

Smart Microscope Navigation for Blood Film Analysis

Category
Software/AI tools

An AI-enabled microscope slide navigation system for automated, optical sampling of biospecimens under high magnification objectives



Image credit: I Stock (nicolas_)

Background

Analysis of the cellular morphology from blood samples on a glass slide under a microscope is essential to clinical decision making. The level of detail needed to distinguish cell features specific to both infectious and non-infectious disorders is obtained with high magnification objectives, however this high spatial resolution comes at the expense of a limited Field of View (FoV).

Unfortunately, blood specimens mostly present agglomerations of overlapping cells and thin areas with distorted red blood cells. As a result, only specific regions of the film, containing spatially separated blood cells at a suitable number density (monolayer), are useful for morphological and textural analysis. Finding these clinically relevant regions requires visual inspection of the multiple FoVs via manual operation of a moving stage microscope, a process which is time consuming and requires the availability of a trained microscopist. This renders the acquisition process costly and unsuitable for high-throughput analysis of specimens.

Technology Overview

UCL researchers have created an AI-enabled scanning system, SmartNav, which can control a digital microscope in a similar way to a human expert. More precisely, SmartNav uses machine learning to control the stage and focus system of a high magnification motorized digital microscope and navigate through blood films in a way which mimics the cognitive steps of a human microscopist. Therefore SmartNav is able to automatically locate areas suitable for cell morphology analysis on a glass microscopy slide.

This approach avoids the need for imaging the whole blood smear by automatically finding the most useful regions for the microscopist to then analyse. This significantly reduces acquisition time as well as memory consumption and therefore enables scaling of high-throughput assessment of blood smears to support haematology clinical pathways.

Benefits

Existing commercial solutions require bespoke, costly equipment, computationally expensive algorithms, tedious calibration procedures, pre-scanning at lower magnifications, special preparation, and manual labelling of the glass slides. SmartNav does not rely on such constraints and therefore can be a faster, cost-efficient solution to blood film analysis.

Applications

This technology could be used to accelerate peripheral blood (and bone marrow) film analysis in the context of blood disorders such as leukaemia, anaemia or parasitic infections.

Opportunity

UCL is looking to find a partner for a commercial or licensing opportunity.

Patents

[PCT/GB2021/053189 "Automated Microscopy"](#)

IP Status

Patent application submitted

Seeking

Development partner, Commercial Partner, Licensing