SARAH FOBI MENSAH

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SUMMARY

Dedicated graduate student in statistics with a strong passion for using advanced statistical techniques and machine learning to tackle real-world problems and make meaningful contributions across fields like engineering, healthcare, and finance. Experienced in functional data analysis, predictive modeling, Bayesian data analysis, regression modeling and dimensionality reduction techniques. I bring hands-on experience in research and consulting, working on projects ranging from experimental and survey data analysis to developing robust predictive models. Continuously expanding my knowledge through data science courses, I am excited to apply my skills to create impactful, data-driven solutions.

PROFESSIONAL EXPERIENCE

Graduate Researcher August 2024 – present

- Conducted in-depth statistical analysis of microcalorimeter data to investigate heat generation by chondrocytes over a 48-hour period, revealing insights into cellular metabolism and its potential link to cartilage degradation.
- Applied a Generalized Least Squares (GLS) model to account for non-constant variance, accurately assessing differences in total heat generation across cell groups.
- Led initial findings to a manuscript submission, and currently expanding the research through functional data analysis to examine heat generation curves over time.

Graduate Research Assistant December 2023 – May 2024

- Explored dimensionality reduction techniques, including sparse principal component analysis, to improve the interpretability and analysis of high-dimensional metabolomics data in the context of early osteoarthritis diagnosis.
- Investigated the potential of sparse contrastive PCA for reducing the dimensionality of metabolomics data, aiming to make the data more manageable and informative for identifying early molecular markers of osteoarthritis.
- Exploring the potential for predictive algorithms with reduced-dimensionality data to aid in early detection of osteoarthritis, with hopes of identifying less invasive diagnostic methods, such as blood-based testing, to enhance patient care in future research.
  Funded by: National Institute of Arthritis and Musculoskeletal and Skin Diseases (1R01AR081489-01A1)

Statistical Consultant January 2024 – May 2024

- Applied statistical methodologies including mixed-effects models to account for repeated measures and accurately assess quantitative survey responses.
- Analyzed the effectiveness of storybook-based Alzheimer's disease education for children and adults, assessing its impact on awareness across different age groups.
- Provided clear communication of statistical methods to clients which ensured transparency throughout the analysis process and lead to informed decisions for program recommendations and development.

Research Assistant October 2021 - July 2022

- Contributed to the construction of predictive models using six machine learning algorithms to classify alcohol and drug misuse across South Africa's nine provinces based on key risk factors.
- Supported the development and validation of machine learning models on an imbalanced dataset, identifying high-risk groups for targeted interventions in substance misuse

Data Analytics Intern
KPMG, Australia July 2020 – August 2020

- Identified data quality issues with the dataset presented by the Sprocket Central company and created visualizations to help the company better understand its customers.
- Analysed the company's dataset using RMF (Recency, Frequency and Monetary) analysis to help the company determine which customers it should target to increase its revenue and customer lifetime value.

EDUCATION

Ph.D. Statistics, GPA: 3.9 Expected 2027
Montana State University, Bozeman, MT

M.S. Statistics, GPA: 3.89 May 2024
Montana State University, Bozeman, MT

B.S. Actuarial Science, GPA: 3.89 September 2021

Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

TEACHING EXPERIENCE

Graduate Teaching Assistant, Department of Mathematical Sciences, MSU — August 2022 – Present
Courses taught: STAT 216 (Introduction to Statistics), STAT 337 (Intermediate Statistics with R)

- Provide hands-on instruction with R software, teaching data wrangling, visualization, hypothesis testing, and guided students in performing statistical analysis and drawing data-driven conclusions.

TECHNICAL SKILLS

Programming Languages: R Studio (Markdown), Python, SAS
Database: SQL
Data Visualization: Tableau
Project Management Tool: Git/GitHub
Statistical Methods: Bayesian data analysis, regression analysis, hypothesis testing, experimental design, spatial data analysis, functional data analysis.

PROFESSIONAL ASSOCIATIONS

Member, American Statistical Association — March 2024 - present
Member, Royal Statistical Society — January 2024 - present

AWARD/ LEADERSHIP EXPERIENCE

Scholarship Awardee, Ghana Scholarship Secretariat — May 2021
Judicial Committee Chair, Actuarial Science Students' Association-KNUST Chapter — September 2020 – August 2021
Deputy Finance Chair, Actuarial Science Students' Association of Ghana — September 2019 – May 2020

PUBLICATIONS

Odoom, Christopher, Alexander Boateng, **Sarah Fobi Mensah**, and Daniel Maposa. "Modeling of the Daily Dynamics in Bike Rental System Using Weather and Calendar Conditions: A Semi-Parametric Approach." *Scientific African* (2024): e02211.

- Proposed a robust method using penalized splines quasi-Poisson regression to model bike rentals, revealing hidden relationships not identified by traditional parametric models which informed future transportation strategies.

Boateng, Alexander, Christopher Odoom, Eric Teye Mensah, **Sarah Mensah Fobi**, and Daniel Maposa. "Predictive Analysis of Misuse of Alcohol and Drugs using Machine Learning Algorithms: The Case of using an Imbalanced Dataset from South Africa." *Appl. Math* 17, no. 2 (2023): 261-271.

- Compared six supervised machine learning algorithms to predict alcohol and drug abuse across South Africa's nine provinces, proposing an optimal predictive model.