Nuwan Gunasekara

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Summary

I am an AI researcher specializing in evolving data stream learning, focusing on advanced techniques like Neural Networks and Gradient Boosting. My work addresses critical challenges in Online Learning, including detecting and adapting to concept drifts in data streams and mitigating catastrophic forgetting in Neural Networks for online learning. I actively contribute to the open-source MOA and CapyMOA stream learning frameworks. I have also published multiple publications in reputed venues and have delivered tutorials on online learning. I have extensive experience in the industry, having participated in multiple machine learning projects and developed network capture tools. Explore my GitHub for accessible source codes.

Research Publications

1. H. M. Gomes, **N. Gunasekara**, and Y. Sun, " Machine Learning on the Fly: A Hands-On Tutorial for Streaming Data," in *ICDE*, IEEE, 2025. URL: https://doi.ieeecomputersociety.org/10.1109/ICDE65448.2025.00342.
2. H. M. Gomes, A. Lee, **N. Gunasekara**, *et al.*, *Capymoa: Efficient machine learning for data streams in python*, 2025. arXiv: 2502.07432 [cs.LG]. URL: https://doi.org/10.48550/arXiv.2502.07432.
3. **N. Gunasekara**, S. Nowaczyk, and S. Pashami, "Pragmatic paradigm for multi-stream regression," in *IDA*, Springer, 2025. URL: https://doi.org/10.1007/978-3-031-91398-3_27.
4. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, and A. Bifet, "Gradient boosted bagging for evolving data stream regression," in *Data Mining and Knowledge Discovery*, Springer, 2025.
5. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, and A. Bifet, "Gradient boosted trees for evolving data streams," in *Machine Learning*, Springer, 2024. URL: https://doi.org/10.1007/s10994-024-06517-y.
6. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, A. Bifet, and Y. S. Koh, "Recurrent concept drifts on data streams," in *IJCAI*, 2024. URL: https://doi.org/10.24963/ijcai.2024/888.
7. **N. Gunasekara**, "Advanced adaptive classifier methods for data streams," Ph.D. dissertation, University of Waikato, 2023. URL: https://hdl.handle.net/10289/16142.
8. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, and A. Bifet, "Survey on online streaming continual learning," in *IJCAI*, 2023. URL: https://doi.org/10.24963/ijcai.2023/743.
9. **N. Gunasekara**, H. Gomes, A. Bifet, and B. Pfahringer, "Adaptive neural networks for online domain incremental continual learning," in *DS*, Springer, 2022. URL: https://doi.org/10.1007/978-3-031-18840-4_7.
10. **N. Gunasekara**, H. Gomes, A. Bifet, and B. Pfahringer, "Adaptive online domain incremental continual learning," in *ICANN*, Springer, 2022. URL: https://doi.org/10.1007/978-3-031-15919-0_41.
11. **N. Gunasekara**, H. M. Gomes, B. Pfahringer, and A. Bifet, "Online hyperparameter optimization for streaming neural networks," in *IJCNN*, IEEE, 2022. URL: https://doi.org/10.1109/IJCNN55064.2022.9891953.
12. **N. Gunasekara**, "Meta learning on string kernel svms for string categorization," M.S. thesis, Auckland University of Technology, 2010. URL: https://hdl.handle.net/10292/1087.
13. **N. Gunasekara**, S. Pang, and N. Kasabov, "Tuning n-gram string kernel svms via meta learning," in *ICONIP*, Springer, 2010. URL: https://doi.org/10.1007/978-3-642-17534-3_12.

Projects

KEEPER	transforms industrial data into actionable insights using AI, to optimize assets like trucks, pumps, and network equipment, collaborating with Swedish industry partners and research institutes.
FREEWAY	develops an Asynchronous Federated Learning framework to improve vehicle operation analytics for diverse fleets of commercial EVs, tackling scalability, connectivity, and efficiency. By combining edge computing and MLOps, it focuses on real-time energy forecasting, activity recognition, and anomaly detection while ensuring data privacy. The consortium includes Volvo Trucks, Swedish research institutes, and SMEs.
AIM-TRUE	uses AI to optimize Volvo's aftermarket services, boosting efficiency and part availability via predictive logistics.
CapyMOA	Stream Learning Framework.
MOA	Massive Online Analysis Stream Learning Framework.
Project with Civil Engineers	to predict the Axial Capacity of Cold-Formed Steel.

