Olayinka V. Olowe

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Education

Joseph Ayo Babalola University, Osun-State, Nigeria — January 2017-August 2019
Bachelor of Science with Honours
Specialization: Major of Computer Science

Highland College of Technology, Ibadan, Oyo-State, Nigeria — October 2015-August 2017
National Diploma with Honours
Specialization: Computer Hardware Engineering

Publications

O. V. Olowe, and M. Adebowale. *Charis-Data: An Intelligent Database System Using BERT Model as NLP Technique.* [Short Paper]. Appeared in Nigerian Computer Society Data Science Summit, 2020

O. V. Olowe. *Natural language Interface to Database Systems NLIDBs*. Appeared in Nigerian Computer Society Data Science Summit, 2019 (NCSDSS '19). [Papers Link Here]

On-Going Work

Nural: Intelligent Tutoring Agents Using Deep Learning.

Presentations

Charis-Data: Intelligent Agents to facilitate Database System. [Co-presented with Dr. Adebowale Matthew]. JABU Computer Science Undergraduate Research Conference, 2020.

Natural language Interface to Database Systems NLIDBs. Appeared in Nigerian Computer Society Data Science Summit, Social Impact Session, 2019 (NCSDSS '19).

JABU Computer Science Undergraduate Program Evaluation and Renewal. [Co-presented with Dr. Afeni Damola]. JABU Centre for Data and Technology Research, 2019.

Solar-powered Battery Storage System for Robot. HCT Software & Hardware Engineering Exhibition, 2017.

Research Experience

Seedbuilders Foundation Research Lab — March 2023-Present
Working on *Intelligent Tutoring System* as lead researcher.

- Contributed to the project ideation and conceptualization by integrating the application of the necessary AI methodologies, implemented the knowledge-based repository, which houses subject-specific information and expertise.
- Inspired by real-world problems with students learning experiences seen in my past work experience and defined my research problem on intelligent agents for NLIDBs, by identifying the knowledge gaps in the existing work.
- Implemented natural language processing (NLP) techniques to enable seamless communication and interaction between the agents and students.
- Contributed to the development and implementation of AI and machine learning algorithms for the intelligent tutoring agents. Ensuring the agents are capable of adaptive and personalized learning, catering to the unique needs and learning styles of individual students.
- Optimized the agents' interface, navigation, and interaction mechanisms to ensure they are intuitive, accessible, and inclusive.

JABU Centre for Data and Technology Research Lab with Dr. Adebowale Matthew — Summer 2019
Worked on *Charis-Data: An Intelligent Database System Using BERT*.

- Designed the user interface and interaction models to ensure a seamless and intuitive experience for users.
- Design the API (Application Programming Interface) to serve as an intermediary between the web Interface and the database.

- I designed and developed a web application as a data visualizer to give the non-technical user a friendly way to interact with the data, like asking English sentence like query.
- Worked with another undergraduate student to collect and preprocess relevant datasets for training and testing the NLI system and developed the query generator that interpret the inputted natural language to SQL for the database.
- I identified knowledge gaps in the existing work, defined and scoped the research problem, analyzed the workload data, implemented the deep learning models, ran the experiments, discussed the results, and wrote the paper.

Grad Course Projects

CSB 435C Data for Social Impact with Dr. Afeni Damola Spring 2019

- Partnered with two graduate students from Salforld University, UK and worked on a research project on studying the impact of Search Engine Optimization (SEO) on small businesses, and SMEs in Africa.
- Defined the specific aspects of SEO impact on small businesses that need exploration, such as increases in web traffic, conversion rates, or improved rankings in search engine results pages (SERPs).
- Executed the collection of data which involved reaching out to small business owners for interviews, distributing surveys, and analyzing website traffic data.
- Analyzed the collected data using statistical analysis or and identified major patterns, trends, and insights.

CSB 437 Business Computer Information Systems with Dr. Afeni Damola Spring 2019

• Used difference-in-difference and fixed effects to evaluate the impact of online store platform ads policy changes on incentivized purchases in electronic and products and devices, e.g., phones, batteries and screen protectors. • Applied NLP techniques, e.g., TFIDF, n-grams, for matching and sentiment analysis.

- Proved and validated with robustness check that after Jumia's ban on incentivized purchases, the number of unnatural purchase maintained while their characteristics became more similar to natural purchase, providing a proof-of-concept for evaluating platform-wide policy effects.

