

# STEVEN KOLAWOLE

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## RESEARCH INTEREST

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Exploring efficiency problems in Machine Learning from algorithms, methods, data, and system perspectives.

## EDUCATION

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**(incoming) Ph.D.**, Carnegie Mellon University 2023 -

Language Technologies Institute, School of Computer Science

**BSc.**, Federal University of Agriculture Abeokuta, Nigeria 2017 - 2023

Department of Computer Science; CGPA: 4.24 / 5.0

## RESEARCH EXPERIENCE

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### Independent Researcher

*ML Collective*

#### - Co-Lead Investigator

*in submission ([preprint](#))*

- Vision Transformers for Edge Devices - An Overview.

*Fall 2022*

- **Collaborators:** Nahid Alam, Cisco Meraki; Simardeep Singh Sethi, IIT-Delhi; Nishant Bhansali, IIT-Roorkee; Karina Nguyen, UC Berkeley.
- **Summary:** Studied and categorized Vision Transformers differently based on their architectures, focusing on the Vision Transformers targeted for edge devices; Analyzed what methods enabled ViTs to reduce model parameters and increase inference speed; Compared and contrasted the architectural differences to understand which specific changes make a ViT more suitable for mobile devices.

#### - Co-Lead Investigator

*in submission ([preprint](#))*

- Evolutionary Federated Learning using Particle Swarm Optimization.

*Apr 2022 - pres.*

- **Collaborators:** Ender Minyard, Columbia University; Nayan Saxena, University of Toronto; Dr. Akhil Mathur, Nokia Bell Labs - Cambridge.
- **Summary:** Explored how evolutionary-based algorithms, as a second-order method, can improve communication efficiency in Federated Learning (FL); Introduced a novel FL algorithm that uses particle swarm optimization to minimize costs and speed up training time, better than gradient-based learning; implemented versions of NEAT and simulated annealing for our development iterations; built the client-server architecture.

#### - Lead Investigator

*The Thirty-First International Joint Conference on Artificial Intelligence ([IJCAI-22](#))*

- Sign-to-Speech Model for Sign Language Understanding

*Apr 2021 - Mar 2022*

- **Advisor:** Dr. Babatunde Olorisade, Senior Lecturer of Data Science, Cardiff Metropolitan University
- **Summary:** Created a pioneer sign language dataset for a sub-Saharan African country to develop a real-time sign-to-speech translation system to reduce the communication barrier between the hearing-impaired community and the larger society in sub-Saharan Africa - the region with the most hearing disabilities cases; performed the YOLO, SSD, and classification modeling experiments using TensorFlow and Pytorch.

### Research Assistant

*German Research Centre for Artificial Intelligence (DFKI)*

Research Interest: Continual learning on resource-efficient pre-trained models

*Fall 2021*

- **Advisor:** Nils Rethmeier, PhD Researcher, DFKI.
- **Summary:** Investigated the performance accuracy and efficiency of resource-efficient pre-trained models (CLESS) against large, self-supervised models when fine-tuned on fine-grained tasks; Reviewed literature and performed downstream tasks (i.e., Ultra-Fine Entity Typing) on CLESS.

## SELECTED INDEPENDENT COURSEWORK

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- MIT 6.S965: TinyML and Efficient Deep Learning Computing, *MIT Han Lab*

- Deep Learning Specialization, *Deeplearning.ai*
- CS 11-747: Neural Networks for NLP, *Carnegie Mellon University*
- TensorFlow: Advanced Techniques Specialization, *Deeplearning.ai*

## TECHNICAL STRENGTHS

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|-----------------------------|---|
| <b>Machine Learning</b>     | Scikit-Learn, TensorFlow, Pytorch, OpenCV, NLTK.                      |
| <b>Data Science</b>         | SQL, Pandas, Matplotlib, Seaborn, Folium, Plotly, Tableau, Streamlit. |
| <b>Software Engineering</b> | FastAPI, Flask, Django, GraphQL, SQL, ElasticSearch, Docker, CI/CD.   |
| <b>Others</b>               | Open-Source Development, Web Scraping, Cloud Computing with GCP.      |

## WORK EXPERIENCE

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**Founding Machine Learning Engineer** 2022  
*ASAnalytics (now Nazari)*

- handling the backend engineering of ASAnalytics, a dynamic opinion mining platform/app for digital assets on the Algorand blockchain with real-time analytics and data scraping from social media platforms (Twitter, Reddit, and GitHub) - enables users to understand the degree of hype/fear around a specific digital asset;
- building with my friends with \$115k funding from the Algorand Foundation.

**Data Science Intern** 2021  
*SeqHub Analytics LLC* *New Haven, CT*

- Fine-tuned mT5 for machine translation on low-resource Nigerian ethnical languages;
- Worked on new capabilities as microservices for the company's flagship conversational AI agent modeled as a teaching assistant - including a teacher-student report's edit prediction functionality using Levenshtein Distance;
- Built a dockerized dashboard app that automates the analytics part of the firm's Emotional Analytics workflow boosting development speed by 45%.

**Data Scientist (Contract)** 2020 - 2021  
*ScityLana NG* *Lagos, Nigeria*

- Under NDA. Worked on projects ranging from propensity modeling to end-to-end Machine Learning applications built from start to finish single-handedly.