Employment History

2024 – · · · · **Postdoctoral Fellow,** Halmstad University. Sweden.
Part of the research team at the broader KEEPER project.
AIM-TRUE project with Volvo Logistics.
FREEWAY project with Volvo Group Truck Technology.
Jointly taught *Big Data Parallel Programming* and *Programming for Data Science* courses.

2021 – 2024 **Research Assistant,** Artificial Intelligence Institute, University of Waikato. New Zealand.
Develop CapyMOA Stream Learning Framework.
Maintain MOA (Massive Online Analysis) Stream Learning Framework.
Project with Civil Engineers to predict the Axial Capacity of Cold-Formed Steel.

2021 – 2022 **Teaching Assistant (Machine Learning),** Faculty of Computer Science, University of Waikato.
Tutor Machine Learning Course (COMPX310) .

2010 – 2020 **Senior Software Engineer.** Endace Tecnologies Ltd. New Zealand.
Develop and maintain high-speed network packet capturing and analysing tools and libraries for Endace network capturing hardware.

2007 – 2008 **Support Engineer.** Virtusa.
Support internal applications for internal customers around the globe.

Education

2020 – 2023 **Ph.D., University of Waikato**, Hamilton, NZ.
Thesis title: *Advanced Adaptive Classifier Methods for Data Streams.*

2008 – 2010 **M.Sc. Information Sciences, Auckland University of Technology**, NZ.
Thesis title: *Meta learning on string kernel SVMs for string categorization.*

Education (continued)

2005 – 2007 **B.Sc. Management Information Systems, University College Dublin**, Ireland.

Skills

ML Frameworks	ML: Pytorch, TensorFlow, Deep Java Library (DJL), Scikit-learn, Weka Stream Learning: MOA, CapyMOA, Scikit-multiflow, Avalanche AutoML: FLAML
ML Techniques	Neural Networks, Boosting, Bagging, Drift detection & adaptation
Networking	TCP/IP, libpacp, Wireshark.
OS	Linux, FreeBSD, MacOS.
Programming Languages	Java, C, Python, bash, CUDA Programming
Languages	English and Sinhalese.
Misc.	Academic research, Academic writing, Tutoring.

Tutorials, Workshops, Talks, Program Committees, Board Member

Tutorials	*Machine Learning on the Fly: A Hands-On Tutorial for Streaming Data*. ICDE, Hong Kong, 2025. *Machine Learning on Streaming Data*. Volvo, Sweden, 2025. *Data stream learning with CapyMOA*. IJCAI, Jeju, South Korea, 2024.
Workshops	Time-Evolving Data Science / Artificial Intelligence for Advanced Open Environmental Science (TAIAO), Hosted by AI Institute, University of Waikato, [2021, 2022]
Talks	"Online Hyperparameter Optimization for Streaming Neural Networks", Cardiff University - Machine Learning Seminar, 2022
Guest Lecture	Advanced Topics in Stream Learning, University of Waikato, - Data Stream Mining (COMPX523 Masters Course), 2023
Program Committee Member	PC Member for the IJCAI Survey Track, 2024/2025 PC Member for the IJCAI Human-centred AI Special Track 2025, PC Member for the ECML-PKDD Research Track 2025 Conference committee member of the 2024 NZ Artificial Intelligence Researchers Association Conference and co-organised the PhD Forum
Board Member	New Zealand Artificial Intelligence Researchers Association, 2023-2024
Core maintainer	CapyMOA Stream Learning Platform

Honors & Awards

Awards and Achievements

2020-2024 **Research & Enterprise Study Award**, AI Institute, University of Waikato.
Three and half year scholarship is funded by the "*Entrepreneurial Universities - Real time analytics for Big Data*" project at AI Institute, University of Waikato.

References

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