Komlan Atitey, Ph.D.

CONTACT

Address: Biostatistics and Computational Biology Branch, NIH/NIEHS
111 T W Alexander Dr, Rall Building, Research Triangle Park, NC 27709
Email: komlan.atitey@nih.gov ; atiteydavidkomlan@yahoo.fr
Mobile: +1 4028179597
Languages: French, English, Chinese

EDUCATION

PhD in Computational Biology 10/2016 – 10/2019
Swansea University in United Kingdom
Dissertation title: Computational Models and Bayesian Analysis of Genetic Networks

Master's degree in Information and Communication Engineering 09/2013 – 12/2015
Harbin Engineering University in China
Dissertation title: A Novel Prediction algorithm for Multiple Target Tracking

Study Chinese Language 09/2012 – 08/2013
Harbin Engineering University in China

Master's degree in Physics of solids 11/2006 – 07/2007
University of Lomé in Togo
Dissertation title: A dynamical theory of the electromagnetic based on maxwell's equations

Bachelor of sciences in Physics.
10/2003 – 11/2006
University of Lomé in Togo

CERTIFICATION

Data Science: Machine Learning Certification - *Harvard University, MA, United States* 2023

- **Statistical Analysis:** Proficient in using statistical methods and tools to analyze data, interpret results, and draw meaningful insights.
- **Machine learning Algorithms:** Familiarity with a variety of machine learning algorithms, including supervised and unsupervised learning, regression, classification, and clustering.
- **Data Cleaning and Preprocessing:** Ability to preprocess and clean raw data, handle missing values, and prepare data for analysis.
- **Feature Engineering:** Experience in selecting, transforming, and creating meaningful features to improve model performance.
- **Model Evaluation and Validation:** Understanding of various model evaluation techniques, cross-validation, and hyperparameter tuning.

High-Dimensional Data Analysis Certification - *Harvard University, MA, United States.* 2023

- **Dimensionality Reduction Techniques:** Proficiency in using methods like Principal Component Analysis (PCA), t-Distributed Stochastic Neighbor Embedding (t-SNE), Uniform Manifold Approximation and Projection (UMAP), Autoencoder, and Variational Autoencoder.
- **Feature Selection and Extraction:** Selecting relevant features and extracting meaningful information from high-dimensional datasets to improve model performance.
- **Clustering Algorithms:** Familiarity with clustering techniques like k-means, and hierarchical clustering for grouping similar data points.

RESEARCH FOCUS AND INTEREST

- Develop a computational framework that can be used to aid in the engineering of anti-infection drugs or optimize drug combination therapies for various diseases.
- Perform statistical spatiotemporal modeling for single-cell analysis.
- Develop computational approaches to identify cancer drivers from single-cell and imaging data.
- Investigate the molecular mechanisms of interactions between cancer cells and immune cells (ICs), as well as the interactions among different populations of intra-tumor ICs that are essential for current and future cancer immunotherapy.
- Integrating mechanistic models and machine learning approaches to create hybrid models that can capture both the deterministic nature of biological processes and the ability to adapt and learn from data. This integration enables the incorporation of experimental data to refine and validate the mechanistic models.

SKILLS

Computational skills: Mathematics, Statistical inference, Probabilistic and Deterministic modeling, Immune System Modeling and Analysis, Machine Learning, Deep Learning, Processing single-cell data, Data visualization, Bioinformatics, Data warehousing, Hierarchical clustering, Functional Genomics, Programming in R, MATLAB, and Python, Unix/Linux.

Technical skills:
https://github.com/NIEHS/MUBCOVID
https://github.com/KomlanAtitey62/DEGBOE
https://github.com/komlanAtitey/Multiscale_Multicellular_Quantitative_Evaluator-MMQE-

RESEARCH EXPERIENCE

Research Fellow in the National Institutes of Health (NIH/NIEHS) 11/2020 – Present
Biostatistics and Computational Biology Branch (BCBB) 40 hours per week

- Develop a hybrid statistical computational approach that captures the dynamics of proliferative immune responses involving varying levels of cells, cytokines, and chemokines, as well as cell heterogeneity and interactions between mediators (cytokines).
- Develop a discrete time evolution model for gene mutation using Bayesian inference and gene mutation datasets.
- Create a statistical approach to model discrete nonstationary processes.
- Provide dynamic modeling of gene mutations to identify lung cancer drivers by considering gene-gene interactions within the tumor microenvironment.
- Develop a multivariate metric to assess the visualization and interpretability of high-dimensional single-cell biomedical data projections, capturing important features.

Postdoc Associate research 10/2019 – 10/2020
Department of Biochemistry, University of Nebraska – Lincoln 40 hours per week

- Develop and analyze a mechanism-based, multiscale, multicellular model of the immune system, integrating it with experimental data.

Ph.D. research 10/2016 – 10/2019
College of Engineering, Swansea University, United Kingdom

- Provide statistical insights into the regulatory dynamics of gene expression activation and inactivation.
- Quantify the uncertainty of reaction rates in biochemical reactions and evaluate their impact on gene expression.
- Develop a statistical method for modeling probability distributions in messenger RNA (mRNA) and protein production to elucidate the stochastic dynamics of biological reactions.

TEACHING AND MENTORING

Graduate Mentor 01/2021 - Present
Biostatistics and Computational Biology Branch of NIH/NIEHS, Research Triangle Park 10 hours per week

- Mentor graduate students in statistical programming and single-cell data analysis to achieve effective visualization and interpretability.

