Clement Nyanhongo

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Education

Dartmouth College, Thayer School of Engineering (*Expected August 2025)*
Degree: Ph.D. in Electrical and Computer Engineering
Advisor: Eugene Santos Jr.
Research Interests: Artificial Intelligence, Machine Learning, Human Factors

Dartmouth College (*June 2018*)
Degree: B.Eng. in Computer Engineering

Relevant Coursework: Numerical Methods of Computation, Artificial Intelligence, Network Science and Complex Systems, Operations Research, Deep Generative Models, Machine Learning, Logic and AI, Deep Learning, Probabilistic Systems, Full Stack Web Development, Statistics, Modern Information Technologies, Database Systems, Distributed Systems, Data Structures and Algorithms, Digital Electronics

Computer Skills: Python, Machine Learning (Pytorch, TensorFlow, Sklearn etc.), Bash, Distributed Computing

Industry Experience

JP Morgan Chase & Co, *Quantitative Research Summer Intern, New York* (*June – Sept 2023*)
Department: CIB, Wholesale Credit Quantitative Research Team

- Conducted research to quantify the relative impact of idiosyncratic and systematic climate factors on rate migrations in stochastic counterparty credit risk forecasting models.
- Developed a scalable lazy evaluation library to optimize array computations that utilize eager evaluation, by deferring operations until needed. Applied the library to several risk forecasting models and it outperformed vectorized NumPy and TensorFlow (graph) code in terms of time efficiency ($5-25\%$ improvement margin).

TerraClear Inc, *Student Researcher - Rock Map Design Project, Hanover NH* (*January – Sept 2018*)

- Developed image processing techniques to detect rocks from agricultural fields, using Gaussian filtering, and hierarchical clustering to pre-process field images before classification with convolutional neural networks.

Research Experience

Distributed Information and Intelligence Analysis Lab (Thayer School), *Graduate Research Assistant* (*2019 - Present*)

Research Overview: Developing algorithms to understand and explain human preferences using theoretical foundations from Inverse Reinforcement Learning, game theory, knowledge representation and deep learning. The goal is to infer a decision-making agent's intent; and provide prescriptive measures to enhance its future decisions.

Projects:

Clinical Decision Support for ICU Patient Outcomes (*2025 - Present)*

- Fine-tuning BERT-based models to extract rich embeddings from unstructured clinical data, such as the MIMIC-IV dataset, on patients admitted to emergency ICU centers.
- Leveraging sequential learning models (e.g., Transformers, LSTMs) to predict future patient ICU visits using embeddings of states (diagnosis history) and actions (procedures and prescriptions).
- Applying Inverse Reinforcement Learning (IRL) to infer reward distributions from trajectory data, enabling the clustering and identification of patient subgroups based on inferred treatment patterns and outcomes.

Improving Consistency in Learned Reward Models (*2023 - Present*)

- Investigating the robustness of learned reward functions against ambiguity, ill-definition, susceptibility to noise, and other forms of misspecification in Inverse Reinforcement Learning tasks.
- Studying computationally efficient techniques to preprocess and standardize reward functions without loss on task objectiveness (policy invariance); with applications such as Reinforcement Learning from Human Feedback (RLHF) in Large Language Models, and agent behavioral classification.

Multiagent Learning and Nonlinear Team Behavior (*2021 - Present*)

- Developing generalizable models to predict and evaluate complex team behavior, using Inverse Reinforcement Learning to capture individual and team preferences encapsulated by the computed rewards.

Accepted Publications

- **Clement Nyanhongo**, Bruno Miranda, Eugene Santos, "Reward Distance Comparisons Under Transition Sparsity". *Transactions of Machine Learning Research, TMLR*, 2025.

- Yakaboski, Chase, Gregory Hyde, **Clement Nyanhongo**, and Eugene Santos. "AI for Open Science: A Multi-Agent Perspective for Ethically Translating Data to Knowledge." In *NeurIPS 2023 AI for Science Workshop*. 2023.

- Santos, Eugene**, Clement Nyanhongo**, Hien Nguyen, Keum Joo Kim, and Gregory Hyde. "Contextual Evaluation of Human–Machine Team Effectiveness." In *Systems Engineering and Artificial Intelligence*, pp. 283-307. Springer, Cham, 2021.

- Santos, Eugene, Hien Nguyen, Keum Joo Kim, Gregory Hyde, and **Clement Nyanhongo**. "Validation of Double Transition Model by Analyzing Reward Distributions." In *2020 IEEE/WIC/ACM International Joint Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT)*, pp. 586-591. IEEE, 2020.

- Santos Eugene Jr. and **Nyanhongo Clement**, "A Contextual-based Framework for Opinion Formation" *Proceedings of the 32nd International FLAIRS Conference*, 62-67, Sarasota, FL, 2019.

In Preparation

- **Clement Nyanhongo,** Anthony Ragazzi, Eugene Santos, "Improving Reward Consistency Via Policy Invariant Canonicalization". *Conference on Neural Information Processing Systems,* Nuerips, 2025 (*Under Review*).

- **Clement Nyanhongo**, Bruno Henrique, Eugene Santos, "Robust Team Evaluation via Preferential Inverse Reinforcement Learning". *Association on Artificial Intelligence*, AAAI, 2025 (*Awaiting Submission*).

Awards, Honors and Leadership

- NSF Data Science in STEM Fellow – Awarded a 6-month fully-funded fellowship to teach data science to undergraduate students with non-STEM backgrounds (Jan –June 2020).
- ICML 2022, AAAI 2020 Conference Travel Award Grants (Black in AI).
- Academic citations for Meritorious Performance: Engineering Software Design (ENGS 65), Logic and AI (COSC 189)
- Dickey Center Student Fellowship – Awarded a summer fellowship to work as an engineering intern at a waste-water treatment company in The Gambia (Agua Inc) in 2016.
- Joshua Nkomo Scholarship Recipient- Awarded to the top 50 high school academic achievers in Zimbabwe.
- United States Achievers Program - Selected in a leadership fellowship program to train leaders who give back to their communities. About 30 (out of 5000) students are selected from Zimbabwe and are supported in US college applications.

Teaching Experience

- Teaching Assistant - Machine Learning (ENGS 108), Operations Research (ENGS 108), Numerical Methods of Computation (ENGS 92), Statistics (ENGS 93), Software Development (COSC 50).

Extracurricular Activities

- Societies and Clubs: National Society of Black Engineers (NSBE), Black in AI, Sigma Xi, IEEE
- Voluntary project - Drafted and set up a poultry farm project in Nicaragua through a non-profit organization, Bridges to Community (2018).