Supplementary text for -

Unsupervised multi-latent space RL framework for video summarization in ultrasound imaging

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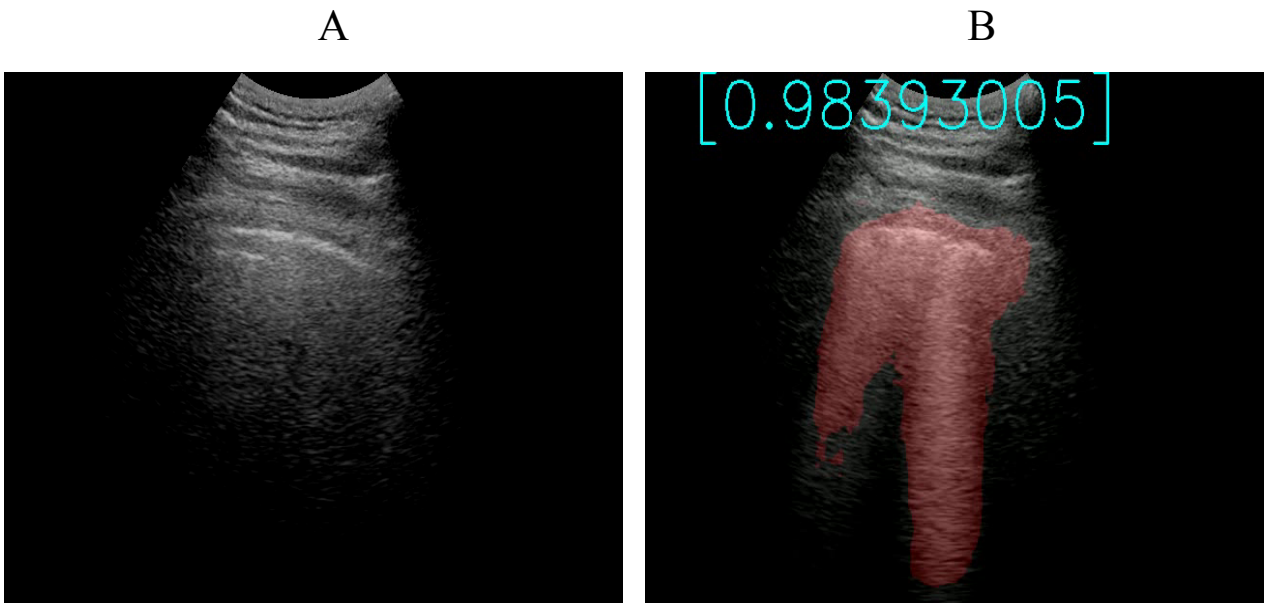
Code and Data Availability