Industry Experience

Miva Open University – a subsidiary of **Ulesson** December 2022-Present

Technical Product Manager/R&D

- Assigned to the Miva project – Nigeria's first online university, I helped Implement and integrate the platform learning management system LMS using technologies such as C#, JavaScript, SQL, ASP .NET
- Designed and incorporate intelligent algorithms into the LMS, to make automated course recommendations based on user's metadata.
- Leading R&D efforts to innovate and incorporate new technologies like AR/VR, ML, and gamification into educational products.

Other Experience

National Economics Society (NES) - NYSC, *IT Specialist* February 2020-January 2021

CGC Nigeria LTD - Intern, *IT Generalist* Summer 2018

Awards

2022 Seedbuilders Foundation AIforSDG Hackathon – #300,000 ($1,500)
2019 JABU Centre for Data and Technology Research Award – #20,000 ($100)

Community/ Association	Black in AI, San Francisco – *Member*	June 2024
	Abuja City AI & Blockchain Society , *Meetup Organizer (Volunteer)*	April 2022
	Nigeria Association of Computer Science – *Associate member*	June 2020
	JABU Computer Science Department Excos – *Executive*	March 2019
	National Youth Service Corp (NYSC), Batch C – *Executive*	November 2019-October 2020

References

Dr. Adebowale Matthew
Professor at JABU, Centre for Data and Technology Research, **Email:** adebowale@cdtr.org.ng

Dr. Titi Azeez
Associate Professor of Computer Science at Joseph Ayo Babalola University, **Email:** tt@cdtr.org.ng

Dr. Olaolu Isong
Head, R&D, Seedbuilders Foundation, **Email:** laolu@seedbuilders.com.ng

Dr. Afeni Damola
Assistant Professor at JABU, Centre for Data and Technology Research **Email:** dafeni@cdtr.org.ng

Statement of Objectives

In the pursuit of harnessing scientific breakthroughs in computer science to advance fields such as education and promote global sustainability, my driving question is: How can we leverage advancements in machine learning and artificial intelligence (AI) to achieve sustainable education? This question underscores my motivation to pursue a Ph.D. in Computer Science. As we endeavor to achieve the United Nations Sustainable Development Goals (SDGs), particularly Goal 4 of ensuring quality education, which is critical in achieving the other goals, it is evident that sustainable education is pivotal. Quality education, aligned with the principles of the SDGs, encompasses accessibility, adaptability, and longevity. Leveraging information technology, particularly AI and machine learning, holds immense potential in transforming education into a sustainable entity. Through the development of intelligent tutoring systems, personalized learning experiences can be facilitated, resource allocation optimized, and continuous improvement in educational outcomes achieved. The goal of an intelligent tutoring system (ITS) would be to engage the students in sustained reasoning activity and to interact with the student based on a deep understanding of the students' behavior. If such systems realize even half of the impact of human tutors, the payoff for society promised to be substantial. My aspiration is to contribute to this vision by advancing intelligent tutoring systems through interdisciplinary insights, rigorous research, innovative methodologies, and collaborative efforts, thereby empowering learners worldwide and catalyzing positive societal change.

Discovering My Research Interests. With a focus on intelligent systems and database, my research journey began during my undergraduate as a student researcher under Dr. Adebowale Matthew at the Centre for Data and Technology Research, Joseph Ayo Babalola University – a Premier Academic Research Institute. The need of an intelligent agent to serves as an intermediary between non-technical user and the database to fetch query results is crucial. Instead of using technical data query languages such as SQL, Users can easily query their database using natural language (NL). I presented an approach to database querying that builds on intelligent agent techniques and provides an interface for inputting queries in natural language and visualize the query results. This work led to my undergraduate research project and first paper I wrote, *Natural Languages Interface to Database Systems (NLIDBs'19) and Charis-Data: An Intelligent Database System Using BERT Model as NLP Technique* respectively. My main contributions include identifying the limitations in the existing methods, implementing the existing and our query methods, and running the experiments. The work experienced a few submissions. Which at first I felt discouraged, although I learned to reflect and was encouraged by how much our work had improved after each corrections. I also enjoyed my experience in research more than the industry for the autonomy and ownership over my work. However, I had some burning questions regarding my research interests going forward. Although I was engaged by the technical aspects of solving open-ended problems, I wanted to find something that would really excite me – what is the thing that would get me out of bed every morning? And how could I find it?

