Basiru Usman, PhD
Teaching Assistant Professor of Business Analytics
Poole College of Management
North Carolina State University, Raleigh, NC
Phone: (919) 805 9557 Email: busman@ncsu.edu
LinkedIn: BasiruUsman

EDUCATION

Ph.D. in Applied Mathematics   2020
Auburn University, Auburn, AL, USA

MS in Data Science   2020
Auburn University, Auburn, AL, USA

MS in Applied Mathematics   2014
African University of Science and Technology, Abuja, Nigeria

BS in Applied Mathematics   2012
Bayero University, Nigeria

PROFESSIONAL EXPERIENCE

Teaching Assistant Professor   **2020 – Present**
North Carolina State University, Raleigh, NC

Graduate Teaching Assistant   **2015 – 2020**
Auburn University, Auburn, AL

PROFESSIONAL CERTIFICATIONS

RED Core Teaching Certification   **2023**
North Carolina State University

Career Essentials in Generative AI   **2023**
Microsoft and LinkedIn

RESEARCH INTEREST

Machine Learning, *Deep Learning*, *Predictive Modeling*, *Health Informatics*, *anomaly detection*, *Optimization in Operations Research*, *Neuro Computations*.

RESEARCH PROJECTS

- Developed Machine Learning approach to anomaly detection in sensor data. This is an industry problem from one of the renown companies, we perform *feature selection* using *Random Forest and Baruta* algorithms and the *anomaly detection* using *Robust Random Cut Forest (RRCF), Isolation Forest, HDBSCAN* and *BIRCH*. Understanding and detecting anomaly as early as possible is crucial, more especially in an expensive test, this will significantly lower the company spending. *(Due to privacy issue the GitHub repo is private)* https://github.com/BasiruUsman/Early-Anomaly-Detection-in-Sensor-Data

- Created a machine learning method for *"Human Activity Recognition using Mobile Sensors"*. In this project we used *t-distributed Stochastic Neighbor Embedding* (t-SNE), *Multi-Layer Perceptron* neural network among others. The aim of this project is to gather data from the various sensors in a smartphone in order to classify the activity a person is performing. https://github.com/BasiruUsman/Human-Activity-Recognition

- Use supervised classification algorithms; Neural Network (NN) and *Kernel Perceptron* to solve a multi-class problem. https://github.com/BasiruUsman/ML-KernelPerceptronAndNeuralNetwork

- Created a data-driven *Decision Support System (DSS)* that will predict the result of a phone to sell long term deposit by using *data mining* techniques. Such DSS is valuable to help managers make better data- informed decisions in prioritizing and selecting the next customers to be contacted during bank marketing campaigns.

- Design an online bookstore using a synthetic data. We divide the project into three tasks; Setting up a database with the provided data using *SQL*; Create a web interface interacting with the backend database using *php*; Implement the queries in SQL. https://github.com/BasiruUsman/Simple-Online-Bookstore

- Perform a *data mining* task for a bivariate normal data. We begin by obtaining the theoretical Maximum likelihood estimators for $\mu_X, \mu_Y, \sigma_X^2, \sigma_Y^2$ and ρ. We then perform normality test within each of the clusters obtained and finally we characterized those clusters with respect to country of origin (i.e., where the engine was made) and ISP (Specific impulse of the engine). https://github.com/BasiruUsman/Mixture-of-normals-for-bivariate-normal

PUBLICATIONS

1. **Basiru Usman**, X. Han and P. Kloeden, Upper Semi-continuous Convergence of Attractors for Hopfield-Type Lattice Model. journal of Nonlinearity, DOI:10.1088/1361-6544/ab6813. — **April 2020.**
2. **Basiru Usman,** X. Han and P. Kloeden, Long term behavior of Hopfield neural lattice model, *Comm. on Pure and Applied Analysis.* doi: 10.3934/cpaa.2019039. — **March 2019.**

3. **Basiru Usman,** C. E. Chidume and U. Bello, Krasnoselsekii-type algorithm for the zeros of strongly monotone Lipschitz maps in classical Banach Spaces, *Springer Plus*, (2015), https://springerplus.springeropen.com/articles/10.1186/s40064-015-1044-1— **June 2015.**

Working Papers

1. **Basiru Usman** and Nedret Billor, Outlier Detection using Robust Random Cut Forest. (**Submitted** to International Journal of Data Science and Analytics: Special Issue on Data Science and AI in Finance).
2. **Basiru Usman** and Nedret Billor, Manifold Robust Random Cut Forest. (To be submitted to Computational Statistics and Data Analysis, Ranked **A** in **ABDC** List).