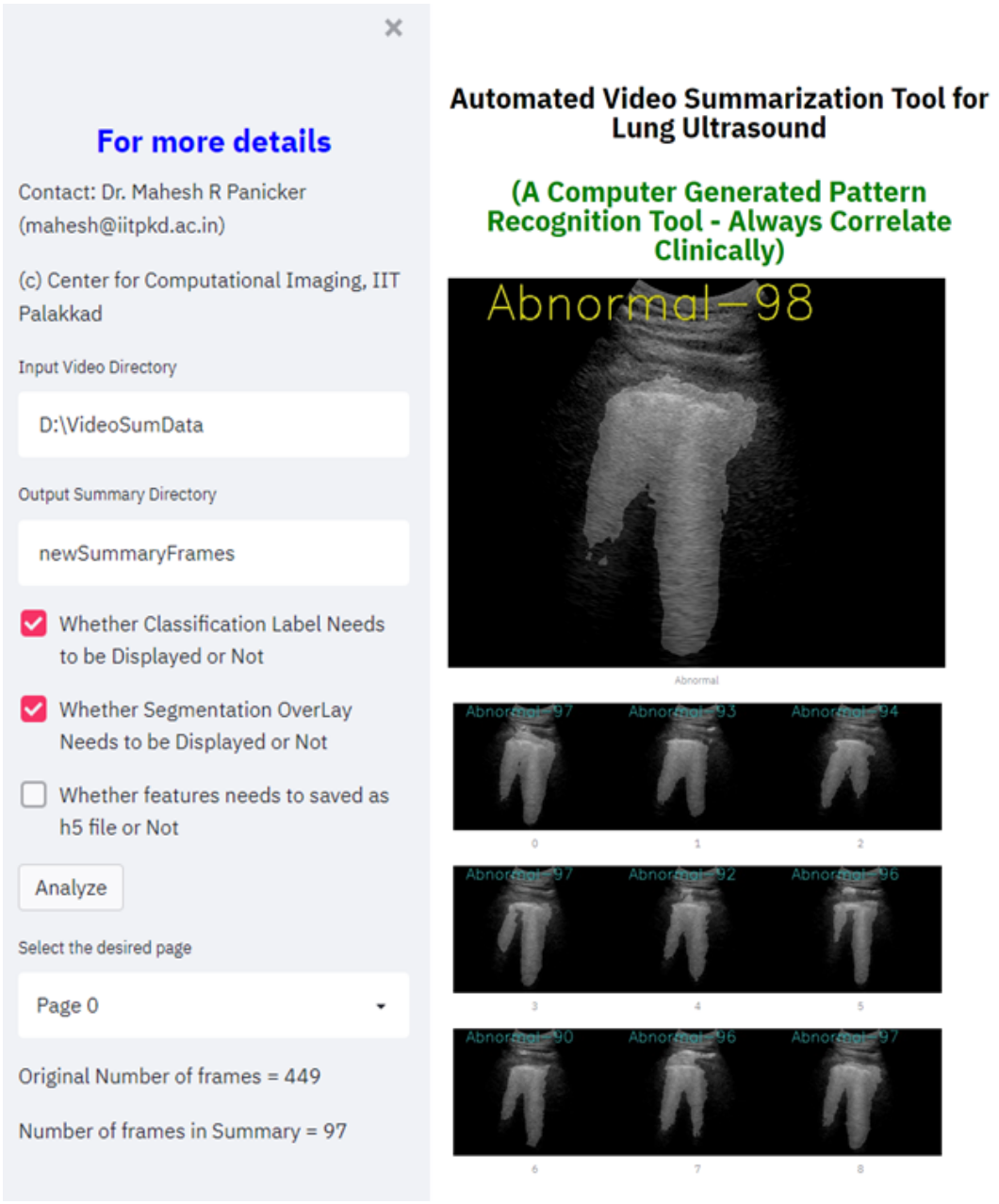
As supplement material to the main text, the code for generating the summary video, the prototype model and a few examples of lung ultrasound scans and their summaries generated by the summarization algorithm are provided in the GitHub repository [1] as additional material for reference.

Preferential Summarization of Key Landmarks

To demonstrate the working of the video summarization algorithm an example video from the given dataset is used to highlight the visual differences between the complete ultrasound video and its summary (refer Supplementary Fig.1 and video name SupVid4 and its summary in [1]). It can be seen that the algorithm for summarizing the video has preferentially selected larger segments of frames with B-lines over frames that don't. Also, it is worth noting that the complete video has about 450 frames whereas the



Supplementary Figure 1: **Preferential (diagnostically important) summarization aspect of the algorithm.** A) Presence of ambiguous regions in the ultrasound scan and B) the preferential selection of pathologically relevant structures like the B-lines for the summary.



Supplementary Figure 2: **Web-application deployment.** The tool has the option to select the classification labels and the segmentation maps to be overlaid on the frames. Provision is also given to save the frame features. The tool will show the summary video, a collage of random 9 frames from the summary video and the frame numbers.

summarized video is just under 100 frames giving a compression ratio over three-fourths the full video length whilst preserving diagnostically important information.

Web-application Deployment for Tele-medicine

To further validate the usefulness of the proposed methodology in tele-medicine, a prototype of the system is developed into a web application as a proof of concept for deployment on cloud. The demo of the tool can be found in [2] and is available for trial by contacting the authors. A sample web-application snap shot is shown in Supplementary Fig.2.

Comments and Disclaimer:

1. As mentioned in the main text, the present work demonstrates a prototype for a robust ultrasound video summarization pipeline. At present the system is trained and validated with ultrasound scans from various geographies obtained from different ultrasound machines by separate clinicians. Future work would include analyzing the proposed system with better pruned US scans i.e. data from distinct machine vendors, standardized ultrasound scans with specific presets which are expected to further increase the performance of the proposed methodology.

2. The following prototype is in development and should not be used as a substitute for a trained professional in making diagnostic decisions.

Supplementary References

1. Roshan P, M. & Mahesh R, P. *Unsupervised multi-latent space reinforcement learning framework for video summarization in ultrasound imaging* GitHub repository, `https://github.com/rpm1412/LUS_Video_Summarization`. 2021.

2. Mahesh R, P. *Web-application deployment of the model in the paper Unsupervised multi-latent space reinforcement learning framework for video summarization in ultrasound imaging* Center for Computational Imaging at IIT Palakkad, `http://www.pulseecho.in/alus/video-summarization/`. 2021.