DILANGA GALAPITA MUDIYANSELAGE

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EDUCATION

Ph.D. in Information Technology at the University of Nebraska at Omaha, NE. *May 2024*
Concentration: Artificial Intelligence, GPA 3.81
Dissertation: Self-Supervised Representation Learning on Multi-Label Classification

Master of Computer Science at the University of Nebraska at Omaha, NE. *Dec 2018*
Concentration: Database and Knowledge Engineering, GPA 3.70
Thesis: Multi-Label Classification Using Higher-Order Label Clusters

Bachelor of Computer Science Honors at University of Peradeniya, Sri Lanka. *Jan 2014*
Major: Computer Science, Statistics and Mathematics, GPA 3.75
Thesis: Performance Comparison of Emerging HEVC Standard with H.264/AVC and frame interpolation based Error Correction Technique for HEVC decoder.

RESEARCH INTERESTS

Medical and Bio-engineer imaging applications, Deep Learning, Representation Learning, Multi Label-Classification, Computer vision, Image/Video Processing, Database/Knowledge Engineering

RESEARCH EXPERIENCE

Graduate Research Assistant - University of Nebraska at Omaha *Aug 2016 - Present*

- Working on research and development for NSF T2 Data-Driven Material Discovery (DDMD), building deep segmentation models for bacteria cell segmentation on metal materials, in collaboration with South Dakota School of Mines and Technology (Published).

- Working on research and development for predicting the fovial center of the Adaptive Optics (AO) scanning images using a deep semantic segmentation approach, in collaboration with the Byers Eye Institute, Stanford University.

- Working on research and development for real-time object detection for safety enhancement using deep anomaly detection approaches (Published).

- Deep learning pipeline for detection and segmentation of lesions in Toxoplasmosis fundus images and data annotation enhancement techniques, in collaboration with the Byers Eye Institute, Stanford University (Published).

- Unsupervised (Cover Coefficient-based Clustering) and supervised machine learning approach to enhance generic high dimensional Multi-label classification performance.

- Serious game (QuaSim), a simulator to provide virtual assistance of Quantum Cryptography concepts with practical hands-on for the students. Analyzed player data to predict the performances and superimpose the lesson map to provide a player-specific gaming environment (Published).

- Technologies used: Python, Matlab, Java, and R statistical programming languages.

Student Worker - University of Nebraska at Omaha *Aug 2017 - Aug 2018*

- Windows-based application for eye-tracking and automatic distortion correction of Age-Related Macular degeneration (AMD) patients. Uses tracing-based technique to determine patient status and correct the distortion in collaboration with the Byers Eye Institute, Stanford University (Currently: Experimenting on real-time patient trials).

- Technologies used: C#.NET, Tobii eye-x eye tracker hardware with Tobii SDK.

Research Assistant - University of Peradeniya, Sri Lanka *Jan 2013 - Jan 2014*

- Conducted research on evaluating the performance of HEVC (High-Efficiency Video Coding) standard compared to H.264 Standard and developed edge-based frame interpolation technique for error correction at HEVC decoder.

- Technologies used: OpenCV library using C++ programming language.

PROFESSIONAL EXPERIENCE

AI Developer - Intern, GUARDIAN RFID® Internship *May 2022 - Aug 2022*

Software Engineer - Trainee hSenid Mobiles Solution (Pvt) Ltd *Jan 2013 - Jan 2014*

- Contributed to the e-Local Government project, by developing Android RESTful Client mobile application and Server-side RESTful web services.

- Played a key role in the testing team of the ongoing Airtel (Sri Lanka) chat application project.

Reviewer

- Artificial Intelligence in Medicine, An International Journal, ScienceDirect. *Jul 2023*

- ACM SIGITE Conference on Information Technology Education. *Apr 2020*

- Expert Systems with Applications, An International Journal, Elsevier. *2019*

TEACHING EXPERIENCE

Teaching Assistant, University of Nebraska at Omaha *Aug 2022 - May 2023*
Course: CSCI 4970 - Undergraduate - Computer Science Capstone
Duties: Acted as a project manager role for 30 undergraduate capstone projects with real clients, task tracking, implementation progress tracking, attending client meetings, attending weekly progress meetings, grading and evaluation.

Instructor - University of Nebraska at Omaha *Jan 2022 - May 2022*
Course: CIST 1300 - Introduction to Web Development
Duties: Conducted Lectures, lab sessions, grade assignments, proctor and grade exams, and other duties as assigned by the course in charge.

Teaching Assistant, University of Nebraska at Omaha *Aug 2021 - Dec 2021*
Course: CIST 1620 - Introduction to Computer Science II (JAVA programming)
Duties: Conducted lab sessions, graded assignments, proctored and graded exams outside of scheduled class hours, and other duties as assigned by the supervisor.

Instructor - Techademy, University of Nebraska at Omaha *May 2020 - Aug 2020*
Course: Artificial Intelligence and Intro to Machine Learning
Duties: Conducted virtual sessions to high-school students

Teaching Assistant, University of Nebraska at Omaha *Aug 2019 - May 2020*
Course: CIST 1400 - Introduction to Computer Science I (JAVA programming)
Duties: Conducted lab sessions, graded assignments, proctored and graded exams outside of scheduled class hours, and other duties as assigned by the supervisor.

