

STEVEN KOLAWOLE

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RESEARCH INTEREST

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

EDUCATION

BSc. in Computer Science, Federal University of Agriculture Abeokuta, Nigeria

2017 - 2023

CGPA: 4.24 / 5.0

RESEARCH EXPERIENCE

Co-Lead Investigator

in review (*preprint*)

Vision Transformers for Edge Devices - An Overview.

2022

- **Collaborators:** Nahid Alam, Cisco Meraki; Simardeep Singh Sethi, IIT-Delhi; Nishant Bhansali, IIT-Roorkee; Karina Nguyen, UC Berkeley.
- **Summary:** We study and categorize Vision Transformers differently based on their architectures, focusing on the state of Vision Transformers targeted for edge devices. Since Transformers are more resource-intensive, we analyze how recent works reduce model parameters and increase inference speed. We compare and contrast the architectural differences to understand which specific changes make a ViT more suitable for mobile devices.
- **Duties:** Reviews literature; compare architectures algorithms - create tables and charts; writing.

Co-Lead Investigator

in review (*preprint*)

Evolutionary Federated Learning using Particle Swarm Optimization.

2022

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

Lead Investigator

The Thirty-First International Joint Conference on Artificial Intelligence (IJCAI-22)

Sign-to-Speech Model for Sign Language Understanding: A Case Study of Nigerian Sign Language

2021 - 2022

- **Advisor:** Dr. Babatunde Olorisade, Senior Lecturer of Data Science, Cardiff Metropolitan University
- **Summary:** Developed a lightweight sign-to-speech machine learning application that works in real-time to reduce the communication barrier between the hearing-impaired community and the larger society, focusing on sub-Saharan Africa, the region with the most hearing disabilities cases.
- **Duties:** Conceptualized the research idea; facilitated the creation of low-resource sign language datasets; reviewed literature; performed the YOLO, SSD, and classification modeling experiments using TensorFlow and Pytorch; built the application using Pyttsx3 and Deepstack; wrote the research paper draft.

Research Assistant

German Research Centre for Artificial Intelligence (DFKI)

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

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.
- **Duties:** Reviewed literature and performed downstream tasks (i.e., Ultra-Fine Entity Typing) on CLESS.

HONORS, AWARDS & RECOGNITION

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.*

TALKS

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.*"

TECHNICAL STRENGTHS

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

WORK EXPERIENCE

Founding Machine Learning Engineer

2022

ASALytics (now Nazari)

- handling the backend engineering of ASALytics, 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.

VOLUNTEERING & COMMUNITY SERVICES

- **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** Led AI+ FUNAAB from being a nascent AI community 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)