Machine Learning-Based Malaria Parasite Detection in Thin Blood Smear Images

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Malaria is one of the top three most prevalent diseases in Ghana, with 5.2 million cases of malaria in 2022 alone, according to Ghana Health Service data. Light microscopy is the current best option for malaria diagnosis; however, accuracy of the diagnosis depends heavily on the skill of microscopists. Especially in rural areas, there is a paucity of skilled diagnostic personnel. In efforts to streamline the malaria detection process in Ghana, we aimed to build an automated malaria parasite detection system for thin blood smears, integrating recent developments in AI. Using images from the publicly available National Institute of Health malaria dataset, we preprocessed these images into grayscale and an image size of 128x128. Using knowledge of computer vision and kernel filters, we trained a Convolutional Neural Network with 4 convolutional layers, 4 max pooling layers and 1 softmax layer on this dataset. Our input images were further processed and classified into 'Parasitised' or 'Uninfected.' After experimentation with different hyperparameters and model architectures, our best model boasted 95.13% in our main performance metric, validation accuracy. Our method performed favourably in our test metrics, showing promise for parasite detection in Ghana. Work must be done to improve ease of use by health officials, and for integration into health systems.

Awards Won: