AGGREY MUHEBWA

151 Holdsworth Way, Amherst, MA 01003
amuhebwa@umass.edu ◇ linkedin.com/in/amuhebwa ◇ amuhebwa.github.io

RESEARCH INTERESTS

I leverage machine learning (ML) and satellite data in order to support critical infrastructure (e.g., roads, electricity grid, and water resources) measurement and analysis , sustainable development, and understand the effect of anthropogenic climate change on water resources and the resulting impact on key sectors like clean energy generation, agriculture and transport.

EDUCATION

University of Massachusetts - Amherst, USA August 2018 - Feb 2023 (Expected)
Ph.D. in Electrical and Computer Engineering
Focus: Applied Machine Learning, Data Science | Advisor: Prof. Jay Taneja

Carnegie Mellon University August 2016 - Dec. 2017
Masters of Science in Electrical and Computer Engineering
Focus: Applied Machine Learning, Data Science

Makerere University, Uganda August 2009 - April 2013
Bachelor of Science in Computer Engineering

WORK EXPERIENCE

Graduate Research Assistant August 2018 - present
University of Massachusetts, Amherst, MA

- **Global River Discharge Prediction using Satellite Data**: 1, 2, 3: Developed a novel approach for modeling temporal-spatial data to train ML models for predicting daily river discharge in regions with limited to no training data. Models trained with this approach out-performs current SOTA models in hydrology. Created tools to make ML models trained on stochastic data more fair and explainable (Explainability, bias detection and mitigation)
- **Road quality measurement using satellite data**: 5, 6. Developed Machine learning and statistical tools to improve road quality measurement using remotely sensed data. Currently working on leveraging limited, region-specific data to mitigate bias emanating from transfer learning
- **Tools to support Electricity demand stimulation**: 4 Built software tools to understand movements of fishing boats as a way of optimizing peak charging periods (on solar mini-grids) of converted electric fishing boats (In collaboration with Equatorial Power Limited)

Intern, Machine Learning May 2020 - August 2020
Atlas AI - Palo Alto, CA

- Worked on building an end-to-end machine learning system to investigate the impact of spatial anonymization on the performance of ML models. This helps key stakeholders to understand the impact of different data anonymization techniques and how they affect performance of ML models used to predict metrics for Sustainable Development Goals (e.g., wealth index)

Visiting Scientist (Structured Experiments) July 2018 - August 2018
Merck, Sharp & Dorme (MSD) - Prague, Czech Republic

- Prototyped an IoT-enabled smart tag for detecting onset of estrus cycles in cows by leveraging machine learning and animal movement patterns

Graduate Teaching Assistant August 2017 - May 2018
Carnegie Mellon University

- Teaching Assistant for 4 classes; Introduction to Deep Learning, Big Data Analytics, Introduction to Data Science and Applied Machine Learning.

Fullstack Software Engineer Jan 2015 - July 2016
Grameen Foundation - Kampala, Uganda

- Developed an end-to-end software system (mobile application, API, and Web application) currently used by Barclays Bank to monitor financial transactions of Village Savings and Lending Associations (VSLAs). This improved the credit scoring process for the unbanked and underbanked communities through understanding their financial behaviors in village SACCOs

Software Engineer (Data Mining, Mapping & Search July 2013 - Dec 2014
Mountbatten Limited - Kampala, Uganda

- Improved performance of DevTrac, a web application used by UNICEF to track location & status of local amenities in Uganda by building custom drupal modules to integrate external data sources and improve geospatial search. This improved probability of positive search results by more than 40%

SKILLS

Python, Machine Learning (Tensorflow, Keras, and Pytorch), Data Science, Data Mining, Software Development

SELECTED PUBLICATIONS

1. **Aggrey Muhebwa**, C.J. Gleason, Dongmei Feng, and Jay Taneja. Towards Fair and Explainable Physics Guided Machine Learning Models in Hydrologic Sciences [under review]
2. **Aggrey Muhebwa**, C.J. Gleason, Sungwook Wi, Dongmei Feng, and Jay Taneja. Moving toward machine learning with distributed training data [under review]
3. **Aggrey Muhebwa**, Sungwook Wi, Colin J. Gleason and Jay Taneja. "Towards Improved Global River Discharge Prediction in Ungauged Basins Using Machine Learning and Satellite Observations." In the Machine Learning and the Physical Sciences workshop at NeurIPS 2021
4. June Lukuyu, **Aggrey Muhebwa**, and Jay Taneja. Fish and Chips: Converting Fishing Boats for Electric Mobility to Serve as Minigrid Anchor Loads. In The Eleventh ACM International Conference on Future Energy Systems (e-Energy'20), June 22–26, 2020, Virtual Event, Australia
5. Gabriel Cadamuro, **Aggrey Muhebwa**, and Jay Taneja. "Street Smarts: Measuring Intercity Road Quality Using Deep Learning on Satellite Imagery." In the Second ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS 2019), July 2019.
6. Gabriel Cadamuro, **Aggrey Muhebwa**, and Jay Taneja. "Assigning a Grade: Accurate Measurement of Road Quality Using Satellite Imagery." In the NeurIPS Workshop on Machine Learning for the Developing World (ML4D '19). December 2018.
7. Durand, M., Gleason, C. J., Pavelsky, T. M., de Moraes Frasson, R. P., Turmon, M. J., David, C. H., **Muhebwa, A** and Wang, J. (2022). A framework for estimating global river discharge from the Surface Water and Ocean Topography satellite mission. Authorea Preprints.

SELECTED TALKS AND PRESENTATIONS

- One Model to Rule Them All: A Ubiquitous Data Modeling Approach to Improved Temporal-Spatial Learning of Physics Guided Machine Learning Models in Hydrology (Oral Presentation). In The American Geophysical Union(AGU) Fall Meeting, 10 - 16 December 2022, Chicago, IL.
- Towards Remote River Discharge Prediction Using Machine Learning and Satellite Observations under Data Scarcity (Oral Presentation). In The American Geophysical Union(AGU) Fall Meeting, 13 - 17 December 2021, New Orleans, LA
- Global River Discharge Prediction in Ungauged Basins Using Machine Learning and Satellite Observations (Oral Presentation). HydroML Symposium, 18 - 20 May, 2022, , Penn State University, PA

AWARDS AND SCHOLARSHIPS

- United Nation's Intergovernmental Panel on Climate Change (IPCC) Scholar (2021-2023)
- Meta (Facebook) Uniting Scholars in Research Recipient (Oct. 2022)
- Google CS Research Mentorship Program Fellow (Class of 2021B)
- College of Engineering Teaching Fellow, University of Massachusetts - Amherst (2020)
- Dean's Fellowship recipient, University of Massachusetts - Amherst (2018-2019)
- Winner, Inter-University African Grand Challenge in Technology (2018)
- Innovators Founders Fellowship Fund recipient (2016-2017)

TEACHING

- Instructor for Ethics, Opportunities and Responsibilities of Artificial Intelligence University of Massachusetts - Amherst (Fall 2020)