Optimal View Detection for Ultrasound-guided Supraclavicular Block using Deep Learning Approaches

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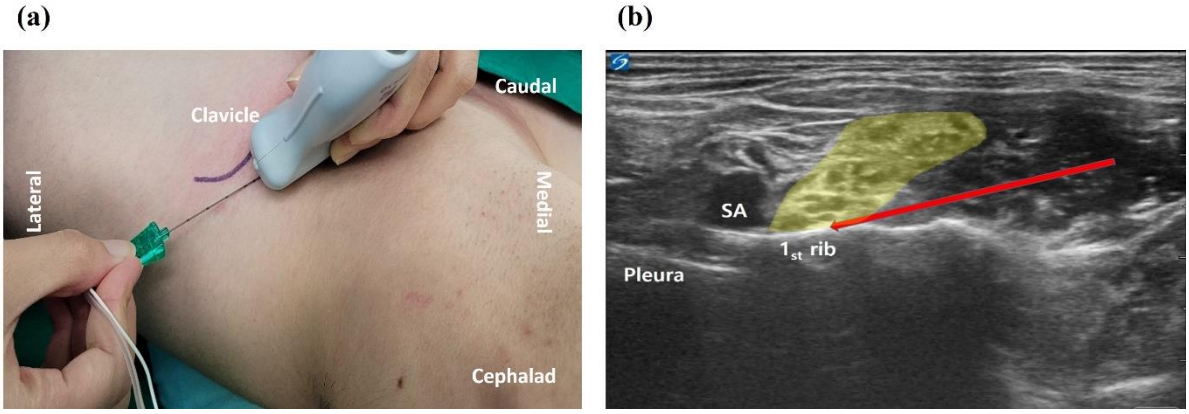
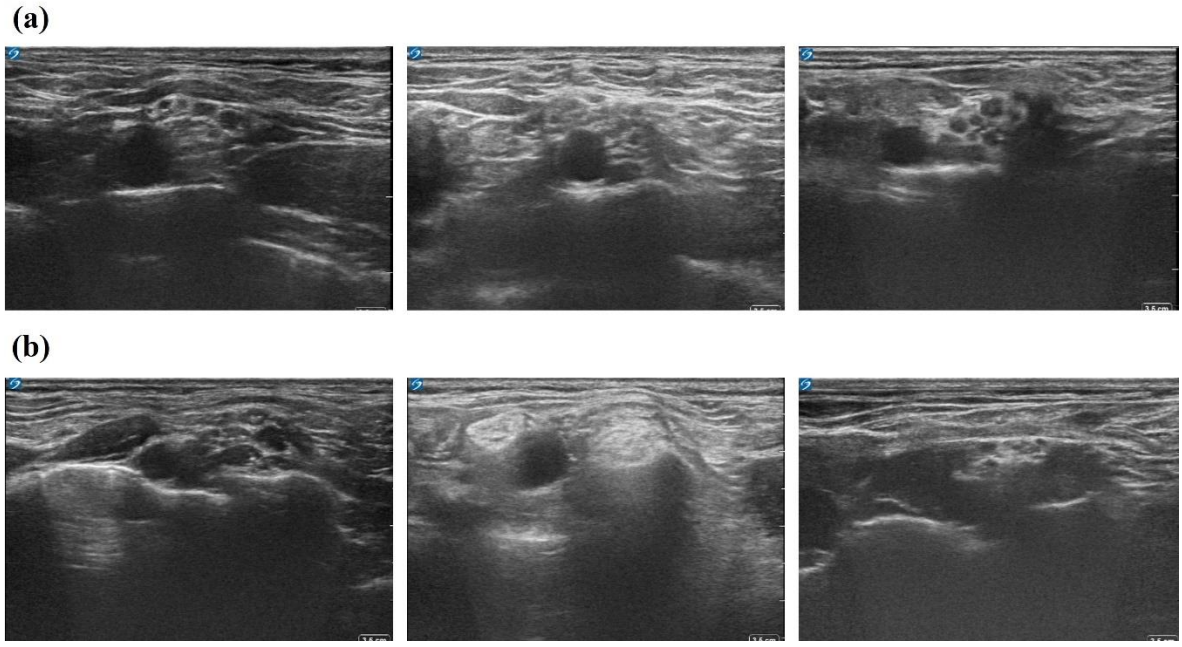
Supplementary figure 1.



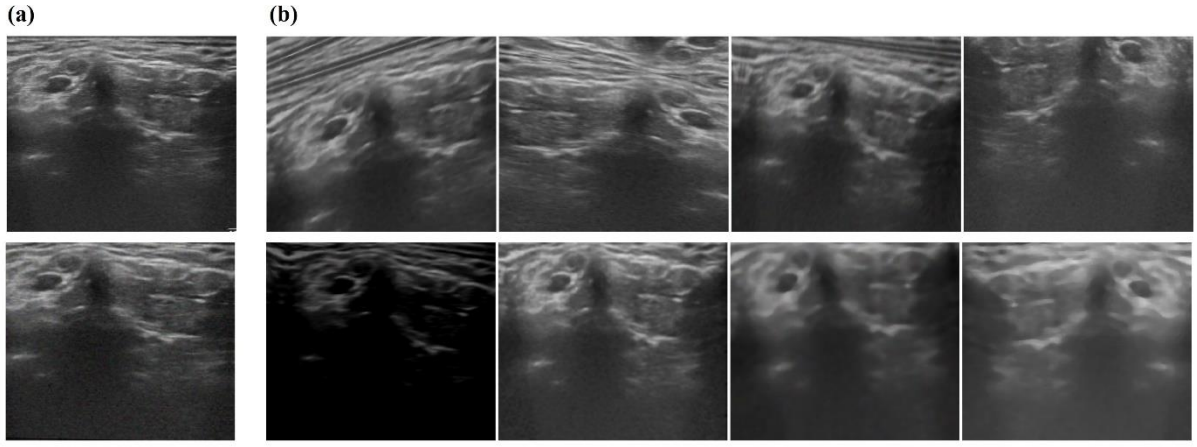
Example of ultrasound-guided supraclavicular brachial plexus nerve block. (a) Placement of the transducer into the supraclavicular fossa just proximal to the clavicle, with caudal tilting to obtain an optimal view. (b) Ultrasound image, showing the brachial plexus (yellow shadow) located postero-lateral to the SA (SA) and on the first rib (red arrow) with the needle position in the corner pocket.

Supplementary figure 2.



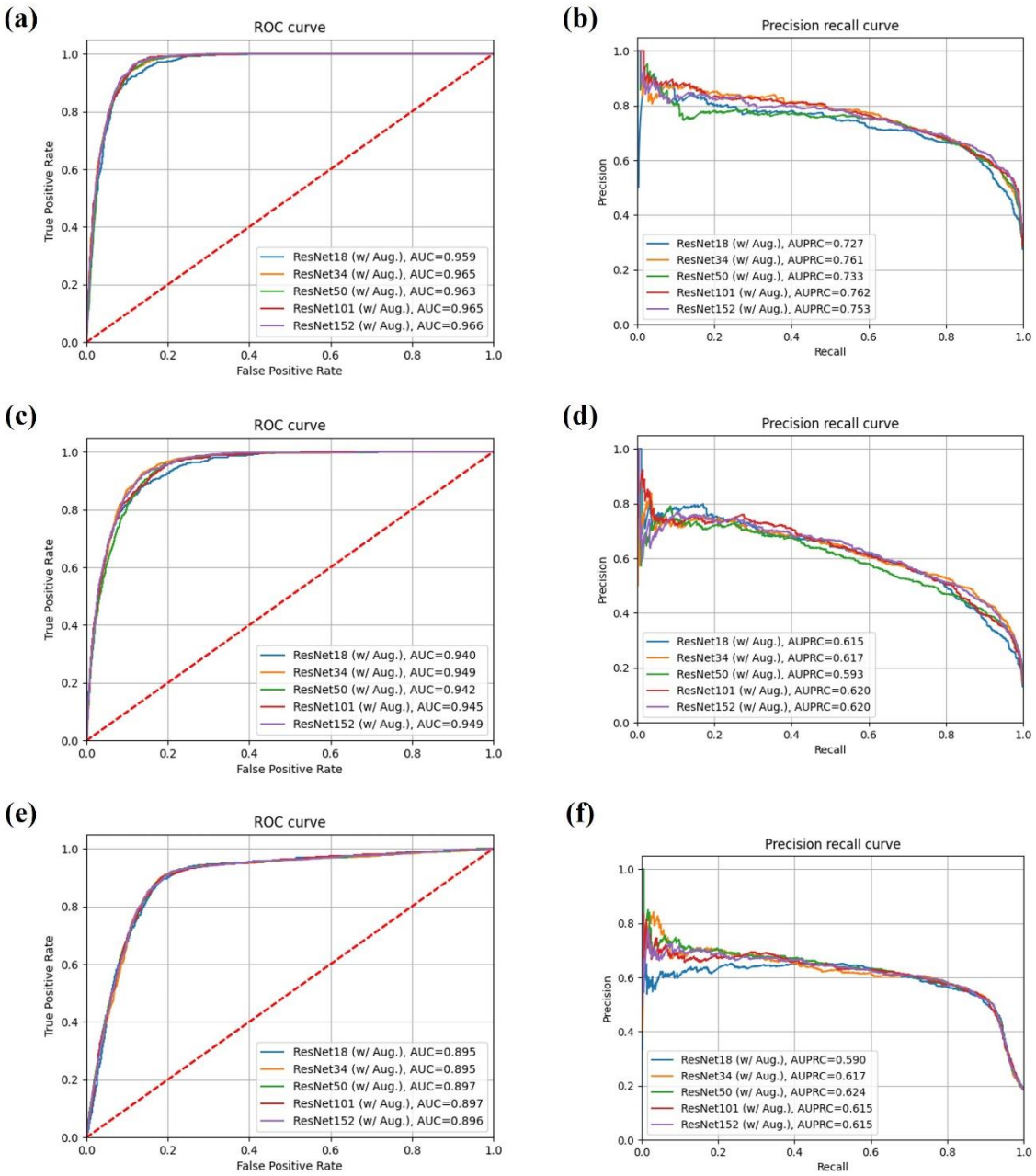
Sample views of an ultrasound-guided supraclavicular block. (a) Optimal views; (b) Nonoptimal views.