**Machine Learning Intern** 2020  
*Rural Farmers Hub* *Abuja, Nigeria*

- Annotated farm boundaries via satellite imageries;
- Built a model using Forest algorithms for soil nutrient-sensing for NPK to predict the best crops to grow on certain soils with up to 87% accuracy.

**Software Engineering Intern** 2019  
*HNG Internship*

- Built DB models & API endpoints for authentication, reviews, & file storage (in Amazon S3) for app usage;
- Implemented a Trainer SDK to correct exercise postures using Geometric algorithms and OpenPose pretrained model.

## HONORS, AWARDS & RECOGNITION

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**AI Champion, Nigeria Computer Society's AI Summit 2022** Won the first place position in the AI Challenge with my project on sign-to-speech, solving a genuine societal problem with an original and reproducible solution.

**2nd Best Poster Award, Data Science Nigeria's AI Bootcamp 2021** Won a poster award for my research project, "Driving an inclusive society: Sign-to-Speech modeling for Sign Language Understanding."

**Winner, DeepQuest AI Challenge 2021** Built an end-to-end working prototype that uses Object Detection to detect sign language meanings in videos and generate an equivalent voice of words communicated by the signs.

**Scholar, MTN Foundation Science & Technology Scholarship Scheme 2020, 2021** Recognizes and rewards the academic excellence of high-performing, low-income full-time students studying in public tertiary institutions in Nigeria. *Success rate: 1.8%*

**1st Runner-up, Mr. Algorithm Award, Data Science Nigeria AI Bootcamp 2020** Recognizing “the most outstanding male starlet in Nigeria’s AI community who not only strives to be the best in Artificial Intelligence but also invests in others through knowledge sharing.”

**Fellow, The Young Professionals Bootcamp 2020 (YPB)** is an in-residence program for high-potential 20-25-year-olds to learn world-class practical training, inspire innovation, drive success in the marketplace and ultimately lead to the transformation of the Nigerian economy. *Selection rate: 3.6%*

**Finalist, “Can You Hack the Future” Ideathon 2020** Built a collaborative-based Recommender System that predicts the nearest locations in need of transport for bike-hailing companies’ riders in Lagos. *Rank: 5 / 40 teams.*

**Gold Medal Winner, NaijaHacks ‘19** One of the two AgroAI team members that built a mobile application that helps farmers detect plant diseases using Computer Vision. *Rank: top 12 / 336 teams at the final Expo day.*

## SELECTED TALKS

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**2022 NeurIPS Workshop on Broadening Research Collaborations, C4AI Independent Research Panel** Giving talks on how I have been able to thrive as an independent researcher and secure collaborations successfully.

**ML Efficiency Workshop, Deep Learning Indaba 2022** Gave a talk on my project, “*Minimizing Communication Costs in Decentralized Federated Learning using Mutable Torrents.*”

**EuroPython Dublin ‘22, Berlin Buzzwords ‘22** Gave talks on “*Open Science: Building Models like we build Open-source Software.*”

**IJCAI Conference 2022 & NeurIPS 2021’s ML4D Workshop** Delivered oral presentations of my accepted paper “*Sign-to-Speech Model for Sign Language Understanding: A Case Study of Nigerian Sign Language.*”

**Lanfrica Talk Series, Deep Learning Indaba 2022, SciPy Conference 2022, Build Stuff 2022, PyConDE & PyData Berlin 2022, Blackathon 2022, Python Web Conference 2022, Nigeria Computer Society’s AI Summit 2022, Masakhane Speaker Series 2021, PyData Global 2021** Gave several talks from different angles/perspectives on my award-winning project, “*Sign Language Understanding in sub-Saharan Africa.*”

**MLCollective’s Open Collab Research Jam #3, #4 & #5** Presented progress on my research in sign language understanding for low-resourced African sign languages.

**PyCon APAC 2021, EuroPython 2021, Python Web Conference 2021, Conf42 Python 2021, PyData Global 2020, PyCon Africa 2020** Delivered several talks on: “*Streamlit: The Fastest Way to build Data Apps.*”

## SELECTED COMMUNITY SERVICES

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- **Community Lead, Google Developer Students Club, FUNAAB** Organized technical & soft-skills training impacting over 3000 students to bridge the gap between learning and becoming industry-grade. Personally taught more than 600 students on various topics across machine learning, data science, and technical skills needed to function in an industrial setting. (2021 - 2022)
- **Data Science Mentor, She Code Africa Mentorship Program** Prepared an immersive, intermediate-to-professional curriculum for female mentees across Western Africa and mentored them, with 90% of my mentees now working professionally across the data science sphere. (2020 - 2021)
- **Campus Lead, Artificial Intelligence Plus, FUNAAB** Transformed AI+ FUNAAB from a nascent club to becoming a top 3 students AI communities in Nigeria - due to which FUNAAB was the African school with the highest number of undergrad researchers participants (9) at the 2022 Deep Learning Indaba. (2019 - 2021)
- **Deputy City Lead - Abeokuta, Data Science Nigeria** On my watch, AI+ Abeokuta won the “AI City of the Year” award at Data Science Nigeria’s AI Bootcamp 2020 - I was nominated for the Mr. Algorithm award for my efforts in knowledge sharing. (2020)

*Updated in: February, 2023*