Gihan Jayatilaka

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INTERESTS

Computer vision	Machine Learning	Deep Learning	Algorithms

EDUCATION

- **University of Maryland** College Park, MD, USA
  PhD in Computer Science [Courses] *Aug 2021 - May 2026*
- **University of Peradeniya** Peradeniya, Sri Lanka
  BSc in Computer Engineering (First Class Honors) [Courses,   Thesis] *2015 - 2020*

EXPERIENCE

- **Futurewei Technologies** Santa Clara, CA, USA
  Research intern (Camera and Vision team) *Summer 2022*
  - Applicability of Vision Transformers for implicit ground-truth tasks
- **University of Peradeniya** Peradeniya, Sri Lanka
  Research Assistant *Aug 2020 - Jul 2021*
  - Computer vision for COVID-19 mitigation
  - Low light image enhancement and Intrinsic Image Decomposition
- **University of Peradeniya** Peradeniya, Sri Lanka
  Undergraduate Thesis Student *May 2020 - Jul 2020*
  - Retinex decomposition of low light images and GAN based enhancement
- **Living Analytics Research Center, Singapore Management University** Singapore
  Research Intern *Feb 2019 - Jul 2019*
  - Computer vision based screen to camera communication

ONGOING PROJECTS

- **Utilizing Nearest (and furthest) Neighbours for Image Categorization**
  Image categorization (image clustering and generalized category discovery) using neighbors and "non-neighbors" in the embedding space. In this work, we explore how much information can be extracted from the neighbors of datapoint in a distribution. In addition, we develop a metric to indicate the confidence of such information.

  Techniques: Self supervised feature embeddings, nearest neighbour/clustering/self labelling algorithms.
  Outcomes: State of the art performance in Generalized Category Discovery task for generic image datasets (CIFAR10, Imagenet100)

- **Scalability of Similary Search (k-Nearest Neighbor) Algorithms to couple with Deep Learning**
  Benchmarking the GPU-accelerated kNN algorithm implementations along with Deep Networks (to generate embeddings as input for kNN) and demonstrate the bottlenecks of speed. [Presentation , Report]

- **Pitfalls of Caption Expansion using Vision Language Models (VLMs)**
  Automated captioning (and caption expansion) has been used in recent literature as a synthetic ground truth for training VLMs. In this project, we evaluated such pipelines and discovered a spectrum of issues that are detectable by off-the-shelf computer vision tools including hallucinations and attribute mismatch.

- *[Mentoring]* **Improving 3D Semantic Occupancy Prediction Using Temporal Information**
  We improve upon the Tri-perspective-view encoding of 3D scenes (for self-driving-related 3D mapping tasks) by a novel transformer architecture to promote temporal information passing through the network.

Most of my earlier projects have an accompanying publication in the next section.

PUBLICATIONS

[P 10] **S2TPVFormer: Spatio-Temporal Tri-Perspective View for temporally coherent 3D Semantic Occupancy Prediction**
Sathira Silva, Savindu Wannigama, Gihan Jayatilaka , Roshan Ragel
In *arXiv preprint arXiv:2401.1378*
PDF , DOI

[J 9] **Holistic Interpretation of Public Scenes Using Computer Vision and Temporal Graphs to Identify Social Distancing Violation**
Gihan Jayatilaka , Jameel Hassan, Suren Sritharan, Janith Bandara Senanayaka, Harshana Weligampola, Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Janaka Ekanayake, and Samath Dharmaratne
In *MDPI Applied Sciences*
DOI , PDF , HTML , Presentation , Project Page

[C 8] **An optical physics inspired CNN approach for intrinsic image decomposition**
Harshana Weligampola, Gihan Jayatilaka , Suren Sritharan, Parakrama Ekanayake, Roshan Ragel, Vijitha Herath, Roshan Godaliyadda
In *2021 IEEE International Conference on Image Processing (ICIP). IEEE.*
PDF , PDF (Paywalled) , DOI , Poster (PDF) , Poster (JPG) , Presentation(PDF) , Presentation(Youtube)

[C 7] **DeepLight: Robust & Unobtrusive Real-time Screen-Camera Communication for Real-World Displays**
Vu Tran, Gihan Jayatilaka , Ashwin Ashok, Archan Misra,
In *2021 20th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN). IEEE.*
Best paper artifact award
PDF , PDF (paywalled) , Code , DOI , Presentation (PDF) , Presentation (Youtube)

