

SUMMARY AND REPORT OF SOFTWARE BY TEAM INTELLITECH FOR THE SCREENERPLUS APK

Background

Malaria is a significant public health challenge in Nigeria, accounting for a substantial portion of global malaria cases and deaths. According to the World Health Organization, Nigeria bears the highest malaria burden globally, with millions affected annually. Effective and timely diagnosis is crucial for controlling and eventually eliminating this disease. Traditional microscopy, while accurate, is labor-intensive and requires specialized skills. Leveraging modern technology, such as machine learning and mobile applications, can enhance diagnostic accuracy and accessibility, particularly in remote areas.

Problem Statement

Despite the high prevalence of malaria in Nigeria, access to reliable diagnostic tools remains limited, especially in rural regions. Conventional diagnostic methods are not only time-consuming but also prone to human error, which can lead to misdiagnosis and improper treatment. There is an urgent need for an efficient, accessible, and accurate method for detecting malaria parasites that can be easily deployed across Nigeria.

In 2022, Nigeria has highest percentage of global malaria cases. 27% in the world and 55% in West Africa (World Malaria Report, 2022). Manual diagnosis is time-consuming and prone to errors. Also, our project give way to for non-technical individual to test for malaria.

Aim

This project aims to develop a mobile application using Flutter integrated with a deep learning model built with TensorFlow for the automated detection of malaria parasites in blood smear images captured on a smartphone camera. This application would empower not only healthcare workers but also the general public in Nigeria with a user-friendly tool for rapid and preliminary malaria diagnosis.

Methodology

1. Data Collection: Used publicly available dataset provided The National Library of Medicine (NLM)
2. Model Development:
 - a. Preprocessing:: Use image augmentation techniques to enhance the dataset and improve model robustness.
 - b. Model Training:: Used a pretrained model, MobileNet V2 with a convolutional neural network (CNN) using TensorFlow. The model was trained to identify malaria parasites in blood smear images.
 - c. Model Evaluation: Validate the model using a separate validation dataset and fine-tune it to achieve optimal performance.
 - d. Exported the model into TFLITE making it mobile for an application.
3. Mobile Application Development:
 - a. Use Flutter to build a mobile application specifically for Android devices
 - b. Integrate the trained TensorFlow model into the Flutter app for real-time malaria detection.
4. Testing and Deployment:

Conduct thorough testing of the application within the development environment to ensure reliability and accuracy. Also, due to cost of lenses, we could test directly from

the camera, we had to upload images, paratized images and other random images. Since this is a hackathon project, deployment in real-world settings was not conducted.

Results

The application demonstrated the ability to detect malaria parasites; however, the accuracy was lower than expected due to limitations in the dataset. The lack of a comprehensive and diverse dataset, which accurately represents real-world conditions, impacted the model's performance. Despite this, the Android application showed potential and provided valuable insights into the development of mobile diagnostic tools for malaria detection. The application was user-friendly, making it suitable for use by both healthcare workers and the general public.

Conclusion

The development of an Android-based mobile application for malaria parasite detection using TensorFlow and Flutter represents a significant advancement in the fight against malaria in Nigeria. This hackathon project demonstrates the feasibility and potential impact of leveraging machine learning and mobile technology to address healthcare challenges. While the accuracy was impacted by dataset limitations, the results are promising. Future work could focus on refining the model, expanding the dataset, and testing the application in real-world settings to further improve malaria management and enhance patient outcomes in Nigeria.