MARDIYYAH ODUWOLE

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RESEARCH INTEREST

I am a Machine Learning Researcher with a strong focus on Multilingual Natural Language Processing (NLP) and Machine Learning Efficiency. My research goal is to make language technologies accessible to underserved communities, particularly in the Global South, where access to computational resources is limited.

EDUCATION

B.Sc Computer Science, National Open University of Nigeria 2020-2023

B.Ed Chemistry, University of Ibadan 2017-2021

RESEARCH EXPERIENCE

Lead Investigator September 2022 - Present
African Sign Language *In Progress*

- Advisors: Isabelle Guyon (Google Research), Megumi Sano (Google Translate), Birhanu Haliu (Paris-Saclay University)
- Summary: Exploring the similarities between low-resource African sign languages and high-resource sign languages like British and American sign languages, and building a sign language transformer for African sign languages.

Independent Researcher *ML Collective & Masakhane*

- **Co-Lead Investigator** August 2024 - Present
  African Multilingual Multimodal Dataset *In Progress*
  - Collaborators: ML Collective-NG; Prince Mireku, Oluwatosin Olajide, Fatimo Adebanjo
  - Summary: Developed a dataset of image-text pairs across a diverse set of African languages and designed a pre-trained vision-language model aimed at surpassing state-of-the-art performance on the image captioning task, specifically tailored to the African context. This project, if successful, will release a multimodal dataset **4X larger** than the currently available ones.
- **Co-Lead Investigator** January 2024 - July 2024
  Data Augmentation in African Machine Translation *In Submission*
  - Collaborators: ML Collective-NG; Oluwatosin Olajide, Faith Hunja, Jamiu Suleiman et al.
  - Summary: Investigated the impact of Switch-out and Sentence Concatenation data augmentation techniques on machine translation for under-resourced African languages, addressing the challenges posed by linguistic diversity and data scarcity.
- **Lead Investigator** December 2022 - January 2024
  What Happens When Small Is Made Smaller? Exploring the Impact of Compression on Small Data Pretrained Language Models *AfricaNLP Workshop, ICLR 2024*
  - Collaborators: Steven Kolawole (Carnegie Mellon University), Busayo Awobade (ML Collective)
  - Summary: Examined the impact of model compression on model size, inference time, and performance metrics beyond accuracy for low-resource language models. We identified the efficiency-accuracy trade-offs and generalization capabilities of compressed models by testing various compression methods such as pruning, knowledge distillation, and quantization on the small-data language model, AfriBERTa. This work provides insights into the effectiveness of different compression techniques for low-resource language models.

- **Contributor** April 2023 - October 2023
  A Robust Regularized Extreme Learning Machine for Regression Problems Based on a Self-Adaptive Accelerated Extra-Gradient Algorithm *arXiv*
  pre-print
  - Advisors: Lateef Jolaoso (Southampton University), Muideen Adegoke (University of Hertfordshire)
  - Summary: Solved the minimization problem from a variational inequalities perspective, leading to improved algorithms more efficient than FISTA. Developed a fast general extra-gradient algorithm with inertial acceleration techniques and variable step size. The algorithm's strong convergence and linear convergence rate were established under mild conditions.

- **Contributor**
  MasakhaNEWS: News Topic Classification for African Languages *IJCAI-AACL, 2023*
  - Collaborators: Masakhane; Adelani David Ifeoluwa (McGill University), Odunayo Ogundepo, Marek Masiak, et al.
  - Summary: Introduced MasakhaNEWS, a benchmark for classifying news topics across 16 African languages. We tested baseline models and refined language models for zero-shot and few-shot learning. ChatGPT excelled in zero-shot classification, achieving a 70 F1 score unsupervised. With minimal training (10 samples per label), we reached an 86.0 F1 score, close to the fully supervised score of 92.6, demonstrating advancements in NLP for under-resourced languages.

