# Automated spatial coherence microscope for malaria diagnosis

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**Abstract:** The detection of malaria at the early stage is very important to heath. In this paper, we developed an automated high resolution microscope based on spatial coherence rather than temporal coherence for the automated quantification of malaria infected red blood cells (RBCs) using machine learning. Different The qunattative features were extracted from the phase images of the samples. The network achieves a good sensitivity and specificity for malaria infection identification.

**Summary:** Birefringence is the direct reflection of the change in the structural and mechanical properties of the sample and change in phase is proportional to birefringence. There are various techniques that are used for the measurement of change in phase such as refractive index tomography, didgital holography microscopy, optical diffraction tomography, spectroscopy microscopy. To attain a high resolution all these methods are using a broad band light source so we need a dispersion compensation meachnism. Spatial coherence microscope is purely based on monochromatic light source so there is no need of dispersion compensation meachnism. The phase extracted from the interferogram recorded by SCM is used for the extraction of morphological features. Further, the features were fed to the SVM classifier for the classification of malria infected cells.

**Method:** The recorded single interferogram of the healthy and malaria infected RBCs were Fourier transformed and phase information is extracted. Further, dirrefent features were extracted from the phase information.

**Results:** The features extrcated from the phase information are used to classify the healthy and malaria infected red blood cells. As the structural and meachnical properties of the cell changes and hence the features changes accordingly. The SVM model was designed to classify malaria infected RBC's from the normal RBC's with an average sensitivity and specificity is 98.5 % and 97.3 % respectively.

**Conclusion:** The present system can be used rapid and label-free diagnosis of malaria infected RBCs. This technique will be used for point-of-care.

Further details of the paper will be presented later.