



Hybrid Intelligence In Medical Image Segmentation For Pulmonary Tuberculosis Diagnosis

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Clinical Context

8-15 mins manual contouring for NHS.

~10% complex cases require correction

Lung segmentation for TB diagnosis

AI improves automation but remains static after deployment.

Manual correction is still needed.

Why Static AI fails in difficult cases

High DICE scores do not guarantee stable anatomical boundaries in complex cases



Input image



Output image

Our Solution - HybridMS

From stable AI to adaptive Hybrid Intelligence

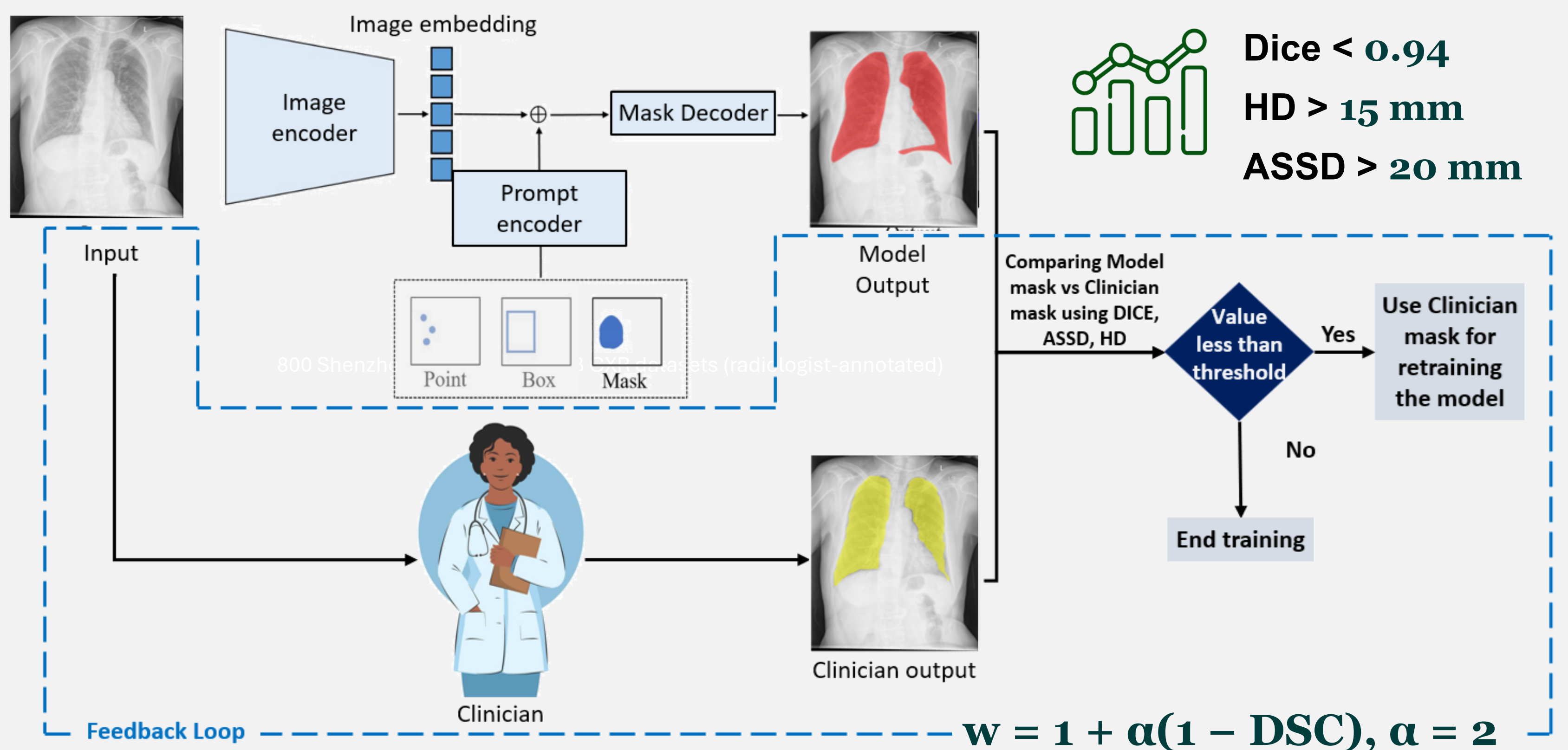


Fig 1: HybridMS: Adaptive Human-in-the-Loop Segmentation built-up on MedSAM.

Performance and Clinical Outcomes

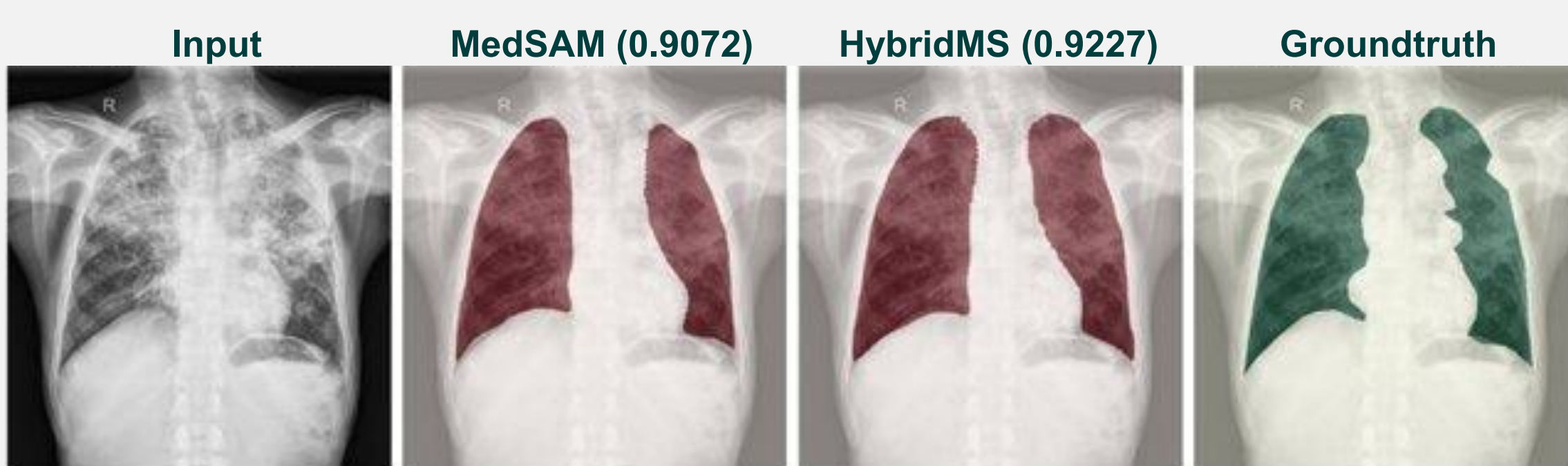


Fig 2: Improved boundary precision (reduced HD and ASSD).

Segmentation Accuracy

Model	Dice	HD (mm)	IoU
MedSAM	0.9435	35.01	0.8941
HybridMS	0.9538	32.64	0.9126

Workflow Efficiency

Case type	Manual segmentation (min)	HybridMS-assisted (min)
Standard cases	8-10	~2.0
Difficult cases	10-15	~2.5

* 800 Shenzhen & Montgomery TB CXR datasets (radiologist-annotated)

Clinical Impact



82% faster annotation (standard cases)



~60% faster correction (complex cases)



Dice: 0.9435 → 0.9538 (p < 0.001)



90% automated; 10% selectively reviewed

HybridMS bridges AI accuracy and real-world clinical reliability for NHS deployment