- **Contributor**
  Masakhane-Afrisenti: Sentiment Analysis using Afro-centric Language Models and Adapters for Low-resource African Languages. *SemEval-2023 Task 12*
  - Collaborators: Masakhane; Tosin Adewumi, Oreen Yousuf et al.
  - Summary: In SemEval-2023's AfriSenti-SemEval Shared Task 12, enhanced sentiment classification in 12 African languages using Afro-centric and multilingual pre-trained models and efficient Adapter methods for zero-shot tasks. Our approach significantly improved results for low-resource languages and showed promise in zero-shot learning with minimal resources.

ENGINEERING EXPERIENCE

Machine Learning Engineer June 2022 - June 2023
Prunedge Development *Lagos, Nigeria*

- Built an opinion mining tool to help clients understand public sentiments toward Nigeria's 2023 general election using Flask and TensorFlow.
- Led a team to build a facial age estimation model using PyTorch.
- Built a chatbot that reduced late replies by customer service representatives by 70%.
- Enhanced the chatbot by integrating OpenAI's API and Flask to eliminate wait time for customers with complaints.
- Built an e-commerce recommendation system to help businesses leverage customer information based on user- and content-based recommendation systems.

Data Scientist November 2021 - March 2022
Zummit Africa *Lagos, Nigeria*

- Worked with a team of data scientists to develop and evaluate deep learning models across various business applications.
- Built an emotion detection model with an accuracy of over 75% using TensorFlow and deployed it to a web application.

Junior Data Scientist August 2021 - November 2021
Zummit Infolabs *Bangalore, India*

- Studied new technologies to support machine learning applications.
- Used the YOLOv5 PyTorch library to train a fake smile detector deployed in a customer relationship management system.
- Transformed raw data into a format that conformed to the expected inputs of deep learning algorithms.

ACCOMPLISHMENTS, AWARDS, RECOGNITION AND FELLOWSHIPS

- Winner, Poster Award at Deep Learning Indaba 2023: Showcased my research work, "What Happens When Small Is Made Smaller," at the 2023 edition of Deep Learning Indaba and won an award for this.
- Winner, Ideathon Award at Deep Learning Indaba 2022: Participated in an ideathon challenge at Deep Learning Indaba 2022. My teammates and I were one of the 10 teams that received the award, which came with mentorship from top researchers at Google and compute from the CURE team.
- Top 10 Female Data Scientists in Nigeria, 2020 2021: Participated in Data Science Nigeria's AI Bootcamp Qualification hackathon in 2020 2021 and qualified as one of the top 10 female participants out of 400 data scientists.

LEADERSHIP AND COMMUNITY SERVICE

Reviewer 2023, 2024
Tiny Papers, International Conference on Learning Representations

- Actively contributed to making research more accessible and approachable for researchers from underrepresented backgrounds by reviewing papers that align with the workshop's objective of creating diverse and complementary research avenues.
- Played a crucial role in enhancing the quality of submissions through detailed and constructive feedback, aiding in the broader dissemination of new ideas and findings in machine learning.

Co-Technical Lead, Data Science/ML 2022 - 2024
She Code Africa

- Provided guidance and resources for African women transitioning into Machine Learning, ensuring a smooth and confident entry into the field.
- Facilitated an inclusive and supportive haven for African women in Machine Learning, enabling skill development and empowerment in the face of social prejudices and systemic barriers.

Core-Team Member 2021 - 2022
Data Scientist Network FUNAAB *Abeokuta, Nigeria*

- Organized meetups and co-facilitated data science training.
- Mentored over 30 AI newbies in FUNAAB to help them kickstart their ML careers in 2021 2022.
- Organized bi-monthly research paper review sessions.
- Reviewed research papers for other research-captivated members.

AI Invasion Facilitator July 2021
Data Science Nigeria

- Co-facilitated an introductory Python/ML course for a week, helping about 40 ML enthusiasts find their feet in ML.