Situations, AI for Agent-Based Modelling (AI4ABM) in International Conference on Learning Representations (ICLR), Workshop

Yunfei Luo, Zhangqi Duan

> Researched and experimented with different reinforcement learning algorithms to train agents to perform stock trading. The methods are evaluated under scenarios with stable and non-stable market

Reinforcement Learning | Machine Learning | Neural Networks

💼 Professional Experience

03.2023
to 03.2024

Machine Learning Scientist, Co-Founder , ONTO, Startup

> Designed and developed a comprehensive framework for creating customizable virtual AI characters, incorporating key architectural components such as memory management, contextual awareness, prompt optimization, tone/style transformation, and robust jail-break defense mechanisms.
> Researched and implemented a Retrieval-Augmented Generation (RAG) framework to enhance the realism and fidelity of virtual AI characters.
> Conducted rigorous testing to evaluate character robustness against jail-break attacks, identifying vulnerabilities and iteratively improving the framework's defense strategies.
> Collaborated with core team members through regular meetings to align on progress, address challenges, and strategize future directions for the company.

Natural Language Processing | Large Language Model | Virtual Character | Information Retrieval | Search Engine
Machine Learning | Research and Development

Summer 2022
to 06.2023

Machine Learning Engineering Intern , Center for Data Science, UMass Amherst

> Developed platform for Building Segmentation and Damage Assessment based on Satellite Imagery
> Integrated the Machine Learning pipeline along with User Interface for Imagery Fetching and Labelling
> Conducted Research and Experiments with various Finetuning setting and Machine Learning techniques to support selections of final-deployed hyper-parameters and models
> Delivered a presentation of the project to the Red Cross (funder and client), resulting in exceptional satisfaction and securing an additional year of funding for the initiative
> Worked as Research Assistant after internship

Computer Vision | Machine Learning | Disaster Response | Software Development | Full-Stack Development

Summer 2020 to 06.2021	**Data Engineering Intern , Institute for Applied Life Sciences, UMass Amherst** ❯ Built pipelines for fMRI data preprocessing and statistical analysis ❯ Conducted Research and Experiments with Machine Learning models for Stroke Detection : Autoencoders, CNNs, and GANs ❯ Worked as Undergraduate Research Assistant after internship `Machine Learning` `fMRI` `Data Preparation`

📖 Teaching Experience

Fall 2021 to Spring 2023	**Graduate Teaching Assistant, CICS, UMass Amherst** ❯ CS 311 Introduction to Algorithm in Fall 2021 and Spring 2023 ❯ CS 590OP Applied Numerical Optimization, and CS 108 Foundation of Data Science in Fall 2022 ❯ CS 220 Programming Methodology in Spring 2022 ❯ Held office hours, led weekly discussion sessions, graded course works, answered questions on course forum, attended weekly TA meeting for discussing the progress/improvements of the course `Javascript` `Algorithms` `Numerical Optimization` `Data Science` `Teaching`
Spring 2020 to Spring 2021	**Undergraduate Course Assistant, CICS, UMass Amherst** ❯ CS 240 Reasoning under Uncertainty in Spring 2021, CS 311 Introduction to Algorithms in Fall 2020, CS 220 Programming Methodology in Spring 2020 ❯ Helped with weekly discussion session, graded course works, and answered questions on Piazza `Javascript` `Algorithms` `Probability` `Teaching`

📖 Professional Certifications

2022	IBM Artificial Intelligence Engineering Professional Certificate
2022	Neuroscience and Neuroimaging Specialization Certificate
2020	TensorFlow Developer Professional Certificate

66 References

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