Background reading

Title: Assessing blood samples for malaria

Project Description:

Malaria is a serious tropical disease, believed to be responsible for the deaths of millions of people every year. However, in many tropical countries any infant with a fever tends to be treated for the disease with the result that the parasite that causes malaria is starting to develop a resistance to the drugs that treat it. As the parasite lives in red blood cells, having an automatic way of determining the number of infected red blood cells is an important step in its diagnosis and treatment -- and in avoiding over-treatment.

The purpose of this project is to develop algorithms that can segment out red blood cells in images of microscope slides and then determine whether or not they are infected using machine learning approaches. A database of images for which the infected cells have been identified by an expert is available. The ultimate aim of this work is to have the algorithms run on a mobile phone, using its camera to capture the images through a microscope.

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| **Keyword** | **Expansion** |
| Assessing blood samples | Evaluate blood samples  Analyse/Assessing Blood panel  Analyse blood samples  Analyze blood samples |
| Malaria | Infected female Anopheles mosquitoes  Parasite  malaria plasmodium  Parasite lives in red blood cells |
| Automatic | Pre-programmed  Self – activating  Computerised / computerized  electronic |
| Number of infected red blood cells | Counting |
| Avoiding over-treatment | Avoiding overdiagnosis  Prevent overtreatment |
| Segment out red blood cells | Separating the red blood cells  RBC segmentation |
| Machine Learning | ML  Artificial Intelligence  Data analysis  Training data |
| Run on a mobile phone | Android  Kotlin, Java, C++, C#  Apple  Swift  Smart-phone |

Search sites:

<https://scholar.google.com/>

<https://dl.acm.org/>

<https://ieeexplore.ieee.org/Xplore/home.jsp>

<https://citeseerx.ist.psu.edu/index>

<https://www.webofknowledge.com/>

<https://app.2dsearch.com/>

Search Strategy Report: <https://app.2dsearch.com/query>

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| Query | ("Blood sample\*" OR "blood panel\*") ("RBC Segmentation" OR "Segment red blood cell\*" OR RBC OR "Red blood cell\*") (Malaria OR "malaria plasmodium" OR "infected female Anopheles mosquitoes" OR "malaria parasite") ("Machine learning " OR "Data Analysis" OR "Training data" OR "Artificial Intelligence") |
| Visualisation |  |
| Google Scholar | Searched on 30/09/2021: 2,300 results |
| ACM | Searched on 30/09/2021: 1 result |
| Lens.org | Searched on 30/09/2021: 396 results |
| PubMed | Searched on 30/09/2021: 7 results |
| IEE Xplore | Searched on 30/09/2021: 0 results |
| Web of Science | Searched on 30/09/2021: 2 results |
| CiteSeer | Searched on 30/09/2021: 682,629 results |

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| Query | ("Blood samples" OR "blood panels") ("RBC Segmentation" OR "Segment red blood cells" OR "Red blood cells") ("Machine learning " OR "Data Analysis" OR "Training data" OR "Artificial Intelligence") (Malaria) |
| Visualisation |  |
| Google Scholar | Searched on 30/09/2021: 5,210 results |
| ACM | Searched on 30/09/2021: 3 result |
| Lens.org | Searched on 30/09/2021: 346 results |
| PubMed | Searched on 30/09/2021: 1 result |
| IEE Xplore | Searched on 30/09/2021: 0 results |
| Web of Science | Searched on 30/09/2021: 1 result |
| CiteSeer | Searched on 30/09/2021: 608,211 results |

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| Query | "blood samples" "malaria" "Artificial Intelligence" |
| Visualisation |  |
| Google Scholar | Searched on 30/09/2021: 733 results |
| ACM | Searched on 30/09/2021: 115,798 result |
| Lens.org | Searched on 30/09/2021: 193 results |
| PubMed | Searched on 30/09/2021: 1 result |
| IEE Xplore | Searched on 30/09/2021: 2 results |
| Web of Science | Searched on 30/09/2021: 1 result |
| CiteSeer | Searched on 30/09/2021: 1,823 results |

Publications:

Segmentation of malaria parasites in peripheral blood smear images - <https://ieeexplore.ieee.org/abstract/document/4959845>

The Malaria System MicroApp: A New, Mobile Device-Based Tool for Malaria Diagnosis

<https://www.researchprotocols.org/2017/4/e70>

Machine learning-based in-line holographic sensing of unstained malaria-infected red blood cells

<https://onlinelibrary.wiley.com/doi/full/10.1002/jbio.201800101>

Malaria Parasite Detection Using Deep Learning : (Beneficial to humankind)

<https://ieeexplore.ieee.org/abstract/document/9121073>

Detection of malaria parasite in giemsa blood sample using image processing

<https://aircconline.com/ijcsit/V10N1/10118ijcsit05.pdf>

Malaria parasite detection and species identification on thin blood smears using a convolutional neural network

<https://dl.acm.org/doi/10.5555/3204094.3204095>

Application Of Malaria Detection Of Drawing Blood Cells Using Microscopic Opencv

<https://www.lens.org/lens/scholar/article/171-649-539-707-286/main>

Automated Detection of Malaria Parasites on Thick Blood Smears via Mobile Devices

<https://www.sciencedirect.com/science/article/pii/S1877050916312029>

Image segmentation techniques for red blood cell : on overview

<https://www.lens.org/lens/scholar/article/114-533-619-202-673/main>

Malaria Screener: a smartphone application for automated malaria screening

<https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-020-05453-1>

Deep Learning for Smartphone-Based Malaria Parasite Detection in Thick Blood Smears

<https://ieeexplore.ieee.org/abstract/document/8846750>

ImageNet Classification with Deep Convolutional Neural Networks

<https://proceedings.neurips.cc/paper/2012/file/c399862d3b9d6b76c8436e924a68c45b-Paper.pdf>