

EP08.17

RAS-LD: development of a deep learning model for segmentation and reconstruction of acoustic shadow regions

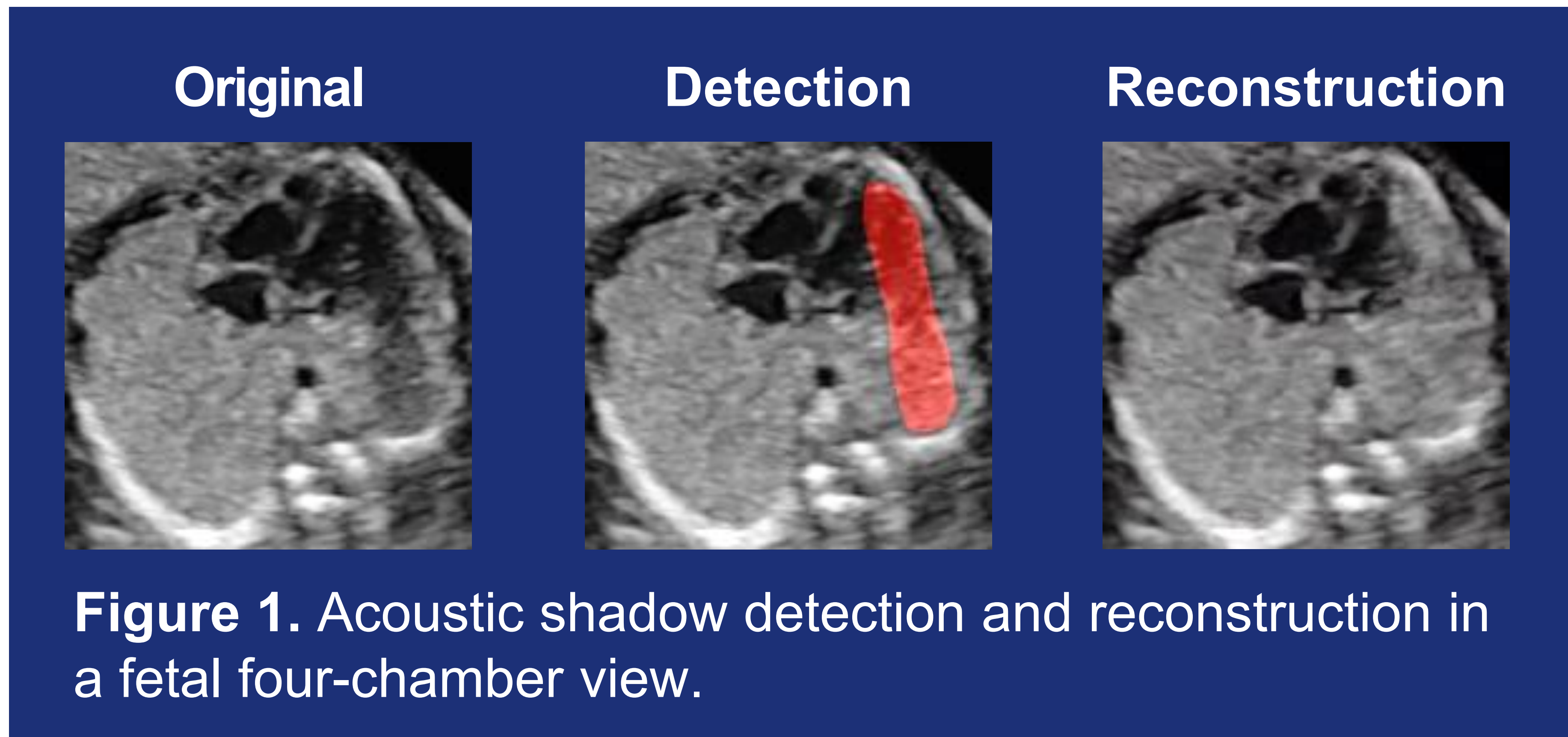
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Introduction

Acoustic shadow obscures distal structures in ultrasound and may impair diagnosis. We developed RAS-LD, which uses reference images from the same video to segment and reconstruct shadow regions while preserving case-specific anatomy.

Objectives

To develop and evaluate an AI model for automatic segmentation and reconstruction of acoustic shadow regions in fetal cardiac ultrasound, preserving case-specific anatomical structures.



Methods

We collected 1,011 fetal cardiac ultrasound videos from 379 cases. Our model first detects acoustic shadow regions, then reconstructs them using reference frames from the same video to preserve case-specific anatomy. We evaluated segmentation with Dice coefficient and reconstruction with SSIM and LPIPS.

Results

The segmentation model achieved a Dice coefficient of 0.803. Reconstruction performance was SSIM 0.835 and LPIPS 0.328. t-SNE and UMAP confirmed that reconstructed images were close to reference images in feature space.

Conclusion

- RAS-LD enabled acoustic shadow removal while preserving case-specific anatomy.
- Reconstructed images were close to reference images in both appearance and feature space.
- This approach may improve AI-assisted fetal cardiac ultrasound screening and is potentially applicable to other anatomical regions.

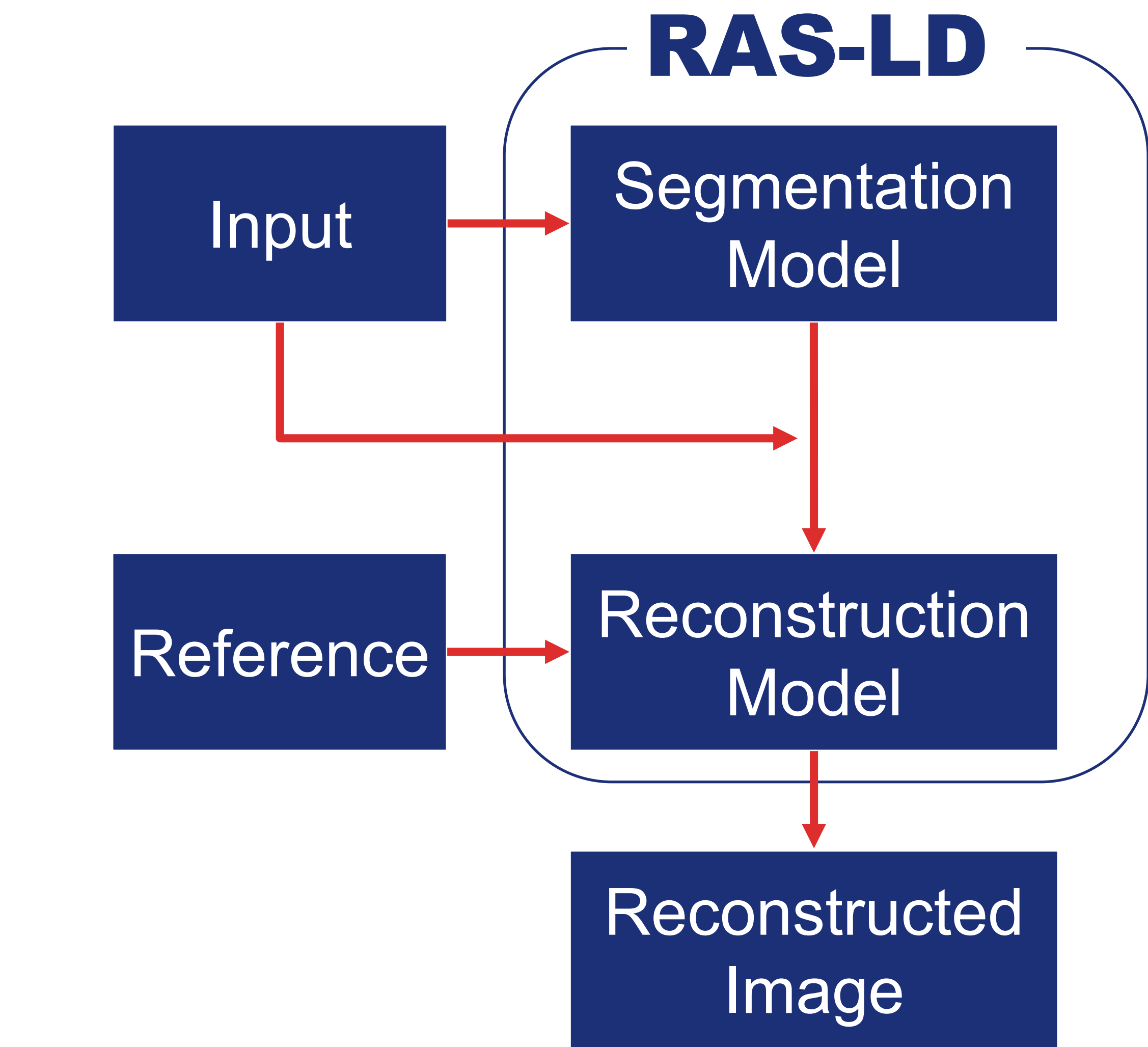


Figure 2. Overview of the RAS-LD pipeline.