[C 6] **Hands Off: A Handshake Interaction Detection and Localization Model for COVID-19 Threat Control**
Jameel Hassan, Suren Sritharan, Gihan Jayatilaka , Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Janaka Ekanayake
In *2021 IEEE International Conference on Industrial and Information Systems (ICIIS)*
PDF , PDF(Paywalled) , DOI , Presentation(PDF) , Presentation(Youtube) , Code

[C 5] **Generalizing of Foreground Estimation Algorithms in Dynamic Background Conditions (Abstract)**
Gihan Jayatilaka* , Harshana Weligampola*, Suren Sritharan*, Dhammika Elkaduwe, Roshan Godaliyadda, Parakrama Ekanayake, Vijitha Herath, Nalin Harischandra
In *SLTC International Research Conference 2020*
PDF , Presentation(PDF)

[C 4] **Non-contact Infant Sleep Apnea Detection**
Gihan Jayatilaka* , Harshana Weligampola*, Suren Sritharan*, Pankayaraj Pathmanathan, Roshan Ragel, Isuru Nawinne
In *2019 IEEE International Conference on Industrial and Information Systems (ICIIS)*
PDF , PDF(Paywalled) , DOI

[C 3] **A Retinex based GAN Pipeline to Utilize Paired and Unpaired Datasets for Enhancing Low Light Images**
Harshana Weligampola, Gihan Jayatilaka , Suren Sritharan, Roshan Goldaliyadda, Parakrama Ekanayeka, Roshan Ragel, Vijitha Herath
In *MERCON 2020*
PDF , PDF(paywalled) , Presentation(PDF) , Presentation(Youtube) , DOI

[J 2] **GPU accelerated adaptive banded event alignment for rapid comparative nanopore signal analysis**
Hasindu Gamaarachchi, Chun Wai Lam, Gihan Jayatilaka , Hiruna Samarakoon, Jared T. Simpson, Martin A. Smith, Sri Parameswaran
In *BMC Bioinformatics 21, 343 (2020)*
PDF , HTML DOI

[J 1] **Adaptive hierarchical clustering for hyperspectral image classification: Umbrella Clustering**
S.S.P. Vithana, E.M.M.B. Ekanayake, E.M.H.E.B. Ekanayake, A.R.M.A.N. Rathnayake, G.C. Jayatilaka , H.M.V.R. Herath, G.M.R.I. Godaliyadda and M.P.B. Ekanayake
In *J. Spectral Imaging 8, a11 (2019)*
PDF , HTML , DOI

Honors and Awards

[A] Algorithms   [C] Competitive Programming   [E] Examinations   [D] Development

