

Bitewulign Mekonnen, Ph.D

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• Machine Learning • Computational Pathology • Medical Imaging • Clinical NLP

Professional Summary

Ph.D holder and experienced postdoctoral researcher with expertise in deep learning for Biomedical imaging and time-series data analysis, closely aligned with the research focus of the AI in Medicine Lab at UBC. Strong publication record in high-impact journals and international conferences, with hands-on experience developing classification, segmentation, and a strong background in clustering models for healthcare applications. Highly proficient in Python programming skills, SQL and extensive experience with TensorFlow, Keras and Scikit-learn, supported by Linux-based GPU cluster computing. Experienced in collaborative, interdisciplinary research environments with strong communication and analytical skills.

Research Interest

My current research interest is computational pathology, medical imaging, and clinical text analysis. The recent advancements in medical imaging technology, genomics, Bioinformatics, and Computational Pathology have led to the development of more precise and non-invasive diagnostic tools. Advancements like high-resolution 3D OCT, MRI, and CT scans enhance visualization of internal structures, thereby improving diagnostic accuracy. Additionally, the integration of deep learning for image analysis has enhanced the ability to detect and monitor diseases at earlier stages.

Education

Ph.D. in Electro-Optical Engineering

09/2016 – 04/2021

National Taiwan University of Science and Technology | Taipei, Taiwan

Dissertation Title: *Machine learning and deep learning methods for near-infrared*

spectroscopy and full-field OCT imaging analysis.

Advisor: Shien-Kuei Liaw (Distinguished Professor, NTUST)

Co-advisor: Fu-Liang Yang (Distinguished Research Fellow /
Professor, Academia Sinica)

Grade Result: Excellent

Master of Science in Physics

03/2009 – 07/2012

Haramaya University | Dire Dawa, Ethiopia

Bachelor of Education in Physics

05/2005 – 07/2008

Bahir Dar University | Bahir Dar, Ethiopia

Work Experience

Postdoctoral Researcher– Biomedical AI and Medical Imaging

05/2021 – 02/2024

Academia Sinica | Taipei, Taiwan

- Developed deep learning models for red blood cell analysis and blood vessel segmentation in 2D and 3D biomedical images.
- Developed and evaluated deep learning models trained on simulated Augmented datasets, achieving high performance in image segmentation on real test datasets, with applications in clinical diagnostics
- Optimized AI model training performance through hyperparameter fine-tuning and data pre-processing techniques
- Designed regression and classification models for time-series biomedical signals, including NIR spectroscopy and photoplethysmography (PPG)
- Published findings in top-tier journals and presented at international conferences.
- Collaborated with interdisciplinary research teams to define real-world healthcare applications

Research Assistant

01/2017 – 04/2021

Academia Sinica | Taipei, Taiwan

- Trained advanced machine learning and deep learning pipelines, unlocking hidden

patterns in Bioimaging data and time-series data

- Planned and delivered technical projects, workshops, and training sessions
- Contributed to the analysis, interpretation and writing of research articles for publication

Physics Lecture

12/2015 – 03/2022

Debre Tabor University | Debre Tabor, Ethiopia

Physics Lecture

07/2012 – 11/2015

Aksum University | Axum, Ethiopia

- Planned and delivered technical projects, workshops, and training sessions
- Designed and delivered undergraduate courses in computational physics, contributing to a 20% improvement in student engagement and understanding through innovation
- Supervised and mentored students in projects, particularly in computational physics and data science applications

Bole Senior Secondary and Preparatory School

07/2008 - 03 / 2009

Addis Ababa | Ethiopia

- Delivered High school Physics and Math classes
- Mentored high school students
- Deliver one-on-one and small group tutoring sessions for high school students in Mathematics and Physics.
- Support students with homework, test preparation, and exam strategies, leading to measurable improvement in grades and confidence

Volunteering Work

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- The Compass Food Bank & Outreach Centre (<https://thecompass.ca/>) 07/2024 – present
 - Global Medic 07/2024 – present

Certificates

Data Science Certificate

11/2024 – 03/2025

Data Sciences Institute, University of Toronto | Toronto

A 16-week accelerated training on the foundation and practical application of data science

- Unix shell, Git/GitHub, proficient in branching, merging, and resolving conflicts, fostering streamlined team workflows
- Developed Python programming skills, excelling in data manipulation, visualization, and ethical software considerations, contributing to comprehensive data-driven solutions
- Proficiently handled SQL for data management, adept at ingesting and querying flat-file datasets, ensuring efficient relational database management
- Ethically designed supervised learning models, showcasing strong algorithmic skills and an end-to-end machine learning process understanding from design to deployment

Cloud Computing & Big Data Professional Development

09/2024 – 11/2024

Seneca Polytechnic | Ontario

An 8-week bridging training on cloud computing, and big data analytics

- Efficiently navigated Canadian IT, Cloud computing and Big Data landscape and the legislated rules and policies that are relevant when working in Canada
- Gained expertise in advanced machine learning, computer vision, and generative AI techniques
- Acquired Python Programming, and Object-oriented programming along with data exploration and analysis tasks
- Developed and deployed machine learning pipelines in serverless environment using Azure Machine Learning
- Utilized Azure cloud services to manage and process big data, ensuring scalability and reliability of data pipelines

