

Automatic parasitemia level quantification at blood slide images for malaria drug discovery

Alexandre Victor Fassio ¹ Anna Caroline Aguiar ¹ Guilherme Souza ¹ Camila de Souza Barbosa ² Camila Lima Zanini ² Gabriela Silva de Oliveira ¹ Giovana Rossi Mendes ¹ Igor Mota Rodrigues de Moura ¹ Sarah El Chamy Maluf ¹ Michael Keiser ³ Rafael Victorio Carvalho Guido ¹
Vol 1, 2022 - 153202
Poster

Abstract

Thick blood smear (TBS) remains the gold standard for evaluating new antimalarial effects against field isolates in schizont maturation assays, one of the most common in vitro techniques employed for drug discovery. Despite its low-cost and wide availability, TBS is a laborious, time-consuming process that heavily relies on experienced parasitologists, trained personnel, and facilities, limiting its use in resource-limited environments. Therefore, we developed a deep-learning-based (DL) autonomous system to quantify parasitemia levels at blood slide images (BSI), a fast and low-cost automatic solution that will potentially improve parasitologists' efficiency and overcome TBS drawbacks. To do so, we have collected 2,000 blood slide images from patients infected with *P. falciparum* and *P. vivax*. Then, all parasites were bounding-box labeled using the tool SuperAnnotate. Finally, DL models were trained to detect and classify parasites by stage using YOLO v3. Our models achieved a high mean average precision (mAP) of 0.86.

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Institutions

- ¹ USP - São Carlos
- ² Universidade de São Paulo
- ³ University of California San Francisco

Keywords

- schizont maturation assays
- parasitemia level quantification
- thick blood smear
- Drug Discovery