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Implementation of an Image Processing System Using Artificial Intelligence for the Diagnosis of Malaria Disease

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Abstract : Image processing become more sophisticated over time due to technological advances, especially artificial intelligence (AI) technology. Currently, AI image processing is used in many areas, including surveillance, industry, science, and medicine. AI in medical image processing can help doctors diagnose diseases faster, with minimal mistakes, and with less effort. Among these diseases is malaria, which remains a major public health challenge in many parts of the world. It affects millions of people every year, particularly in tropical and subtropical regions. Early detection of malaria is essential to prevent serious complications and reduce the burden of the disease. In this paper, we propose and implement a scheme based on AI image processing to enhance malaria disease diagnosis through automated analysis of blood smear images. The scheme is based on the convolutional neural network (CNN) method. So, we have developed a model that classifies infected and uninfected single red cells using images available on Kaggle, as well as real blood smear images obtained from the Central Laboratory of Medical Biology EHS Laadi Flici (formerly El Kettar) in Algeria. The real images were segmented into individual cells using the watershed algorithm in order to match the images from the Kaagle dataset. The model was trained and tested, achieving an accuracy of 99% and 97% accuracy for new real images. This validates that the model performs well with new real images, although with slightly lower accuracy. Additionally, the model has been embedded in a Raspberry Pi4, and a graphical user interface (GUI) was developed to visualize the malaria diagnostic results and facilitate user interaction.

Keywords : medical image processing, malaria parasite, classification, CNN, artificial intelligence
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