Supplementary figure 3.



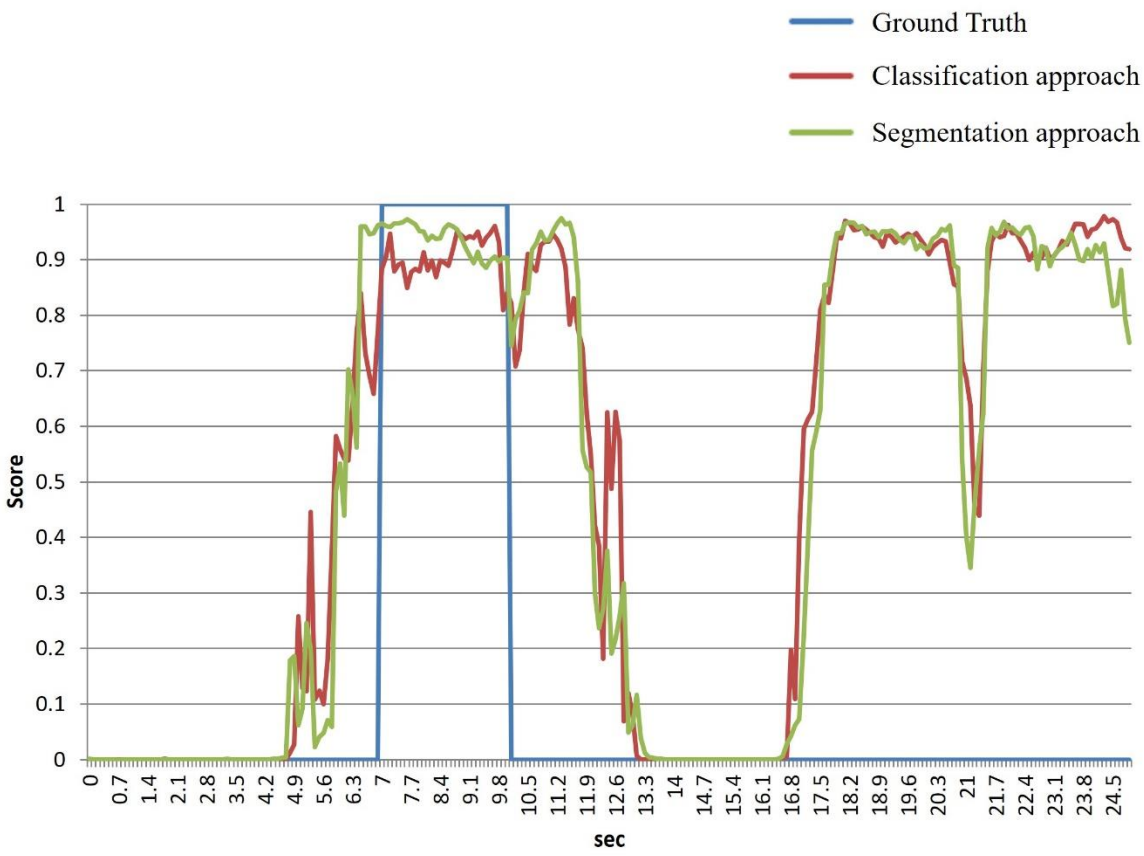
Results of augmentation techniques. (a) Original image. (b) After application of augmentation techniques.

Supplementary figure 4.



Comparative performances of the classification approaches. (a, c, e) ROC curves of test sets (a) 1 (X-Porte), (c) 2 (Venue Go), and (e) 3 (TE7). (b, d, f) PR curves of test sets (b) 1 (X-Porte), (d) 2 (Venue Go), and (f) 3 (TE7).

Supplementary figure 5.



Example of CNN prediction and ground truth in an ultrasound video.

Supplementary figure 6.

Algorithm 1: Method for cropping foreground ultrasound images.

Data: Original ultrasound image I, Kernel K
Result: Extracted ROI image I_{roi}
for *i in height of I* **do**
  for *j in width of I* **do**
    if $I[i,j] > 0$ **then**
      $I[i,j] = 255$;
    else
      $I[i,j] = 0$
    end
  end
end
$I = morphOpen(I, K)$;
$L = findContours(I)$;
$l^* = \arg\max_{l \in \mathcal{L}} contourArea(l)$;
$x, y, w, h = boundingRect(l^*)$;
$I_{roi} = I[y : y + h, x : x + w]$;
return I_{roi};

Example of automated background removal algorithm.