2022	[A]	ACM/IEEE International Conference on Information Processing in Sensor Networks. IPSN 2021 Best artifact award.
2021	[]	University of Maryland, College Park : Dean's Fellowship
2020	[A]	Prof. E.F.Bartholomeusz Endowment award for best mathematical thesis project of the Faculty of Engineering, University of Peradeniya (413 students).
2020	[A]	Escape 2020 – Thesis project symposium of the Deaprtment of Computer Engineering (60 students), University of Peradeniya. Nominated for best thesis
2019	[E]	Huawei Seeds for the Future: Selected to top 10 CS/IT undergraduates of the country in terms of academic merit to participate in the program.
2019	[A]	StatHack 2.0 – nationwide inter university statistical data analysis competition (90 teams) organized by Dept. of Statistics, University of Colombo. Winners
2019	[C]	IEEExtreme 12.0: (World wide algorithmic programming competition : 4300 teams) National Runners up , World Rank 67
2019	[A]	Dialog Axiata Datathon - data science hackathon in SL on smart city planing (for students and data science professionals). Best data engineer award
2019	[C]	ACES Coders v7.0 (National level inter university algorithmic programming competition: 120 competing teams) Champions
2019	[C]	Google Code Jam Qualification round : Perfect score, Best performance in SL, World Rank 298 (24000 participants)
2018	[C]	IEEExtreme 12.0: (World wide algorithmic programming competition : 4000 teams) National Runners up , World Rank 79
2018	[A]	IEEE Region 10 Humanitarian Technology Conference (Asia / Australia region) Humanitarian Technology Products Competition for grad/undergrad students. Champions. Project: Infant sleep apnea detection system
2018	[A]	SLIIT Codefest: Emerging Innovator nationwide open competition: Champions - Gold award. Project: Infant sleep apnea detection system
2018	[A]	BrainStorm: The Premier Biomedical Competition in Sri Lanka. Runners up and Silver medal. Project: Infant sleep apnea detection system
2018	[A]	Dialog NB-IOT Hackathon (Invitational undergrad and professional dev hackathon) Project: Infant sleep apnea detection system: Runners up
2018	[A]	United Nations' Social Innovation Challenge: Shortlisted for national innovation camp and to the per-incubation program (Top 14 out of 700+ teams)
2018	[R]	Sri Lanka Robotics Competition (Inter-university robotics competition) Project Galvans : National rank 4
2017	[C]	IEEExtreme 11.0: National Champions, World Rank 124
2017	[A]	ACES Hackathon 2017: (Intra university hackathon) Project: Expert miner: Software section winners, Best idea of the competition
2016	[A]	IEEExtreme 10.0: National Champions, World Rank 62
2016	[A]	ACES Coders v6.0 Champions
2016	[D]	ACES Hackathon 2016: Project Motify: Software section winners, Most popular idea of the competition
2016	[E]	HDTS Scholarship award in recognition of 2014 GCE AL performances
2015	[E]	Mahapola merit scholarship for performance in GCE AL examination
2015	[E]	Member of the SL national team for Asian and International Physics Olympiads
2015	[E]	Sri Lanka Mathematics Olympiad: National rank 25, High distinction
2014	[E]	GCE AL (Advanced Level) examination. Mathematics A, Physics A, Chemistry A. z score 2.55 , National rank 86 (30,000+ students).
2014	[E]	Sri Lanka Physics Olympiad: National rank 8, Silver Medal
2014	[E]	Sri Lanka Mathematics Olympiad: High distinction
2013	[E]	Star Quest - Astronomical quiz competition: National rank 4.
2013	[E]	National Chemistry Quiz (iChem, SL): National rank 2, High distinction
2013	[E]	Sri Lanka Mathematics Olympiad: National rank 35, High distinction.

Workshops/Training attended

2019	Huawei seeds for the future 2019 two week study in China about telecommunication, 5G, cloud etc:
2018	Hackadev National Social Innovation camp organized by United Nations Development Project and Malaysian Global Innovation & Creativity Center.
2017	Joint Indo-Sri Lanka workshop on big data analytics at 2017 IEEE International Conference on Information Systems.
2014-15	Sri Lanka National Physics Olympiad Team training at University of Colombo, Department of Physics.

Teaching

2021-24	Graduate TA for CMSC 351 Algorithms (2021 Fa, 2022 Sp, 2022 Fa, 2024 Sp).
2023 Fa	Graduate TA for CMSC 420 Advanced Data Structures.
2023 Sp	Graduate TA for CMSC 430 Design and Implementation of Programming Languages .
2022	Volunteer problem setter for Algorithm Implementation Tutorials for CO322 (E18) course.
2021	Volunteer organizer of Neural Networks Reading Group for CO542 (E15) course.
2020	Casual instructor (TA) for Computer Architecture and Digital Logic courses of the Faculty of Engineering, University of Peradeniya.
2018-19	Volunteer instructor (TA) for GP106 Computing (E16, E17)

Services

2019-23	Scientific Committee, National Informatics Olympiad , Sri Lanka.
2021-22	Student reviewer, CS MS/PhD admissions, University of Maryland 2022 Fall and 2023 Fall.
2022	Invited speaker, " What is data science? " (in Sinhala) for high school students.
2021	Invited speaker at " Introduction to competitive algorithmic programming " @ IEEE Student Branch of University of Vocational Technology, Sri Lanka.
2020	Web chair, Wearsys 2020: 6th ACM Workshop on wearable systems and applications.
2018	Instructor at "computational thinking" session series for algorithmic programming competition enthusiasts of University of Peradeniya.
2018	"Gold chasers" Sri Lanka iPhO (International physics olympiad) team support program, Rotract club, University of Moratuwa.
2017	Speaker at " Intro to competitive programming " webinar for IEEE Student branch University of Wollongong.
2017	Instructor at Weekly "Interactive coding sessions" for freshman class of University of Peradeniya.

Skills

Languages	**Java, Python**, C, MATLAB, Bash scripting
Tools (ML)	**Pytorch, Tensorflow**, Keras, Sci-kit learn
Tools (other)	Latex, git

References

- PhD (Department of Computer Science, University of Maryland)
  - Prof. Abhinav Shrivastava .
- Pre-doctoral
  - Prof. Roshan Godaliyadda