Artificial intelligence-based image recognition tool for early detection of sexually transmitted infections

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Background:
Despite increasing prevention and control measures, sexually transmitted infections (STIs) are increasing in many countries, including Australia. Early detection of STIs is crucial to prevent severe clinical consequences and further spread throughout the community. Our study aims to develop an artificial intelligence (AI)-based image recognition tool to help public detect the lesions and link with the clinics for required services. The users could upload the images of lesions on their genitals and the tool provides the percentage likelihood of STIs.

Methods:
We used the existing STI lesion images recorded at Melbourne Sexual Health Centre (MSHC). We included a total of 310 (248 for training and 62 for testing) lesion images caused by herpes, syphilis, genital warts, and also healthy skin pictures as controls. We performed lesion alignment of images and used a residual convolutional neural network (ResNest-34) to learn coupled spatiotemporal features from aligned images. Then, we extracted the spatiotemporal features of the lesions to classify them into the respective STIs in comparison with healthy control.

Results:
The best performed models with 150 epoch, $3e^{-4}$ learning rate, achieved AUC values at 82%, 85%, 79% and 75% for herpes, primary syphilis, secondary syphilis and genital warts respectively. The models' sensitivity for detection of primary syphilis was highest at 75%, followed by primary syphilis (70%), herpes (66%) and genital warts (60%). Despite the limited number of currently available images for model training, it could effectively classify STIs from healthy controls.

Conclusion:
The AI-based image recognition tool could be an effective measure to assist public in early detection of STIs. As a future work, MSHC would collect more images to construct a more efficient model and make it available for the public.

Disclosure of Interest Statement: None