

Workshop Report

AIMM 2024 - Artificial Intelligence for Malaria and Infectious Diseases Modelling in Brazil and Latin America

Introduction

The Artificial Intelligence for Malaria and Infectious Diseases Modelling in Brazil and Latin America (AIMM 2024) was a comprehensive three-day workshop hosted at the Institute of Mathematics, Statistics, and Scientific Computation (IMECC) at the University of Campinas, Brazil. The event focused on integrating Artificial Intelligence (AI) and Machine Learning (ML) in healthcare, specifically for malaria and infectious disease modeling. This report provides an overview of the key activities and presentations from the workshop.

Day 1: Overview

- Date: August 28th, 2024
- Location: IMECC, University of Campinas, Brazil
- Time: 9:00 AM - 4:45 PM

The workshop began with a registration session at 9:00 AM, followed by the opening ceremony in the IMECC Auditorium. Attendance was high, reflecting a strong interest in the workshop's theme.

Opening Ceremony and Welcome Address

At 9:30 AM, Professors Ricardo Miranda Martins and Olawale Awe delivered the welcome address, outlining the significance of AI and ML in healthcare, particularly in tackling infectious diseases. They also provided an overview of the workshop's objectives. Prof Dr. Ricardo Martins (the IMECC institute's director) declared the workshop open.

Keynote Speech

From 9:40 AM to 10:30 AM, Professor Luciana Correia Alves delivered a keynote speech on "How Machine Learning Algorithm Models Help Malaria Epidemiological Surveillance in Brazil." Her insightful presentation was recorded and streamed for wider access on the IMECC UNICAMP YouTube page.

Morning Sessions

Following the keynote address, participants took part in a group photo before enjoying a coffee break.



The morning continued with another insightful presentation by Professor Benilton de Sa Carvalho, on “Overview of AI/Machine Learning: Concepts, Tools, and Applications in Healthcare Modeling.”

Afternoon Session

After the lunch break, the afternoon session started with Dr. Deborah Awe’s presentation on "Introduction to Infectious Diseases Dynamics." Dr. Awe provided a detailed exploration of the spread of infectious diseases, which was followed by a hands-on workshop led by Professor Olawale Awe on “Addressing Data Imbalance in Health Datasets: Machine Learning Case Studies.” Participants actively engaged in practical activities and discussions on applying ML to real-world health datasets.

The day concluded on a high note, setting a dynamic pace for the rest of the workshop.

Day 2: Activities Report

- Date: August 29th, 2024
- Venue: IMECC Auditorium and Lecture Room L002

The second day started with Dr. Deborah Awe's session on infectious disease modeling, focusing on SIR, SI, and SEIR models, using R programming. This was followed by an engaging session on "Tidymodels in R: Applications in Malaria Research" led by Professors Samara F. Kiihl and Tatiana Benaglia. The use of real malaria datasets and interactive learning made this session particularly impactful.

After lunch, Professor Olawale Awe's session on "Machine Learning Models for Malaria Predictions/Diagnosis" gave participants a deep dive into the practical applications of AI and ML in predicting malaria outcomes. A presentation by Michael Fabiyi on integrating AI in diagnostic assays closed the day, sparking lively discussions among attendees.

Day 3: Activities Report

- Date: August 30th, 2024
- Venue: IMECC Auditorium and Lecture Room L002

Day three began with an advanced session on the Stochastic Representation of Plasmodium Vivax with Machine Learning applications led by Matheus A. Pumputis Marques and Prof Veronica Gonzalez-Lopez. Participants explored cutting-edge algorithms for malaria research, gaining insights into future research directions. This was followed by a practical workshop with Professor Olawale Awe, focusing on hyperparameter tuning for ML and deep learning models.

In the afternoon, participant groups presented their collaborative projects, which showcased innovative AI applications in malaria data analysis. The day concluded with the official inauguration of the AMMnet Brazil Chapter, followed by the presentation of certificates to participants.

Results and Outcomes

The AIMM 2024 workshop was highly successful, with over 80% of participants rating the event as "Very Satisfactory" or "Excellent." Key outcomes included:

1. Collaborative Research Initiatives: Researchers and students from multiple fields launched a collaborative project on AI-driven malaria modeling.
2. Student Research Opportunities: Several students showed interest for AI-related projects in disease surveillance, showing the potential for future impact of the workshop.

Lessons Learned

1. More Time for Interactive Sessions: Participants expressed the need for more time to engage in Q&A and brainstorming sessions.
2. Pre-Event Training: Offering preparatory workshops or materials could enhance participants' understanding of complex topics.
3. Continuation: Participants expressed interest in seeing us continuing the workshop annually.

Next Steps

To build on the workshop's success:

- Follow-up webinars and workshops will be organized to delve deeper into specific AI and ML techniques for malaria modeling.
- A formal collaborative research network will be established to maintain partnerships and share data for future projects in Brazil.

The AIMM 2024 workshop was a landmark event that fostered collaboration, advanced knowledge sharing, and showcased the potential of AI in combating infectious diseases.

Videos, materials and lectures from the event can be viewed on the IMECC UNICAMP YouTube page and SaLLy website respectively: <https://www.youtube.com/@imeccunicamp1845> and <https://sally.ufba.br/AIMM2024.html>