Srinitish Srinivasan

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Education

Vellore Institute of Technology **2021 - 2025**

B.Tech in Computer Science & Engineering with specialization in Artificial Intelligence and Machine learning

Work Experience

Indian Institute of Technology, Delhi **April 2025 – Present**

Junior Research Fellow(JRF) working under Dr.Tanmoy Chakraborty *Onsite*

- Primary research focus on Geometric Deep Learning
- Collaborated with the Robotics lab to model robotic motion and dynamics using Geometric Machine Learning and Physics Informed Networks

University of Lincoln **Oct 2023 – April 2025**

Computer Vision Research Intern under the supervision of Dr.Karthik Seemakurthy *Remote*

- Pre-trained the YOLOv5 and YOLOv3 backbone to generate pseudo labels that accurately localizes multiple objects in an image.
- Worked on mitigating Out-of-Distribution errors in object detection during inference-time by developing a test-time transformation technique using Autoencoders and Image Inpainting.
- Implemented a method to successfully transfer backbone weights of YOLOv5 to Ultralytics YOLOv5 after custom pre-training

Vellore Institute of Technology **Sept 2023-March 2025**

Undergraduate Student Researcher under Dr.Omkumar CU's Research Group *Hybrid*

- Designed JPEB GSSL: A graph self supervised technique that combines joint predictive embedding and Bayesian inference.
- Developed the Lorentzian Graph Isomorphic Network(LGIN) to enhance graph representation learning on non-Euclidean manifolds for graph classification.
- Designed and trained Graph Variational Autoencoders to generate node embeddings that model the underlying features of a drug through Self-Supervised learning.
- Developed a contrastive training method to train GNN backbones to defend itself against Adversarial Attacks. Designed a pipeline to transfer backbone weight to a downstream classification task linked with Graph Isomorphic Networks(GIN) for molecular property predictions outperforming over 70% of previous benchmarks.

Center of Cyber Physical Systems, Vellore Institute of Technology **Aug 2023-Oct 2023**

Summer Research Intern under the supervision of Dr.Ganapthy Sannasi *Hybrid*

- Designed a technique to semantically segment sparse crop and weed data using hyper-spectral images during their initial growth period.
- Train and Test several state of the art semantic segmentation loss functions such as Weighted Cross Entropy, Dice Loss, Focal Loss and Dice Log-Cosh.
- Constructed a modified U-net with initial self-supervised embedding layers to capture the underlying spatial and spectral features of crop and weed.

Selected Publications

- Srinivasan, S., OmKumar, C. An edge sensitivity based gradient attack on graph isomorphic networks for graph classification problems. Sci Rep 15, 14998 (2025). https://doi.org/10.1038/s41598-025-97956-7
- Srinitish Srinivasan and Omkumar CU. Leveraging Joint Predictive Embedding and Bayesian Inference in Graph Self Supervised Learning. 2025. arXiv: 2502.01684 [cs.LG]. url: https://arxiv.org/abs/2502.01684.
- Srinivasan, Srinitish, and Omkumar CU. "LGIN: Defining an Approximately Powerful Hyperbolic GNN." arXiv preprint arXiv:2504.00142 (2025).
- Srinitish Srinivasan and Karthik Seemakurthy. Autoencoder based approach for the mitigation of spurious correlations. 2024. arXiv: 2406.18901 [cs.CV]. url: https://arxiv.org/abs/2406.18901.
- Jaskaran Singh Walia et al. "Predicting Liquidity-Aware Bond Yields using Causal GANs and Deep Reinforcement Learning with LLM Evaluation". In: arXiv preprint arXiv:2502.17011 (2025)
- Ganapathy, S., Srinivasan, S. Crop weed separation through image-level segmentation: an ensemble of modified U-Net and encoder–decoder. Neural Comput & Applic (2025). https://doi.org/10.1007/s00521-025-11123-7

Ongoing Publications

Liquidity-Aware Bond Yields using Causal GANs and Deep RL with LLM Evaluation **TBD**

Can we ease the injectivity bottleneck on Lorentzian Manifolds for GNNs? **GRADES NDA(Accepted)**

