CHETHIYA GALKADUWA

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5354, Gainsboro Drive, West Lafayette, IN 47906

RESEARCH INTEREST

Research interests lie in the fields of Machine Learning and Computer Vision, NLP with applications in real world scenarios particularly in brain inspired AI and Biological Plausible models.

EDUCATION

Indiana University Indianapolis, USA *2025-Present*
Ph.D. Student in Computer Science

University of Kelaniya, Sri Lanka *2019-2023*
B.Sc. (Hons) in Computer Science - Second Class (Upper Division)

Trinity College Kandy, Sri Lanka. *2002-2017*
G.C.E Advanced Level in Mathematics (A), Physics (B), and Chemistry (B)
G.C.E Ordinary Level - High Distinction Pass (9-A)

IBA Campus *2017-2018*
Certificate course in Computer science

HONORS & AWARDS

- **Winner CIMA Launch Pad 2017** | Startup Challenge organized by the CIMA Sri Lanka
- **Finalist at the Thinkwave 3.0** | Global Ideathon organized by AIESEC at the University of Moratuwa.
- **Finalist at the Arimac Future Cast 2021** | Ideathon organized by ARIMAC and AIESEC Sri Lanka
- **Finalist at the HackAI 2021** | Ideathon organized by STEMUP Educational Foundation to encourage young innovators across the country to build AI-powered solutions using data science, cognitive computing, machine learning & deep learning technologies to solve some of the most challenging issues in the country.
- **Semi-Finalist at the HackX 2020** | A technology-oriented innovation based Inter-University Startup challenge organized by the Industrial Management Science Student Association of University of Kelaniya
- **The University of Kelaniya Color's Awards 2019** | UOK Colors
- **Best Project – Incoming Global Volunteer – Summer** | AIESEC in University of Kelaniya 19/20
- **Best Team Leader – Incoming Global Volunteer – Summer** | AIESEC in University of Kelaniya 19/20
- **2nd Runner-Up Sri Lankan University Games** | Tennis Men
- **2nd Runner-Up Leads Trophy 2019** | Tennis Men

EXPERIENCES

Graduate Teaching Assistance (*2025 Jan – Present)*

Indiana University Indianapolis, USA

- CSCI-P 536 – Operating Systems
- CSCI-C 310 – Data Structures (Python)
- Assisted in instruction and grading of coursework, including lab assignments, projects, quizzes, and exams.
- Conducted office hours and debugging sessions for Python-based Data Structures coursework covering arrays, linked lists, stacks, queues, trees, graphs, hashing, and algorithm analysis.
- Supported Operating Systems projects involving C and Python, including process scheduling, memory management, and synchronization.
- Coordinated with the instructor to design fair grading rubrics and ensure consistent evaluation across student submissions.

Graduate Assistant. (*2025 May – 2025 August)*

Indiana University Indianapolis, USA

- Conducting research on object detection and image segmentation using deep learning models such as Faster R-CNN and Vision Transformers.
- Evaluating multimodal datasets combining synthetic, real, and generative data for maritime visual understanding.
- Collaborating with faculty and industry collaborators to develop and publish research findings in top-tier computer vision conferences.

Assistant Lecturer (*2024 September – 2024 November)*

Sri Lankan Institute of Information and Technology (SLIIT), Sri Lanka

- Assisting in the instruction and grading of coursework, including managing lab assignments and exams.
- Providing student support through office hours and debugging sessions for C and Python-based operating systems projects.

Python Developer(AI/ML). (*2024 July – 2024 September)*

Cove Island (Ursaleo, USA), Colombo, Sri Lanka

- Develop and deploy Digital Twin solutions across diverse industries including smart buildings, manufacturing, and utilities for NVIDIA's advanced AI and graphics technologies.
- Developing RAG systems and AI Agents using Langchain Toolkits which integrates with OpenAI APIs and FAISS which will efficiently query the relevant details from larger vector databases.

Full Stack Software Engineer **(***2024 Jan – 2024 June)*

iVedha Inc, Toronto, Ontario – Remote (EST Time-zone)

- Building a Global Outage Monitoring platform to monitor service outages and performance issues in the third-party services that the client relies upon, such as SaaS tools. It also provides the ability to monitor third-party banks and financial services, allowing pre-emptive measures against issues in the wider industry.
- Building a Single glass plane integrated with third-party applications such as ELK, PagerDuty, Kibana backstage which can access using an SSO for City National Bank, USA.
- Working on with cloud-based performance monitoring and observability platform for comprehensive monitoring using the Logic Monitor platform.

Undergraduate Research Intern (*2022 Oct - 2023 Feb)*

Kihara Lab @ Purdue University, USA

- Building Probabilistic Deep Learning Models for generate protein backbone folding.
- Building Diffusion base Probabilistic Deep Learning Models for generating new protein structures
- Building Classification Models for both DNA and Proteins.

