

Disposition Masterarbeit MAS Data Science (Draft): How can multi-modal data fusion inform and enhance the surveillance and reporting of tropical diseases?

Context

Traditionally underserved communities in Sub-Saharan Africa and Southeast Asia are disproportionately burdened by tropical diseases such as malaria, dengue, zika, and others. These diseases often thrive in regions with limited healthcare infrastructure and resources, leading to significant morbidity and mortality. In my paper, I would like to explore how multi-modal approaches to machine learning might be used to enhance the surveillance and reporting of these diseases. By integrating diverse data sources such as clinical notes, incident reports, and environmental data, multi-modal ML approaches could potentially provide a comprehensive and nuanced understanding of disease patterns which could facilitate accurate disease detection, help ensure timely interventions, and improve the allocation of healthcare resources. This technological advancement could ultimately serve to better inform public health strategies and significantly mitigate the impact of tropical diseases in these vulnerable regions.

This research aims to explore how multi-modal data fusion can inform and enhance the surveillance and reporting of tropical diseases. Specifically, the study will investigate the integration of various data sources to improve the accuracy, timeliness, and granularity of disease monitoring and reporting systems.

Approach

Datasets

Environmental data

PRISM or CPC Global Temperature and Precipitation Datasets & satellite imagery.

Public Health & Epidemiological Reports

ProMED-mail

Additional datasets

The WHO and CDC publish large datasets on tropical disease incidence at regular intervals.

Feature Extraction

Text

TBC

Image

TBC

Modeling & Evaluation

TBC

References

Shenoy S, Rajan AK, Rashid M, Chandran VP, Poojari PG, Kunhikatta V, Acharya D, Nair S, Varma M, Thunga G. Artificial intelligence in differentiating tropical infections: A step ahead. PLoS Negl Trop Dis. 2022 Jun 30;16(6):e0010455. doi: 10.1371/journal.pntd.0010455. PMID: 35771774; PMCID: PMC9246149.

Attai K, Amannejad Y, Vahdat Pour M, Obot O, Uzoka F-M. A Systematic Review of Applications of Machine Learning and Other Soft Computing Techniques for the Diagnosis of Tropical Diseases. Tropical Medicine and Infectious Disease. 2022; 7(12):398. <https://doi.org/10.3390/tropicalmed7120398>