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Radiomic prediction models for malaria and anemia detection using smartphone conjunctiva photography

Conjunctiva photo–based AI model enabling non-invasive, low-cost malaria and anemia detection in resource-limited regions.

Malaria is a major health issue affecting millions of individuals. Researchers at Purdue University developed a radiomic prediction for malaria detection using smartphone conjunctiva photographs to help healthcare professionals, community health workers, non-governmental organizations, and individuals in resource-limited settings. Unlike traditional malaria detection methods, such as blood-based rapid diagnostic tests (RDTs), which are invasive, costly, and reliant on specialized infrastructure and trained professionals, this technology addresses these limitations by offering a cost-effective solution that utilizes smartphone cameras for accessible and easy-to-use malaria screening in homecare settings and underserved areas. It also does not require invasive blood sampling and eliminates the need for trained personnel and expensive diagnostic tools. This technology is scalable, making it suitable for mass malaria screening in resource-limited settings. The intellectual property for this invention covers the software to extract a list of features of the eye from a photo taken with a smartphone camera, a pre-trained model to predict disease probability given those features and providing a treatment plan for the user if disease probability exceeds a certain threshold.

Technology Validation:

Radiomic analyses utilized 4,302 photos of the inner eyelids captured by study personnel using different Android smartphone models from 405 asymptomatic participants aged 5 to 15 years to predict malaria risk. The receiver operating characteristic (ROC) curve analysis illustrates the performance of the neutral network-based malaria classification model using the selected radiomic features, which achieved an area under the curve (AUC) of 0.76 accuracy with a 95% confident interval from 0.68 to 0.84 in distinguishing between malaria-infected and non-infected cases in

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endemic regions.

Advantages:

-Non-invasive

-Accessible

-Scalable

-Cost-effective

-Transparent interpretation

Applications:

-Healthcare professionals

-Non-governmental health organizations

-Healthcare accessibility

-Malaria control and elimination

-Pediatric healthcare

Related Publications:

https://www.nature.com/articles/s41746-025-01548-8

TRL: 4

Intellectual Property:

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