My work as R&D at Ulesson (an EdTech Company), which was to deliver an innovation in online learning experience and it mission to provide accessible, affordable and quality education, helped me answer those questions. Working with the team on the *Education Tab 2 device project*, under the supervision of Dr. Isong Olaoluwa, we set out to address the challenge of how to enhance student learning ability and that of educators teaching skills. Developing a system that analyses individual student learning process and predicts the most efficient way for students to learn faster. To help educators understands each student learning and comprehensive ability, I developed a test-based simulation platform to analyze student cognitive ability and give them a sense of how student can learn quickly. I used interactive user-friendly web interface to collect student data and to display student learning and cognition results. Prior to the product launch, the system was incorporated into the device and educators and teachers used my tool to analyze and predict each of student performances and how they can improve their learning behavior. I was proud to have contributed to a project that could promote civilization. Through critical thinking on a pressing, real-world issue, I realized what I should be looking for in the research I pursue: the possibility of helping others and the insight into global challenges that would promote humanity. I started to envision making an impact on the real world through my research. The value of our work in the scientific community can only be actualized when our solutions are adopted by downstream users such as learners and educators. Hence integrating AI – Intelligent tutoring agents with quality education is vital step towards a sustainable education future and advancement in all other sustainable goals.

With that overarching goal in mind, I joined Seedbuilders Foundation – an NGO that provides free education for Internally Displaced People (IDP), where I served as a consultant researcher on a project to experiment the use of Intelligent Tutoring Systems (ITSs) to tutor K-12 students in IDP Camps in northern Nigeria. During the project I identified the major stakeholders and their challenges when tutoring the students, and then mapped out their needs. The goals of the ITS research are in twofold; first, is to offer advanced personalized guidance that surpasses traditional computer-aided instruction and rivals the effectiveness of human tutors; and second, to advance our understanding of the cognitive processes involved in teaching and learning. However, our approaches rely solely on the student model, focusing more on theory-based user interfaces. One notable advancement involves AI enabling human teachers to instruct computers, which then guide students. This method only allows computers to generalize problem-solving techniques beyond their training. As the one of the lead researcher, I identified the knowledge gaps in the existing work, defined and scoped the research problem, analyzed the workload data, and implemented the deep learning models. Connecting the dots between my work and the quantifiable impact gives me a tremendous amount of excitement that I am contributing to help solve some real-world major issue. Through the project, I found myself enjoying both scoping and solving open-ended problems and hope to further improve with additional formal training in graduate studies.

Future Work. All my experiences collectively shaped my research interests and motivated me to pursue graduate studies. Today, intelligent systems provide a vital infrastructure to enhance human-level capabilities and drastically increase efficiency in variety of applications. Seeing the application of intelligent systems such as ITS in areas outside of CS (e.g., education and sustainability) incites my urge to build my work around the application and facilitation of intelligent systems in a wide range of fields. With a deep understanding of the problem space and skills gained through solving problems in this space, I hope to continue this line of work by applying ML algorithms and techniques to help intelligent systems become better and accessible. Columbia University's NLP group past and current work indicates its members' unique strengths on this topic. Specifically, I would be excited to work with Dr. Julia Hirschberg and Dr. Zhou Yu. Dr. Julia has made outstanding contributions to Computational Linguistics – Speech and Natural-Language Processing for individuals outside of CS with applications in Emotion and Charisma detection in Speech, using automated speech detection methods. The proposed framework for emotion recognition and detection via multimodal models discussed in her recent work, *(A Mapping on Current Classifying Categories of Emotions Used In Multimodal Models for Emotion Recognition)*, are fundamental to my work on students learning behavior, where an ITS can utilize the framework to empirically detect analyze students emotions and responses in real-life tutoring scenarios. Extending my work under her supervision would give me strong support in leveraging multimodal sensing techniques. My research interests also greatly overlap with Dr. Zhou's work, such as (*Comparing experts and crowds for AI data work: allocating human intelligence to design a conversational agent)*, Designing algorithms for students' interactions with an intelligent tutoring system through multimodal sensing, will help achieve effective and natural communication in fields like education. Interactivity which is a natural occurrence in tutoring, conversational agent can play a major role in helping the ITS augment it conversation with learners. I would be excited to work with Dr. Zhou by bringing my skills and experience in applying ML techniques to conversational agents.

Where I See Myself. As an African from a low-income family and a first-generation college student, I have faced significant challenges in striving to obtain an education. The struggle to finance my undergraduate studies has adversely affected both my grades and my overall well-being. This fuels my zeal every day to provide access to sustainable education for marginalized groups in society through AI research and integration in education. Fortunately, I have spent the past four years after my undergraduate studies working in both academia and the non-profit sector. Through these valuable experiences, I have not only learned about the many real-world challenges people face but also discovered research interests that allow me to address some of those challenges. After completing my graduate studies, I aim to pursue a career in academia to develop research and practical application tools that tackle these issues and more. Furthering my education at Columbia University would bring me one step closer to my goal of advancing intelligent systems in various fields and improving equal access to educational resources for marginalized groups like mine.