Student Supervision, University of Nebraska at Omaha *May 2019 - Aug 2019*
Duties: Supervised two summer high-school interns on robotic car assembling (F1-tenth), and robotic vision concepts and implementations.

Temporary Instructor, Information Technology Centre, University of Peradeniya, Sri Lanka. *Feb 2015 - Jul 2016*
Duties: Conducted IT-related tutorial discussions and practicals, Preparation of teaching materials, Assisted students' coursework

Temporary Demonstrator, Faculty of Science, Department of Statistics and Computer Science, University of Peradeniya, Sri Lanka. *Feb 2014 - Feb 2015*
Courses: Digital Image processing using MATLAB, Artificial Intelligence and Expert Systems, Operating System Concepts, Object Oriented Programming (JAVA), Data Structures and Database Management Systems, Server-Side Web Programming.
Duties: Mainly created exam papers, marked tutorials, quizzes, exam papers, and invigilated exams in the above-mentioned theory/practical courses.

Visiting Instructor, Postgraduate Institute of Science (PGIS), University of Peradeniya, Sri Lanka. *Jan 2015 - May 2015*
Course: Database Management Systems (Practical), MySQL Database Management System for GIS applications

PUBLICATIONS

Journals (Peer-reviewed)

- V. Bommanapally, **D. Abeyrathna**, M. Ashaduzzaman, M. Subramaniam, and P. Chundi. *Super-Resolution based Methodology for Self-Supervised Segmentation of Microscopy Images.* Frontiers in Microbiology, Systems Microbiology, 2024.

- **D. Abeyrathna**, S. Rauniyar, R.K. Sani, and P.C. Huang. *A Morphological Post-Processing Approach for Overlapped Segmentation of Bacterial Cell Images.* Machine Learning and Knowledge Extraction (IMDP), 4(4), 1024-1041, 2022.

- **D. Abeyrathna**, M. Ashaduzzaman, M. Malshe, J. Kalimuthu, V. Gadhamshetty, P. Chundi and M. Subramaniam. *An AI-Based Approach for Detecting Cells and Microbial Byproducts in Low Volume Scanning Electron Microscope Images of Biofilms.* Frontiers in Microbiology, Systems Microbiology, 2022.

- A. D. Chakravarthy, **D. Abeyrathna**, M. Subramaniam, P. Chundi, and V. Gadhamshetty. *Semantic Image Segmentation Using Scant Pixel Annotations.* Machine Learning and Knowledge Extraction (IMDP), 4(3), 621-640, 2022.

- M. B. Dissanayake and **D. Abeyrathna**. *Performance comparison of HEVC and H.264/AVC standards in broadcasting environments.* Journal of Information Processing Systems, 11(3), 2015.

Conferences (Peer-reviewed)

- **D. Abeyrathna**, T. Life, S. Rauniyar, S. Ragi, R. Sani and P. Chundi. *Segmentation of Bacterial Cells in Biofilms Using an Overlapped Ellipse Fitting Technique.* In 2021 International Conference on Bioinformatics and Biomedicine (BIBM), pages 3548-3554. IEEE, 2021.

- **D. Abeyrathna**, M. Subramaniam, P. Chundi, M. Hasanreisoglu, S. Halim, P. Ozdal, and Q. Nguyen. *Directed Fine Tuning Using Feature Clustering for Instance Segmentation of Toxoplasmosis Fundus Images.* In 20th International Conference on Bioinformatics and Bio-engineering (BIBE). IEEE, 2020.

- **D.Abeyrathna**, P.C. Huang, and X. Zhong. *Anomaly Proposal-Based Fire Detection for Cyber-Physical Systems.* In 6th Annual International Conference on Computational Science and Computational Intelligence (CSCI'19), pages 1203-1207. IEEE, 2019.

- A. D. Chakravarthy, **D. Abeyrathna**, M. Subramaniam, P. Chundi, S. Halim, M. Hasanreisoglu, S. Yasir, and Q. Nguyen. *An approach towards automatic detection of Toxoplasmosis using fundus images.* In 19th International Conference on Bioinformatics and Bioengineering (BIBE), pages 710-717. IEEE, 2019.

- **D. Abeyrathna**, S. Vadla, V. Bommanapally, M. Subramaniam, P. Chundi, and A. Parakh. *Analyzing and predicting player performance in a quantum cryptography serious game.* In International Conference on Games and Learning Alliance, pages 267276. Springer, 2018.

- M. B. Dissanayake and **D. Abeyrathna**. *Edge-based frame inter-polation technique for error correction at HEVC decoder.* In 8th International Conference on Ubi-Media Computing (UMEDIA), pages 263-267. IEEE, 2015.

Abstracts and Workshops

- M. Rahman, V. Bommanapally, **D. Abeyrathna**, M. Ashaduzzman, M. Tripathi, M. Zahan, M. Subramaniam, & V. Gadhamshetty. Poster on *Machine Learning-Assisted Optical Detection of Multilayer Hexagonal Boron Nitride for Enhanced Characterization and Analysis*. In 2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2023.