PUBLICATIONS

- Abstract: C. Galkaduwa, H. Yashodhara, " Prediction of 8-State Protein Secondary Structure Using Deep Neural Network Approach," **International Conference on Advances in Computing and Technology and Student Symposium 2023**
- Paper: Galkaduwa, C., Ranasinghe, N. (2024). Data Science and Its Importance. ***Biomed Sci Clin Res****,3*(1),01-04.
- Paper: Recurrent Task-Guided Gain Modulation for Biologically Inspired Bottom-Up and Top-Down Learning. (In Preparation)

PRE-PRINT

- Chethiya Galkaduwa, Praveen Bhawantha. Leveraging Key-Value NoSQL Databases for Enhanced Decision Support Systems: A Comparative Analysis SUMMARY REPORT. *TechRxiv.(Pre-print)*
- Chethiya Galkaduwa. Challenges and Opportunities in Information Sharing during Cybersecurity Exercises. *TechRxiv. (Pre-print)*

PRESENTATION

- Recurrent Top-Down Counter-Hebbian Network for Sustained Visual Attention, Poster Presentation at *Luddy School's 25th Anniversary Research Symposiu. (*Nov 2025)
- Prediction of 8-State Protein Secondary Structure Using Deep Neural Network Approach, FCTFRS 2023, SL

PROJECTS

1. Recurrent Task-Based Modulation for Biologically Inspired Top-Down and Bottom-Up Networks
Indiana University Indianapolis (2025) – Ongoing

- Introduced a recurrent task-based gating mechanism that iteratively refines hidden activations in BU–TD networks, inspired by cortical feedback loops.
- Prevents over-suppression of neurons compared to one-shot gating, enabling more flexible and biologically plausible task-driven attention.
- Demonstrated improvements in robustness, interpretability, and alignment with biological attention dynamics, supporting cross-disciplinary relevance.

2. **Entity Causal Graph Based Dynamic Augmentation for VQA in Low-Resource Languages**
Indiana University Indianapolis (2025)

- Designed and implemented a multilingual Visual Question Answering (VQA) pipeline using causal graph-based augmentation to improve performance in low-resource languages (Hindi, Sinhala, Urdu).
- Generated structured causal graphs from image-question pairs using Gemma 3 models, translated them, and integrated them into VQA prompts for improved contextual reasoning.
- Demonstrated performance gains in low-resource settings (e.g., Sinhala) through benchmark evaluations using CVQA dataset, enhancing both accuracy and interpretability.

3. Verification and Validation of Maritime Object Detectors Using Mixed-Domain Data
Indiana University Indianapolis, Purdue University West Lafayette (2025)

- Developed a domain-aware evaluation framework to assess object detector robustness using real (VAIS-12), synthetic (3D simulation), and generative (SDXL) maritime imagery.
- Applied latent space clustering (UMAP, HDBSCAN, K-Means) and multivariate distance metrics (Wasserstein, FID, MMD) to curate balanced test datasets.
- Evaluated Faster R-CNN performance across domains using mAP, precision, recall, and domain-specific confusion matrices.
- Findings revealed generative data enhanced generalization and recall, synthetic data improved precision, while real-world data was most challenging but essential for deployment fidelity.

4. **BrandNet: Deep Visual Classification of Winter Apparel Brands with EfficientNetV2B0**
   Indiana University Indianapolis – Deep Learning Project (2025)

- Designed and trained a convolutional neural network (EfficientNetV2B0) to classify 34 winter clothing brands from real-world product images.Applied advanced data augmentation, class balancing, and staged fine-tuning to combat overfitting and limited data diversity.
- Evaluated the model on an unseen 887-image test set, achieving ~77% training accuracy and ~13.87% test accuracy.
- Performed in-depth error analysis using confusion matrices and ablation studies, identifying key bottlenecks in generalization due to inter-brand visual similarity and dataset bias.

5. **Transformer Model for Sequence-to-Sequence Learning**
   University of Kelaniya Sri Lanka (2023)

Transformer model for sequence-to-sequence learning, a fundamental task in Natural Language Processing (NLP), using PyTorch. The model was trained on a dataset of input phrases paired with their corresponding target phrases. The objective was to predict the target phrase given an input phrase. The project involved data preprocessing, model architecture design, training, and evaluation.

6. **Prediction of 8-State Protein Secondary Structure Using Deep Neural Network Approach.**
   University of Kelaniya Sri Lanka – Undergraduate Final Year Research (2023) – ICATC 2023

The study presented a novel approach for protein secondary structure prediction using a combination of different deep neural networks. The proposed models demonstrate promising performance in predicting secondary structure elements from amino acid sequences and profile features.

7. **DNA Sequence Classifier.**
   Kihara Lab - Purdue University West Lafayette (2022)

A classification model that is trained on the human DNA sequence and can predict a gene family based onthe DNA sequence of the coding sequence. This model is used to classify gene families based on the DNAsequence of the coding sequence. This can be useful in understanding genetic variation and evolution acrossdifferent species, as well as in identifying specific genes and genetic markers for medical and biological research.

8. **Protein Sequence Classifier.**
   Kihara Lab - Purdue University West Lafayette (2022)

This modal determines the protein's family type based on the sequence. Inspired by search engines such asBLAS. Modal will classify protein's family based on the protein sequence and the model is compared by usingdifferent models like Naive Bayes and Adaptive Boosting.

EXTRACURRICULAR ACTIVITIES

IEEE

- IEEE Volunteer Engagement Coordinator – IEEE Young Professionals Sri Lanka *(2023)*
- IEEE Training and Development Coordinator – IEEE Young Professionals Sri Lanka *(2022)*
- IEEE Computer Society Chapter University of Kelaniya – Vice president *(2021)*
- IEEE National Projects – Publicity Team Member | Project SL Inspire *2021*

AIESEC

- Brand Experience Manager – International President's Meeting 2021
- Organizing Committee Vice President – Marketing in Leadership Development Seminar 2020

Computer Science Student's Association – University of Kelaniya

- President *(2022)*
- Vice President *(2021)*

Co-Chair for the Career Fair 2020 - University of Kelaniya

Sri Lankan University Games 2019 – Representing the Tennis Team