Lecturer in statistical inference for a summer school 01/2021 - Present
Biostatistics and Computational Biology Branch of NIH/NIEHS, Research Triangle Park 2 hours per week

- Preparing and delivering lectures on statistical inference topics such as hypothesis testing, confidence intervals, and regression analysis.
- Designing course materials, including lecture slides, handouts, and assignments.
- Organizing and leading interactives discussions and group activities to enhance students' understanding and application of statistical inference concepts.
- Providing guidance and support to students, answering questions, and addressing any concerns related to the course content.
- Sharing real world examples and case studies to demonstrate the practical relevance of statistical inference in various fields.
- Collaborating with other faculty members or teaching assistants to coordinate course logistics and ensure a smooth learning experience for students.

Demonstrator in math Cafe 02/2017 – 06/2019
College of Engineering, Swansea University, United Kingdom. 06 hours per week

- Provide excellent customer service, actively listening to graduate and under-graduate students' questions and concerns and responding in a courteous and helpful manner.
- Explain various mathematical concepts and problem-solving techniques to students, using language that is easily understandable to students with different levels of mathematical knowledge.
- Help graduate and under-graduate students who are facing challenges in understanding certain math concepts, and provide additional explanations and examples as needed.

High school teacher of Physics 09/2007 – 08/2012
High school of Adidogome, Lome, Togo 30 hours per week

- Planning and delivering engaging physics lessons to students.
- Creating and administering assessments to evaluate students' understanding of physics concepts.
- Providing individualized instruction and support to students with diverse learning needs.

PUBLICATION

K. Atitey. DEGBOE: Discrete time Evolution modeling of Gene mutation through Bayesian inference using qualitative Observation of mutation Events. *Journal of Biomedical Informatics*. September 2022

K. Atitey et al. Mathematical modeling of proliferative immune response initiated by interactions between classical antigen presenting cells under joint antagonistic IL-2 and IL-4 signaling, *Front Mol Biosci*. January 2022

K. Atitey et al. Inferring distributions from observed mRNA and protein copy counts in genetic circuits. *Journal of Biomedical Physics and Engineering Express*. December 2018, 5 (2019) 015022

K. Atitey et al. Elucidating effects of reaction rates on dynamics of the lac circuit in Escherichia coli. *Journal of BioSystems*. January 2019,175 (2019) 1–10

K. Atitey et al. Determining the Transcription Rates Yielding Steady-State Production of mRNA in the Lac Genetic Switch of Escherichia coli. *Journal of Computational Biology*. September 2018, 25(9):1023-1039

P. Loskot, **K. Atitey** and L. Mihaylova. Comprehensive review of models and methods for inferences in bio-chemical reaction networks. *Bioinformatics and Computational Biology*, Frontier in Genetics, May 2019

MANUSCRIPT UNDER REVIEW

K. Atitey et al. Variational Bayesian inference of hidden stochastic processes with unknown parameters

K. Atitey et al. MIBCOVIS: A Multivariate Interpretable Benchmarking and Computational framework for Optimal Visualization of high-dimensional Separable data with unknown ground truths

CONFERENCE PRESENTATION

K. Atitey et al. Performance Metrics of High Dimensional Reduction Methods for Better Visualization and Interpretability of Separable Biological Data, *ISMB 2021*, April 2021, USA

K. Atitey et al. Benchmarking framework for optimal visualization and interpretability of high-dimensional separable data. ISCB/ISMB 2021 (https://www.youtube.com/watch?v=S0ilWgQ_QHg&t=2s)

K. Atitey and C. Yang. A Novel Prediction Algorithm in Gaussian-Mixture Probability Hypothesis Density Filter for Target Tracking. *The 8th International Conference on Image and Graphics (ICIG 2015)*. August 2015. Tianjin (China)

POSTER PRESENTATION

K. Atitey and B. Anchang. Optimizing single-cell spatiotemporal dalay variations to identify key features driving progression, *ISMB 2023*, July 2023

K. Atitey and B. Anchang. Multicellular and Multiscale Modeling of Proliferative Immune Response Under Joint Synergistic and Antagonistic Cytokine Signaling, *ISMB 2022*, July 2022

K. Atitey and P Loskot. A Bayesian inference framework for statistical evaluation of protein production data from in-silico cell experiments. *The 41st Research Students' Conference in Probability and Statistics*. July 2018. University of Sheffield (UK)

INVITED TALKS

Career development discussion 11/2021

- Received invitation from Purdue University to lead group discussion with graduate students in Systems Biology and Computational Biology, West Lafayette, IN, 47907 US

AWARDS AND SCHOLARSHIPS

Award for PAIR-UP UNC Imaging Workshop 01/2023

- Workshop hosted by the University of North Carolina at Chapel Hill in North Carolina. The workshop provides training in advanced microscopy considerations for imaging live cells using transmitted light, fluorescent probes, and fluorescent biosensors.

Award for PAIR-UP Imaging Workshop 10/2022

- Workshop hosted by the Rockefeller University Bio-Imaging Resource Center in New York. The workshop provides training in advanced fluorescence microscopy and super-resolution techniques for live cell imaging.

Fellows Award for Research Excellence (FARE 2022), in USA 07/2022

- NIH Awarded Study Section: Informatics/Computational Biology/Systems Biology https://www.niehs.nih.gov/careers/research/fellows/involvement/awards/excellence/index.cfm

Highly prestigious Zienkiewcz fully funded Scholarship 02/2016

- Scholarship for the PhD research in Engineering, Swansea University, United Kingdom Reserved for top calibre students (outstanding academic performance with a minimum of a First Class Honors Degree). This scholarship is opened to UK, EU and International students.