# Nuwan Gunasekara

ng198002@gmail.com linkedin web github

## Summary

I am an AI researcher specializing in evolving data stream learning, focusing on advanced classification techniques like Neural Networks and Gradient Boosting. My work addresses critical challenges in Online Learning, including detecting and adapting to concept drifts in Stream Learning and mitigating catastrophic forgetting in Online Continual Learning for Neural Networks. I actively contribute to the open-source Massive Online Analysis (MOA) framework and have multiple publications. With a solid academic background, I bring ten years of industry experience in developing network capturing and analyzing tools and libraries. Explore my GitHub for accessible source codes.

## Research Publications

1. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, and A. Bifet, "Gradient boosted trees for evolving data streams," in *Machine Learning*, Springer (accepted), 2024.
2. **N. Gunasekara**, B. Pfahringer, H. M. Gomes, and A. Bifet, "Survey on online streaming continual learning," in *Thirty-Second International Joint Conferences on Artificial Intelligence (IJCAI)*, 2023.
3. **N. A. Gunasekara**, "Advanced adaptive classifier methods for data streams," Ph.D. dissertation, University of Waikato, 2023.
4. **N. Gunasekara**, H. Gomes, A. Bifet, and B. Pfahringer, "Adaptive neural networks for online domain incremental continual learning," in *Discovery Science (DS): 25th International Conference, Montpellier, France, October 10–12, 2022, Proceedings*, Springer, 2022, pp. 89–103.
5. **N. Gunasekara**, H. Gomes, A. Bifet, and B. Pfahringer, "Adaptive online domain incremental continual learning," in *31st International Conference on Artificial Neural Networks (ICANN), Bristol, UK, September 6–9, 2022, Proceedings, Part I*, Springer, 2022, pp. 491–502.
6. **N. Gunasekara**, H. M. Gomes, B. Pfahringer, and A. Bifet, "Online hyperparameter optimization for streaming neural networks," in *2022 International Joint Conference on Neural Networks (IJCNN)*, IEEE, 2022, pp. 1–9.
7. **N. Gunasekara**, S. Pang, and N. Kasabov, "Tuning n-gram string kernel svms via meta learning," in *Neural Information Processing. Models and Applications: 17th International Conference, ICONIP 2010, Sydney, Australia, November 22-25, 2010, Proceedings, Part II 17*, Springer, 2010, pp. 91–98.
8. **N. A. Gunasekara**, "Meta learning on string kernel svms for string categorization," M.S. thesis, Auckland University Of Technology, 2010.

## Source Code for Published Methods

Source code for publication [1]
Source code for publication [4]
Source code for publication [5]
Source code for publication [6]

## Memberships

- Tertiary Student Representative, New Zealand Artificial Intelligence Researchers Association.

## Employment History

2021 – · · · ·
**Research Assistant,** Artificial Intelligence Institute, University of Waikato.
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.
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*.

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

## Skills

| | |
|---|---|
| ML Frameworks | Pytorch, TensorFlow, Deep Java Library (DJL) by Amazon, Scikit-learn, Scikit-multiflow, MOA (Massive Online Analysis), Weka, Avalanche (Continual Learning), FLAML (AutoML) by Microsoft. |
| General Online ML Techniques | Neural Networks (MLP, CNN), Naive Bayes, Hoeffding Trees, One-Class Classifier, Logistic Regression, Bagging and Boosting |
| Drift Detection Techniques | ADWIN, DDM |
| Online Replay Buffer Techniques | Experience Replay with reservoir sampling. |
| Networking | TCP/IP, libpacp, Wireshark. |
| OS | Linux, FreeBSD, MacOS. |
| Coding | Java, C, Python, Shell scripting, ML algorithm development for GPUs, GNU Debugger, Valgrind |
| Languages | English and Sinhalese. |
| Misc. | Academic research, Academic writing, Tutoring. |

## Workshops and Talks

| | |
|---|---|
| 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 |

## Honors & Awards

### Awards and Achievements

2020 **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

**Professor Albert Bifet**
Director
AI Institute, University of Waikato.
abifet@waikato.ac.nz
+64 27 216 8779

**Professor Bernhard Pfahringer**
Co-Director
AI Institute, University of Waikato.
bernhard@waikato.ac.nz

**Dr. Heitor Murilo Gomes**
Assistant Professor/Lecturer in Artificial Intelligence
School of Engineering and Computer Science,
Victoria University of Wellington.
heitor.gomes@vuw.ac.nz
+6421 026 01285

**Dr. Guilherme Weigert Cassales**
Postdoctoral Fellow
AI Institute, University of Waikato.
guilherme.cassales@waikato.ac.nz
+64 20 4124 1768