3. **Basiru Usman,** Ismail Abdulrashid, Salihu Sabiu Musa and Abdullahi Yusuf, A Conceptual Modeling Framework for Designing Combination Chemotherapy Regimens for Cancer. (**Submitted** to European Journal of Operational Research, Ranked **A** in **ABDC** List)

4. **Basiru Usman**, Ismail Abdulrashid, Hakim Ghazzai, and Yehia Massoud, Artificial intelligence in healthcare operations to enhance cancer treatment outcomes: An Optimized Drug Regimen and Chemotherapy Scheduling. (To be submitted to Annals of Operations Research, Ranked **A** in **ABDC** List).

5. **Basiru Usman** and Ismail Abdulrashid, Optimal Control Treatment Analysis for the Predator- Prey Chemotherapy Model: A Study of Quadratic and Linear optimal Control. (To be submitted to *Computers and Operations Research,* Ranked **A** in **ABDC** List).

6. **Basiru Usman**, Xiaoli Wang, Random Attractors for Stochastic Hopfield Lattice Models with white noise in Weighted Spaces. (To be submitted to SIAM Journal on Applied Mathematics, Ranked **A** in **ABDC** List).

7. **Basiru Usman**, Xiaoli Wang, Ismail Abdulrashid, Nonautonomous Lattice Model for Neural Networks (To be submitted to SIAM Journal on Applied Mathematics, Ranked **A** in **ABDC** List).

TEACHING AND MENTORING EXPERIENCE

North Carolina State University, Raleigh, NC

- I developed and taught a graduate level course titled **"Data Engineering Management and Warehousing".** This is an MBA core course for our students in Master's in Marketing Analytics program**.**   **Spring 2021 – Present**

- Interactively taught Predictive Analytics for Business course. This is an undergraduate course, and the teaching style is interactive where each student is required to bring laptop to the class to engage in the class activities.   **Fall 2020 – Present**

- Mentored a group of Business Analytics Honor program through their *practicum*. We collaborated with industry to help student solve a *financial outlier* detection problem for a *fortune 500 company*.   **Spring 2022**

- Mentoring a group of Business Analytics Honor program in a *practicum*. We are helping a non-profitable company design their *database.*   **Fall 2022 (Ongoing)**

- Mentored a Business Analytics Honor student on an honor contract. **Spring 2021**

Auburn University, Auburn, AL

- Taught an interdisciplinary course title "Statistics for Engineers and Scientists**".** This is a course designed for engineers and scientists.   **Spring 2020**

- Taught an interdisciplinary course title "Statistics for Biological and Health Sciences**".** This is taught interactively with a software.   **Fall 2019**

- I have taught hundreds of students from a diverse background in different courses including Linear algebra, Linear differential Equation and Calculus. **Fall 2015 – Fall 2020**

AWARDS AND SCHOLASHIPS

- **Teaching assistantship**, Department of Mathematics and Statistics, Auburn University. This is renewable scholarship based on the academic performance.   **2015 - 2020**

- **Research Citation,** Department of Mathematics and Statistics, Auburn University. This award is to honor a graduate student that is excellent in research.   **December 2018**

- **Haynsworth Fellowship**, Department of Mathematics and Statistics, Auburn University. This scholarship is intended to reward students with outstanding research achievements.
                                                                                 December 2018
- **Don & Sandy Logan Fellowship**, Department of Mathematics and Statistics, Auburn University. The fellowships are intended to acknowledge and reward academic performance.   **December 2017**

