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ARTIFICIAL INTELLIGENCE FOR NTDS: A SYSTEM TO SUPPORT THE DIAGNOSIS OF HELMINTHIASIS FROM MICROSCOPY USING REAL-TIME ARTIFICIAL INTELLIGENCE WORKING IN SMARTPHONES WITH LIMITED CONNECTIVITY

Oral Presentations Session
ORAL PRESENTATION SESSION 06: GLOBAL HEALTH & HIV

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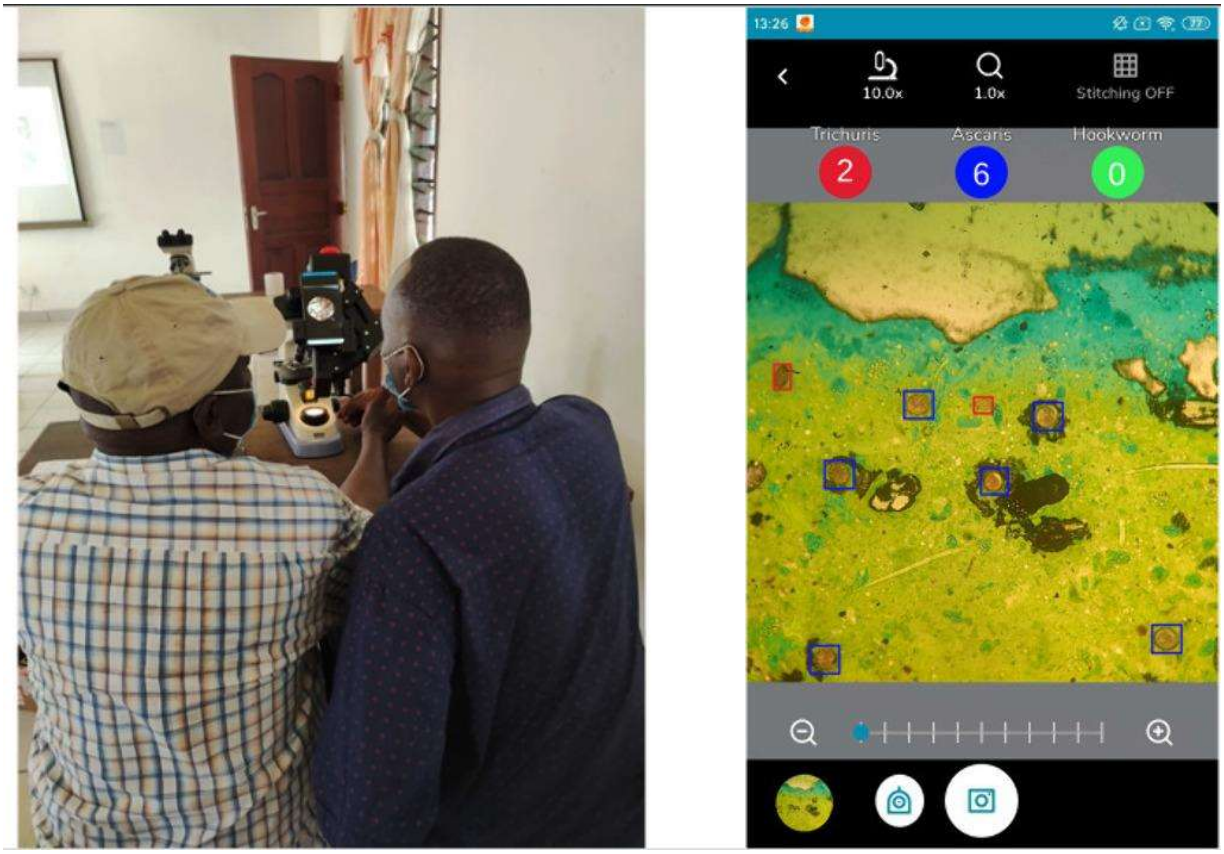
Background: Soil-transmitted helminthiasis (STH), a neglected tropical disease (NTD), affects 1.5 billion people. Although the Kato-Katz technique is the recommended diagnostic method, it has decreased sensitivity and is labour-intensive. To address these issues, a methodology was created and piloted to digitize samples, train and deploy an artificial intelligence (AI) model which runs in real-time on a smartphone for the detection and quantification of Ascaris lumbricoides, Trichuris trichiura and hookworm.
Methods: 1347 stool samples from 5-15-year-old children (Kwale, Kenya) were collected and analyzed by 8 experts with an AI (SSD-MobileNet V2 network) app on smartphones coupled to an optical microscope. The AI model was improved through an iterative methodology in 2 weeks with 4 versions. To iteratively improve the AI model, images were uploaded to a telemedicine platform. Labeled images were used to train a new version of the model, which was deployed on smartphones for the next day's campaign.
Results: The final model, trained with 679 images and 1685 labels, achieved 87.27% precision and 84.72% recall on a validation set of 311 images and 553 labels.
Conclusions/Learning Points: This experiment showed the possibility of human-AI feedback loops to support the work performed by lab technicians close to the point-of-care. The methodology demonstrated the feasibility of carrying out these studies leveraging the latest artificial intelligence tools in a real-world setting without the need for connectivity or expensive equipment. The use of AI could support the WHO's 2030 control and elimination targets for
NTDs.



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