AI to detect very early HIV infections before antibodies have been developed.

Research interests: My research interests are machine learning and deep learning with application to health, biology, and agriculture. I have found these domains to be exciting not only because of their practical value but also as an inspiration for new types of problems that prompt the development of new theories and algorithms that have not been investigated before.

Problem

Blood transfusion is an essential component of the healthcare system of every country and patients who require blood transfusion service as part of the clinical management of their condition have the right to expect that sufficient and safe blood will be available to meet their needs. However, this is not always the case, The blood collected is not always healthy.
A recent study conducted by doctor Yoda is Burkina Faso has shown that on 1/2500 blood collected is infected with HIV, 1/408 hepatitis B and 1/308 for hepatitis C. This infected blood passes through the cracks when the time of seroconversion is not respected by the donor. For example, an HIV-infected donor who comes to give blood before 22 days or 30 days after an unprotected sexual relationship or the contamination. The test will detect that the donor is negative however the virus is present. The receiver of this blood is at a higher risk of contamination. The current method used to prevent this case is PCR

Polymerase chain reaction (PCR) tests are used to detect HIV's genetic material, called RNA. These tests can be used to screen the donated blood supply and to detect very early infections before antibodies have been developed. This test may be performed just days or weeks after exposure to HIV. Although these tests are the most accurate, they are not performed as often as the other HIV tests because they are expensive and also time- and labor-intensive.

Deep Learning (DL) is a subfield of machine learning and artificial intelligence that is increasingly used in medicine for diagnosis, classification, or prediction. How can deep learning be used to tackle this problem?

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