GENERALIZABLE SEGMENT ANYTHING MODEL VIA SELECTION STRATEGY FOR SKIN LESION SEGMENTATION

Authors:
Sun J[1,2], Yu Z[5,6], Yan S[5,6], Towns J[1,2], Zhang L[3,4], Ong JJ[1,2], Ge Z[5,6], Zhang L[1,2,7,8]

[1] Melbourne Sexual Health Centre, Alfred Health, Melbourne, Australia
[2] The School of Translational Medicine (STM), Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, VIC, Australia
[3] Suzhou Industrial Park Monash Research Institute of Science and Technology, Suzhou, China
[4] School of Public Health and Preventative Medicine, School of Medicine, Nursing and Health Sciences, Monash University, Australia
[5] AIM for Health Lab, Monash University, Melbourne, VIC, Australia
[6] Faculty of IT, Monash University, Melbourne, VIC, Australia
[7] China-Australia Joint Research Center for Infectious Diseases, School of Public Health, Xi'an Jiaotong University Health Science Center, Xi'an, Shaanxi, China
[8] Phase I clinical trial research ward, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, China.

Background:
Sexually transmitted infections (STIs) often present with dermatological lesions, so the accurate segmentation of lesions will help the development of recognition tools, allowing users to detect STI-related skin lesions earlier, so they can attend healthcare for earlier screening, treatment and thus prevent ongoing transmission. However, segmentation of STI-related lesions has relied on manual annotation by specialists, which is time-consuming and prone to inconsistency, highlighting the need for more efficient tools.

Methods:
To address these challenges, we introduced an innovative point-selection strategy to improve accuracy in skin lesion segmentation. Specifically, we first identified the uncertain areas by the Segment Anything Model (SAM), which may contain lesion parts, and learned the distribution of these uncertain areas. With this learned prior, complementary points were selected as prompts to refine the segmentation results. Furthermore, to avoid segmentation regions overlapping benign areas, we constrained the segmentation results through pseudo-boxes crafted by the selected points. We evaluated our approach on five public datasets which include general and STI-related skin lesions. Segmentation accuracy was assessed using the Dice score.

Results:
Our proposed techniques collectively resulted in lesion segmentation with more precise, completed, and compact lesion areas compared to previous methods. For general skin lesions, the Dice score increased from 0.849(95%CI: 0.838-0.861) to 0.860(0.849-0.871), reflecting an absolute improvement of 1.30%. For STI-related lesions, the Dice score improved from 0.704(0.693-0.715) to 0.769(0.763-0.775), an absolute improvement of 9.23%. The average segment time was 0.129 seconds per image, fulfilling the requirement for rapid segmentation in clinical practice.

Conclusion:

Our proposed model introduces a well-designed framework for skin segmentation through the point-selection strategy, especially for STI-related lesion segmentation. By applying our model to STI-related skin lesion segmentation tasks, our work directly contributes to advancing automated tools for sexual health research, offering improved support for the screening, monitoring, and management of STIs.

Disclosure of Interest Statement:
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