

AI-Powered Malaria Diagnosis System with Mobile, Web, and Chatbot Integration

Malaria Screener

Group: 16

1. Abel Mekonn
2. Delina Mulubrhan
3. Zelalem Abera
4. Zelalem Wubet

Project Idea

Problem: Malaria diagnosis in resource-limited areas relies on manual microscopy, which is slow and requires expertise. Patients and healthcare workers also lack real-time guidance on symptoms, prevention, and treatment.

Goal: Develop a cross-platform mobile app (Flutter) for AI-powered malaria screening, a Next.js dashboard for healthcare providers, a Django backend, and a Malaria-specific chatbot for instant support. The system will:

- Automate parasite detection in blood smears using AI-based models.
- Store and manage patient records.
- Provide a chatbot assistant for malaria-related queries.

Relevance to Sustainable Development Goals (SDGs)

Malaria is directly linked to the United Nations Sustainable Development Goals (SDGs), particularly:

- SDG 3: Good Health and Well-being – Target 3.3 aims to end malaria by 2030.

“By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases “

Literature

1. "Malaria Screener: A Smartphone Application for Automated Malaria Screening" (Yu et al., 2020) Android-based AI microscopy for malaria detection (98.6% accuracy).
2. "AI Chatbots in Healthcare: A Systematic Review" (Palanica et al., 2019) Demonstrates the effectiveness of medical chatbots in improving patient education and triage.

Data Description

The project will utilize three primary types of data. For malaria blood smear analysis, we will use image datasets sourced from the NIH Malaria Dataset. These images will be in JPEG or PNG format and will undergo preprocessing including normalization, augmentation, and segmentation to ensure optimal model performance. For the chatbot functionality, training data will be compiled from authoritative sources including WHO malaria guidelines and peer-reviewed medical journals. This text data will consist of FAQ pairs and symptom-treatment mappings that will be processed through NLP cleaning and intent classification pipelines. All patient records including demographics, diagnostic results, and medical history will be securely stored and managed in a PostgreSQL database system designed for healthcare applications.

Approach (Deep Learning + NLP)

The malaria detection system will employ deep learning techniques using fine-tuned CNN architectures such as EfficientNet or ResNet specifically optimized for analyzing both thin and thick blood smear images. These models will be deployed efficiently across platforms, using TensorFlow Lite for mobile implementation and full TensorFlow/PyTorch frameworks for backend processing. For the malaria assistance chatbot, we will implement either transformer-based models like BERT or GPT-3.5-turbo. The chatbot will be designed to provide comprehensive support, answering frequently asked questions about malaria symptoms, prevention methods, and treatment options while also offering practical guidance about when to seek medical attention. This chatbot functionality will be seamlessly integrated into both the mobile application and web dashboard interfaces to ensure accessibility across platforms.