- **The Abdus Salam International Centre Scholarship for a Pre-Ph.D. program in Mathematics.** Very competitive where only one student is selected from a Nation's applicants, But I was not able to attend.   **August 2015**

- **Total e&p Scholarship for 200level undergraduate**, Bayero University, Nigeria. This award highly competitive where only 2 people are selected from each state after passing highly competitive exam.   **2008 – 2011**

- **PTDF undergraduate Scholarship**, Bayero University, Kano, Nigeria. This scholarship is awarded to higher scorers of a highly competitive exam. The students from Engineering and Science faculties of the same University will compete among themselves.   **2008 - 2011**

ACADEMIC FUNDINGS AND GRANTS

- Graduate Teaching Assistantship Study Grant ($17,428.50), this is renewable assistantship based on the academic performance.   **2015 – 2020**

- Funding from 2020 SCMB 2nd Annual Symposium in Atlanta, GA on **February 17 - 18, 2020** to attend the conference.

- Grant from Mathematics Department, Auburn University ($500) to attend the 2019 Joint Mathematics Meetings (JMM), Baltimore, Maryland, USA, **January 16-19, 2019.**

- African Institute of Science and Technology (AIST) M.Sc. study grant given by the Nelson Man- dela Institute (NMI). This grant covered my tuition, accommodation, and feeding. Candidate from Sub-Saharan Africa are selected for this award after passing a highly comprehensive entrance examination. **2013 – 2014**

- Total e&p Scholarship for 200l undergraduate Grant (N 150,000 yearly), this grant is renewable upon maintaining a CGPA of at least 3.5. **2008 - 2011**
- PTDF undergraduate Scholarship Grant (N 200,00 yearly), this grant is renewable upon maintaining a CGPA of at least 3.5. **2008 – 2011**

PROFESSIONAL PRESENTATIONS AND TALKS

- I gave a series of Pro Tips talk about using machine learning to implement personalized product recommendations, see here.   **2022**

- I gave a talk on predictive analytics and the future of marketing see here.   **2022**

- European Network for Business and Industrial Statistics Summer Meeting. Contributed talk "Anomaly detection using Robust Random Cut Forest" **2021**

- Joint Mathematics Meetings, Denver, Colorado. Contributed talk "Upper Semi-continuous Con- vergence of Attractors for Hopfield-Type Lattice Model" **January 2020**

- Joint Mathematics Meetings, Baltimore, Maryland. Contributed talk "Long term behavior of a random hopfield neural lattice model" **January 2019**

- Interdisciplinary Colloquium, Auburn University, Auburn, Alabama. "Long term Behavior of a Random Hopfield Neural Lattice Model" **November 2018**

- Applied Mathematics seminar, Auburn University, Auburn, Alabama. "Hopfield Lattice Model" **October 2018**
- Nigerian Mathematical Society Conference, African University of Science and Technology, Abuja, Nigeria. "Isotone projection cone" **July 2014**

PROFESSIONAL MEMBERSHIP

- Member of the Decision Science Institute.   **2019 - Present**
- Member of the American Mathematical Society   **2015 - Present**

OUTREACH/SERVICE

- Co-chair a special session, Joint Mathematical Meeting at Denver, Colorado, USA **2020**
- Volunteered Organizers of American Mathematical Society Sectional Meeting, College of Sciences and Mathematics, Auburn University, Auburn, AL, U.S.A. **2020**
- Volunteered Organizers of Special Conference on Set-theoretic Topology, College of Sciences and Mathematics, Auburn University, Auburn, AL, U.S.A. **2017**
- Division B Regional Science Olympiad, College of Sciences and Mathematics, Auburn University, Auburn, AL, U.S.A. **2016**

SKILLS

Languages
- Fluent in English and native in Hausa

Computer Programming

- Excel Analytics, Python, R, Tableau, Spark, CouchDB, JMP, SAS, SQL, MATLAB, and PHP.

Cloud Computing

- AWS: S3, DynamoDB, Data Pipeline
- Cloudera

REFERENCES

References will be provided upon request.