Business Communication Workshop

09/2024 – 11/2024

Seneca Polytechnic | Ontario

Cybersecurity Awareness Workshop

09/2024 – 11/2024

Seneca Polytechnic | Ontario

OBIO® Health Science Tech. Training for Software and Data Pro

09/2024 – 11/2024

Ontario Bioscience Innovation Organization (OBIO) | Ontario

- Acquired in-depth knowledge of the health science ecosystem, including the

integration of digital technologies, machine learning applications, and software development life cycle practices

- Developed technical and professional skills to succeed in digital technology roles in the health science industry

IBM Data Science Professional Certificate

02/2024 – 03/2024

Skills

Programming: Python, SQL, Microsoft Azure

Machine Learning: Deep Learning, CNNs, Transformers, Classification, Regression

Libraries: TensorFlow, Keras, Scikit-learn, PyTorch

Computing: Linux-based GPU high-performance computing clusters

Microsoft Office: Word, Excel, PowerPoint

Image processing software ImageJ

Citation management software EndNote

Mentorship and Service

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- Mentored junior researchers and students in machine learning and biomedical imaging projects
 - Actively contributed to collaborative, interdisciplinary research environments

Publications

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- **Bitewulign Kassa Mekonnen**, Wei-Ru Lu, Tung-Han Hsieh, Justin Chu & Fu-Liang Yang, Accurate and 30-plus days reliable cuffless blood pressure measurements with 9-minutes personal photoplethysmograph data and mixed deduction learning. *Sci Rep* **14**, 23722 (2024). <https://doi.org/10.1038/s41598-024-75583-y>.
 - **Bitewulign Kassa Mekonnen**, Tung-Han Hsieh, Dian-Fu Tsai, Shien-Kuei Liaw, Fu-Liang Yang, Sheng-Lung Huang, Generation of Augmented Capillary Network Optical Coherence Tomography Image Data of Human Skin for Deep Learning and Capillary Segmentation. *Diagnostics*, **11**, 2021. doi: <https://doi.org/10.3390/diagnostics11040685>.
 - **Bitewulign Kassa Mekonnen**, Webb Yang, Tung-Han Hsieh, Shien-Kuei Liaw, Fu-Liang Yang, Accurate prediction of glucose concentration and identification of

major contributing features from hardly distinguishable near-infrared spectroscopy, Biomedical Signal Processing and Control, 59, 2020. doi: <https://doi.org/10.1016/j.bspc.2020.101923>.

- **Bitewulign Kassa Mekonnen**, Webb Yang, Tung-Han Hsieh, Shien-Kuei Liaw and Fu-Liang Yang, Classification of Near-infrared Spectroscopic Glucose Concentrations Using Convolutional Neural Network, 2020 Opto-Electronics and Communications Conference (OECC), 2020. doi: <https://doi.org/10.1109/OECC48412.2020.9273623>.
- **Bitewulign Kassa Mekonnen**, Dian-Fu Tsai, Tung-Han Hsieh, Fu-Liang Yang, Shien-Kuei Liaw and Sheng-Lung Huang, Deep Learning Approach for Red Blood Cell Segmentation from Full-Field OCT Data of Human Skin, 2019 IEEE International Conference on BioPhotonics (BioPhotonics), 2019. doi: <https://doi.org/10.1109/BioPhotonics.2019.8896748>

Conference Presentations

1. ICBALST-24, International Conference on Bioinformatics Applications in Life Sciences and Technologies, April 2-3, 2024, Toronto, Canada (Accepted for oral presentation).
Title: Synthetic full-field optical coherence tomography (FF-OCT) image data generation for microvascular networks of human skin for the purpose of deep learning
2. ACS Spring 2024, Many Flavors of Chemistry, March 17-21, 2024, New Orleans, Louisiana & Hybrid, United States (Accepted for oral presentation)
Title: Towards glucose detection: Machine learning insights from near-infrared spectroscopic data (ID: 3982081)
3. ACS Fall 2023, Harnessing the Power of Data, August 13-17, 2023 in San Francisco, CA, United States (Poster presentation)
Title: Machine learning approaches to glucose sensing and prominent contributing features extraction from hardly distinguishable near-infrared spectroscopy (ID: 3919190)
4. 2022 RCAS research presentation & poster award, Research Center for Applied Sciences,

Academia Sinica, Taipei, Taiwan, December 7, 2022 (Flash talk and Poster presentation)

5. OECC 2020, 25th Optoelectronics and Communications Conference, October 4-8, 2020, Taipei, Taiwan (oral presentation)
6. BioPhotonics 2019, The 4th International Conference on Biophotonics, September 15-18, 2019, Taipei, Taiwan (oral presentation)

References

1. **Prof. Hossein Pourmodheji:** York university Toronto, ON, Canada, He taught me **cloud computing and big data** at Seneca Polytechnic college in collaboration with YMCA of GTA
Email: hossein.pourmodheji@senecapolytechnic.ca
2. **Prof. Fu Liang Yang:** Distinguished Research Fellow, Liang Yang, Research Center for Applied Sciences, Academia, Academia Sinica, Taiwan. Current PI and Ph.D. Thesis Co-advisor and postdoc PI
E-mail: flyang@sinica.edu.tw
3. **Dr. Tung-Han Hsieh:** Research Specialist, Research Center for Applied Sciences, Academia Sinica, Taiwan. Ph.D. Collaborator.
E-mail: thhsieh@gate.sinica.edu.tw