Leveraging Joint Predictive Embedding and Bayesian Inference in GSSL **Neurocomputing**

Projects

Easing the injectivity bottleneck of HGNNs on Lorentzian Manifolds Source Code

- Developed a novel graph neural network that extends Graph Isomorphic Networks (GIN) to hyperbolic spaces using the Lorentz model, enhancing expressivity for distinguishing non-isomorphic graphs
- Proposed a theoretical framework for powerful graph neural networks on hyperbolic spaces that follow the hyperbolic-tangential-hyperbolic transformation and a cardinality-aware Lorentz centroid aggregation function to approximately preserve its injectivity.

JPEB G-SSL: Leveraging Joint Predictive Embedding and Bayesian Inference in Graph SSL Source Code

- Developed a non-contrastive self-supervised learning framework to improve graph neural network representations without relying on negative sampling or complex decoders.
- Incorporated a semantic-aware objective using pseudo-labels derived from Gaussian Mixture Models (GMMs), enhancing node discriminability by evaluating latent feature contributions.
- Achieved state-of-the-art results on benchmark datasets by bridging spatial and semantic graph features while ensuring computational efficiency and resistance to representation collapse.

An Edge Sensitivity based Gradient Attack on GIN for Graph Classification Source Code

- Developed a novel white-box, gradient-based adversarial attack targeting GNN latent space embeddings, addressing a key gap in existing literature on gradient attacks for latent representations.
- Designed a high-performance GNN model for molecular property prediction, integrating spectral, spatial, and isomorphic insights, which surpassed over 75% of comparable LLM-based architectures.
- Experimentally validated the model's robustness against the developed adversarial attack, demonstrating a significant vulnerability with an average performance drop of 25% and informing strategies for building more resilient GNNs.

Real Time Surgical Smoke Detection using Graph Neural Networks and 3D CNNs Source Code

- Designed a Graph Neural Network and a 3D CNN based feature extractor to detect smoke in surgical videos.
- Used the features extracted by the 3D Convolution Neural Network as the node embeddings of the graph and the position of the frames in time to create the graph adjacency matrix.
- The graph was dynamically created during training enabling the exploration of a wide range of features.

Differential Equations using Equilibrium Driven Neural Networks Source Code

- Implemented a numerical solution using neural networks to solve ordinary and partial differential equations.
- The implementation takes consideration of mathematical constraints such as Dirichilet and Neumann Boundary Conditions.

Self Supervised Psuedo-labelling using Autoencoders built on YOLOv5 Backbone Source Code

- Pre-trained the YOLOv5 backbone to precisely localize multiple objects within an image.
- Designed a pipeline to successfully transfer the pre-trained backbone weights to Ultralytics YOLOv5 for fine-tuning.

Mitigation of Spurious Correlations in YOLOv5 Source Code

- Identified patterns in miss-classified instances of YOLOv5 using Self-Supervised Learning.
- Used Image Inpainting labels as weak labels and developed an Autoencoder to correct miss-classified instances through Test time Transformation, thus effectively adapting to the OOD setting.

Honors and Achievements

- Awarded a travel grant of 1500 USD from GRADES NDA, ACM SIGMOD/PODS to present my poster "Can we ease the injectivity bottleneck on Lorentzian Manifolds for GNNs?"
- Awarded funding from IIT Delhi for Graph Expansion research (May-Dec 2025).
- Finalist (Top 5 of 200+ teams) in AgriTech Robo Challenge (VIT/Erasmus Agrhi, 2024).
- Scholarship recipient for Oxford Machine Learning Summer School.
- Raman Research Award recipient (Vellore Institute of Technology).
- Winner, TechEthos Hackathon (VIT / Univ. of Cardiff) on Low Resource Language Translation.
- Selected for John Hopkins University HEEP Program.
- Invited Keynote Speaker: Temporal Graph Neural Networks Seminar at Vellore Institute of Technology.
- Invited Speaker: Google I/O Extended (GDSC) on Palm API, MediaPipe, and Quantization.
- Appointed Lead, Student Council for Data Science & Applications (IIT Madras).