- A. Akhavanrezayat, V. Bommanapally, **D. Abeyrathna**, M.S. Halim, C. Or, I. Karaca, G. Uludag, N. Yavari, V. Bazojoo, A. Mobasserian, Y. Shin, M. Hasanreisoglu, P. Chundi, Q. Nguyen, and M. Subramaniam. Abstract on *A novel objective method to detect the foveal center point in the $rtx1^{TM}$ device using artificial intelligence*, Investigative Ophthalmology & Visual Science, 64(8), pp.1068-1068, 2023.

- **D. Abeyrathna**, and M. B. Dissanayake. Abstract on *Performance Comparison of Emerging High-Efficiency Video Coding (HEVC) and h.264/ AVC Standards* was published in the proceedings of PGIS Research Congress, Post Graduate Institute of Science, University of Peradeniya, 2015.

Book Chapters and Patents

- **D. Abeyrathna**, M. Subramaniam, and P. Chundi. *An Overview of Machine Learning.* In P. Chundi, V. Gadhamshetty, B. Jasthi, and C. Lushbough (Eds.) *Machine Learning in 2D Materials Science* (pp. 144-163). CRC Press, 2023 (ISBN 9780367678203)

- A. Akhavanrezayat, K.J Hassan, Q.D. Nguyen, M. Subramaniam, V. Bommanapally, and **D. Abeyrathna**. Artificial Intelligence-Based Methods to Objectively Identify the Foveal Center in Adaptive Optics Retinal Imaging. U.S. Provisional Patent Application No. US 63/497,679. (Patent)

AWARDS AND SCHOLARSHIPS

- Best Visualization Award Runners Up Datapalooza, Data Analytics competition 2019 Conducted by Mutual of Omaha in collaboration with Holland Computer Center, Lincoln, Nebraska.

- Best Presenter Award - 8th Annual CS Graduate Research Workshop 2018: Presented on the topic of Cover Coefficient Clustering based approach to enhancing Multilabel classification predictive performance.

- Best Presentation Award - CSG International Hackathon 2017: Worked as a team of 3 to develop a mobile and web-based video streaming solution called DartaGram.

- University of Nebraska at Omaha - Advantage Scholarship (2016 - 2017)

- Championship award of IEEE ACES coders 2012 - coding competition, organized by IEEE student branch - Faculty of Engineering in University of Peradeniya, Sri Lanka.

WORKSHOPS AND SEMINARS

- The annual NSF-T2 Data-Driven Material Discovery (DDMD) workshop - Montana. Conducted an oral presentation on "Bacteria Cell instance segmentation and retrieve measurements using SEM images" on 19th and 20th October 2022.

- The annual NSF-T2 Data-Driven Material Discovery (DDMD) workshop - Omaha (Nebraska). Conducted an oral presentation on "A Morphological Post-Processing Techniques for Biofilm Segmentation" on 16th and 17th September 2021.

- The Computer Science annual graduate research workshop - University of Nebraska at Omaha. Conducted an oral presentation on "Cover Coefficient Clustering Approach for Multi-label Classification" on 14th April 2017. (Awarded for the best presentation).

- The 8th IEEE International Conference on Ubi Media Computing (UMEDIA - 2015) in conjunction with the 15th International Conference on Advances in ICT for Emerging Regions (ICTer2015), sponsored by IEEE Sri Lanka section. Conducted an oral presentation in the session of Systems and Multimedia Processing.

- The PGIS Research Congress - 2015, Organized by Post-Graduate Institute of Science, University of Peradeniya, Sri Lanka. Conducted an oral presentation in the session of Information & Communication Technology (ICT), Mathematics and Statistics.

- Conducted a Seminar on Service Oriented Architecture at the University of Peradeniya in 2013.

- Participant of the IEEEXtreme 6.0 24-Hour Programming Competition in 2012.

PROJECT WORK

- Developed a web-based Patient Detail Management System which collects patient details in to centralized database for data analytics.

- Developed a Chess-end-game application using C#.NET as a mini project using Artificial Intelligence techniques.

- Developed GUI-based distributed Semi-Join simulation for simple SQL ad-hoc queries using C#.NET.

- Implemented a mathematical model of the elbow method to determine the ambiguous natural number of clusters for a dataset.

LANGUAGES

Fluent in English and Sinhalese (oral and written)

SKILLS

Programming languages	Python, Java, C#.NET, C++, PHP, JavaScript
Machine Learning	Supervised, Self-Supervised, Unsupervised, Pytorch, TensorFlow
Mobile App development	Android with RESTful web services
Web technologies	RESTful/SOAP, JEE/JSP, PHP, JQuery, XML, JSON
Database	MySQL, MSSQL server, Microsoft Access, MongoDB
IDEs	IntelliJ IDEA, Eclipse, R Studio, Visual Studio, PyCharm

VOLUNTEER WORK

- **Escort and position athletes - Special Olympics Nebraska, Inc**   *May 2019*

    Volunteered to escort and position athletes with special needs.