

Dawn of artificial intelligence - Enable digital Pathology in Pakistan: A paradigm shift

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Dear Editor, Pathology particularly histopathology is considered to be a busy and challenging field. It is considered as gold standard for the diagnosis and management of patient particularly in cases of tumour. It has been more than twenty years since the introduction of whole slide imaging (WSI) in the developed part of the world. Various whole slide image (WSI) devices and use of artificial intelligence (AI) based softwares have transformed the field of Pathology.¹

Digital pathology is a novel technology and currently being implemented in most of the developed part of the world.² Once the patient's data becomes digital, it is easily stored, reproducible on a single click and quality remains same. This data can be used to make disease models, disease trends and predict the outcome of a particular disease through data mining which will open new horizons of precise medicine.

The use of WSI with computational pathology and data storage devices have revolutionized the working in histopathology. The world witnessed an exponential rise in its adoption particularly after Covid-19 pandemic.¹ However, in the developing world either it is not being implemented or its use is still sub-optimal.

By realizing the potential of digital and computational pathology along with the use of artificial intelligence software, we can bring a drastic change in the field of personalized medicine in the developing part of the world.³ Numerous validation studies have been published indicating that WSI is a reliable tool for routine diagnosis in surgical pathology.⁴

In 2017, United States Food and Drug Administration (FDA) gave permission to the first WSI for primary diagnosis in surgical pathology.⁵ Furthermore, the use of medical image

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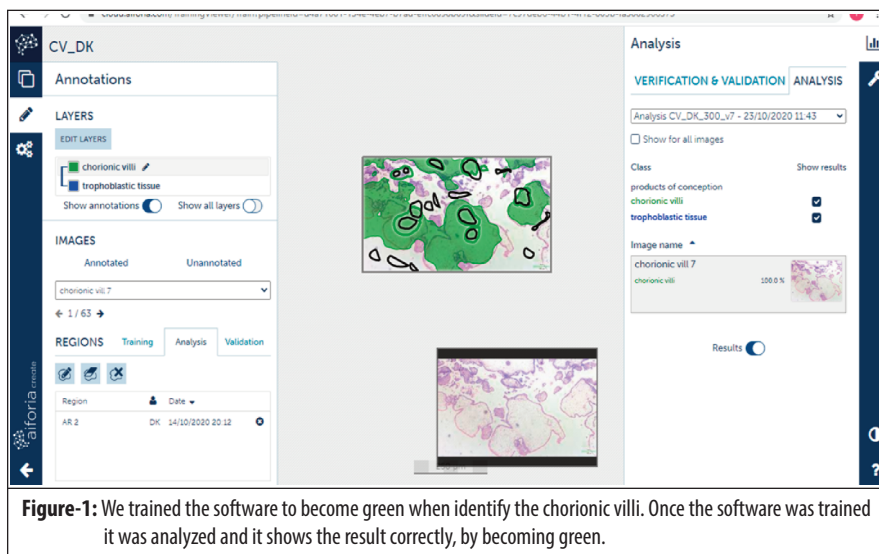


Figure-1: We trained the software to become green when identify the chorionic villi. Once the software was trained it was analyzed and it shows the result correctly, by becoming green.

analysis AI based softwares have made the work of pathologists much easier by accurately measuring, quantifying and even picking the small pathologies.⁶

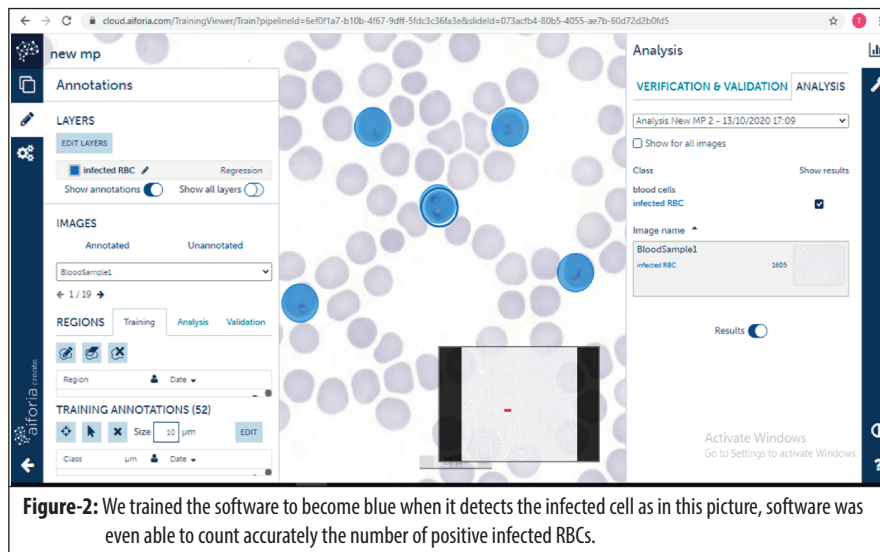
Despite all these advantages, it is judicious to acknowledge some unresolved issues which still need to be addressed adequately before WSI finds its place in routine application across the globe particularly developing countries. These issues include the initial cost of procurement, implementation and operational costs of WSI and additional obligatory hidden costs of training of staff and pathologists, technical support, digital slide storage systems, and regulatory or licensing costs⁷

Our projects

We performed pilot projects to validate the use of AI based software in our setup from 1st to 30th September 2020. These projects include chorionic villi and malarial parasite identification. Due to the unavailability of whole slide scanner and digital microscope we made digital slides through the camera of microscope and trained the slides on deep neural network based AI software Aiforia.

Chorionic villi & malarial parasite identification

Total 30 previously diagnosed cases of product of conception and malarial parasite were taken and converted into digital slides. These cases were fed into the AI based



software which was trained to analyse these digital slides. The software could correctly diagnose 24 cases of chorionic villi and 26 cases of malarial parasite as shown in figure-1 and 2.

Digital pathology is at our door step and its adoption is now the demand of the day. Digital pathology and AI based applications can be helpful not only for second and third opinion but AI enables digital pathology can reduce the work load of pathologist by accurate measurement, counting and helping the pathologist in picking up small pathologies which can be overlooked.

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