M.Sc. BSc. Emmanuel Sam

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PROFILE

Dedicated and results-driven Research Fellow with 6+ years of experience teaching undergraduate level courses in ICT, Business Computing, and Informatics, and 5+ years of experience effectively applying data-driven problem-solving approaches and researching effective and efficient algorithms to support informed decision-making. Studied the parameterized complexity (PC) of four intractable computational problems, resulting in preprocessing algorithms for solving them efficiently. Published three articles from a study of the stability of Echo State networks and their performance on non-temporal tasks. Supervised and coordinated over six process improvement projects ranging from data analytics to software development, with one leading to over 30% increase in student admissions and another resulting in a more efficient course and exam timetabling.

RESEARCH INTERESTS

Algorithms, Deep Learning, Reservoir Computing, Parameterized Complexity Theory, and Data Visualization

EDUCATION

PhD, Informatics   07/2019 – 09/2024 (expected)
University of Bergen, Bergen, Norway
   Thesis Title: *The Parameterized Complexity of the Structure of Lineal Topologies*
   Supervisor: *Associate Prof. Nello Blaser*

M.Sc., Information Technology for Management (Distinction)   05/2011 – 10/2012
Coventry University, UK & Ghana Communication Technology University
   Thesis Title: *Adoption of M-commerce Services among Merchants in Ghana*
   Supervisor: *Dr. Francis Omani*

BSc., Mathematics (Second Class Upper Honours)   08/2004 – 05/2008
Kwame Nkrumah University of Science and Technology, Ghana
   Thesis Title: *Statistical Analysis of Sunlight Data*
   Supervisor: *Dr. Francis T. Oduro*

GRANTS & AWARDS

- Travel Grant for ACAI 2018**,** European Association for Artificial Intelligence **08/2018**
- Best Student in Management Information Systems and Information Technology Related Programmes at graduate Level (2011/2012 Academic Year), Ghana Communication Technology University. **01/2013**

RESEARCH EXPERIENCE

Research Fellow   07/2019 – 07/2023
University of Bergen, Bergen, Norway
   Supervisor: *Associate Prof. Nello Blaser*
- Investigated the parameterized complexity of computing graph structures with applications in data visualization and network design, resulting in three research papers in renowned conferences and journals.
- Employed data visualization to shed light on the structure of typical network data, offering valuable insights into parameters useful for designing efficient algorithms.
- Conducted extensive literature review of intractable computational issues that arise in the context of techniques for improving the quality of information visualization, leading to several open research questions of practical and theoretical interest.

Research Trainee   **01/2016 – 07/2017**

University of Cape Coast and Academics Without Borders Canada (AWBC)
    Supervisor: Dr. Sebastian Basterrech
- Investigated the stability and controllability conditions of the Echo State Network (ESN) model and compared its performance for non-temporal tasks, such as predicting the impact of a post on Facebook, with classical machine learning techniques, such as Support Vector Regression (SVR) and Adaptive Network Fuzzy Inject System (ANFIS).

Assistant Statistician   **12/2010 – 05/2011**

Research & Marketing Services International, Ghana
- Collaborated with team members to design questionnaires and collect data for market analysis.
- Contributed to identifying of trends, correlations, and patterns in data using regression analysis, time-series analysis, ANOVA, hypothesis testing, etc.

Research Assistant   **09/2009 – 09/2010**

Wisconsin International University College, Ghana
- Conducted end-of-semester analysis of student data, including data about attendance and student evaluation of teaching, using SPSS, Excel, and VBA, resulting in improved teaching and learning.

PUBLICATIONS

- E. Sam, M. Fellows, F. Rosamond, P. A. Golovach, On the parameterized complexity of the structure of lineal topologies (depth-first spanning trees) of finite graphs: The number of leaves, in: M. Mavronicolas (Ed.), Algorithms and Complexity, Springer International Publishing, Cham, 2023, pp. 353–367.
- E. Sam, B. Bergougnoux, P. A. Golovach, N. Blaser, Kernelization for finding lineal topologies (depth-first spanning trees) with many or few leaves, in: H. Fernau, K. Jansen (Eds.), Fundamentals of Computation Theory, Springer Nature Switzerland, Cham, 2023, pp. 392–405.
- E. Sam, S. Basterrech, P. Kromer, Analysis of the dynamics of the echo state network model using recurrence plot, in: A. Abraham, S. Kovalev, V. Tarassov, V. Snasel, A. Sukhanov (Eds.), Proceedings of the Third International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'18), Springer International Publishing, Cham, 2019, pp. 353–361.
- C. Donkor, E. Sam, S. Basterrech, Analysis of tensor-based image segmentation using echo state networks, in: J. Mazal (Ed.), Modelling and Simulation for Autonomous Systems, Springer International Publishing, Cham, 2019, pp. 490–499.
- E. Sam, S. Yarushev, S. Basterrech, and A. Averkin, Prediction of Facebook Post Metrics using Machine Learning, XXI International Conference on Soft Computing and Measurement (SCM'2018), Saint Petersburg, Russia, May 23 - 25, 2018. Available in arXiv.

TEACHING & ADVISING EXPERIENCE

Lecturer | IT & Business Computing   **11/2012 – 06/2019**

Wisconsin International University College, Ghana

- Principles of Programming & Intermediate Programming with C++	*2015 – 2019*
- Database Systems, and Object-Oriented Programming with Java	*2015 – 2017*
- Data Structures and Algorithm Development with C++/Java	*2012 – 2015*
- Supervising undergraduate Level Projects for final year students	*2012 – 2019*

Part-time Lecturer | ICT   **2013 – 2019**

Radford University College, Ghana

- Numerical Methods	*2013 - 2016*
- Probability & Statistics	*2013 - 2018*
- Data Structures & Algorithms	*2014 - 2019*

Part-time Lecturer | Faculty of Informatics   **2014 – 2016**

Ghana Communication Technology University & Staffordshire University, UK

- Advanced Java Technologies	2014 – 2016
- Object Oriented Application Engineering	2014 – 2016

Teaching Assistant | Business Computing Department   **2008 – 2009**
Wisconsin International University College, Ghana.
- Provided instructional assistance to students with challenges in Object Oriented Programming with Visual Basic, Probability and Statistics, and Quantitative Methods I & II

UNIVERSITY SERVICE

FPT Newsletter Reporter   **2019**
University of Bergen, Bergen, Norway
- Conducted in-depth interviews with the Algorithms community members at conferences and workshops to gather news for [FPT Newsletter](#).

Project coordinator   **01/2014 – 06/2019**
Wisconsin International University College, Ghana
- Oversaw the implementation of the university's student information and library management systems. Led a project to fine-tune Open Course Timetabler (an open-source timetabling application) to suit the university's timetabling needs and managed the timetabling process, streamlining the processes related to courses and exams timetables.

MEMBERSHIPS

- NORA (Norwegian AI Research Consortium) School   **2022**
- University of Bergen ICT Research School   **2019**
- IEEE Membership (# 94836352)   **2018**
- IEEE Computational Intelligence Society Membership   **2018**

REFERENCES

- **Nello Blaser**
  Associate Professor of Machine Learning
  Department of Informatics
  University of Bergen
  nello.blaser@uib.no
- **Sebastian Basterrech**
  Postdoc
  Department of Applied Mathematics and
  Computer Science,
  Danmarks Tekniske Universitet
  sebbas@dtu.dk
- **Michael Fellows**
  Professor of Algorithms
  Department of Informatics
  University of Bergen
  michael.fellows@uib.no