Real-time Standard Scan Plane Detection and Localisation in Fetal Ultrasound using Fully Convolutional Neural Networks
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Supplemental Material

No Author Given

No Institute Given

1 Description of Standard Scan Planes

Table 1 contains a detailed description of the standard fetal US scan planes which we model in our contribution. Our choice of scan planes and their description are based on references [1] and [2]. In Fig. 1 we additionally show visual examples of each modelled class manually chosen from our expert-annotated ground-truth dataset.

2 Supplementary Detection and Localisation Results

We show additional supporting results for the retrieval and localisation of fetal standard scan planes from the recorded clinical examinations in Fig. 2. The images also contain the corresponding saliency maps. Note the video included with our submission which demonstrates the real-time annotattion of frames and the real-time localisation of the fetal anatomy using our proposed method.

References

1. NHS Screening Programmes: Fetal anomalie screen programme handbook pp. 28–35 (2015)
2. Salomon, L., Alfirevic, Z., Berghella, V., Bilardo, C., Leung, K.Y., Malinger, G., Munoz, H., et al.: Practice guidelines for performance of the routine mid-trimester fetal ultrasound scan. Ultrasound Obst Gyn 37(1), 116–126 (2011)

Table 1. Modelled standard planes with their key characteristics and the number of each category in our dataset.

Abbreviation	Characteristics	# images
Brain (Th.)	Transverse view of the fetal head at the level of the thalami. Biometry: Head circumference, biparietal diameter, ventricular atrium	2099
Brain (Cb.)	Transverse view visualising the cavum septum pellucidum and the cerebellar hemispheres. Biometry: Transcerebellar diameter, nuchal fold.	1483
Abdominal	Transverse section of the fetal abdomen visualising the umbilical vein, the spine and the stomach bubble. Biometry: Abdominal circumference.	1288
Kidneys	Transverse section of the fetal abdomen at the level of the kidneys.	632
Lips	Coronal view of the lips and nasal tip.	1404
Profile	Median facial profile of the head visualising the nasal bone and facial features.	291
Femur	Longitudinal view of the femur, with both ends clearly visible. Biometry: Femur length.	1136
Spine	Sagittal view of the spine also visualising the bladder and aorta.	400
LVOT	Section visualising the left ventricular outflow tract containing the left ventricle and aorta, the right ventricle and the inter-ventricular septum.	1022
RVOT	Section visualising the right ventricular outflow tract containing the right ventricle, pulmonary artery, aorta and superior vena cava.	891
3VV	3 vessel view containing the pulmonary artery, ascending aorta and superior vena cava.	965
4CH	View of the 4 cardiac chambers.	904
Background	Frames randomly sampled from videos.	50150

(a) Brain (Th.)

(e) Lips

(i) LVOT

(b) Brain (Cb.)

(f) Profile

(j) RVOT

(c) Abdominal

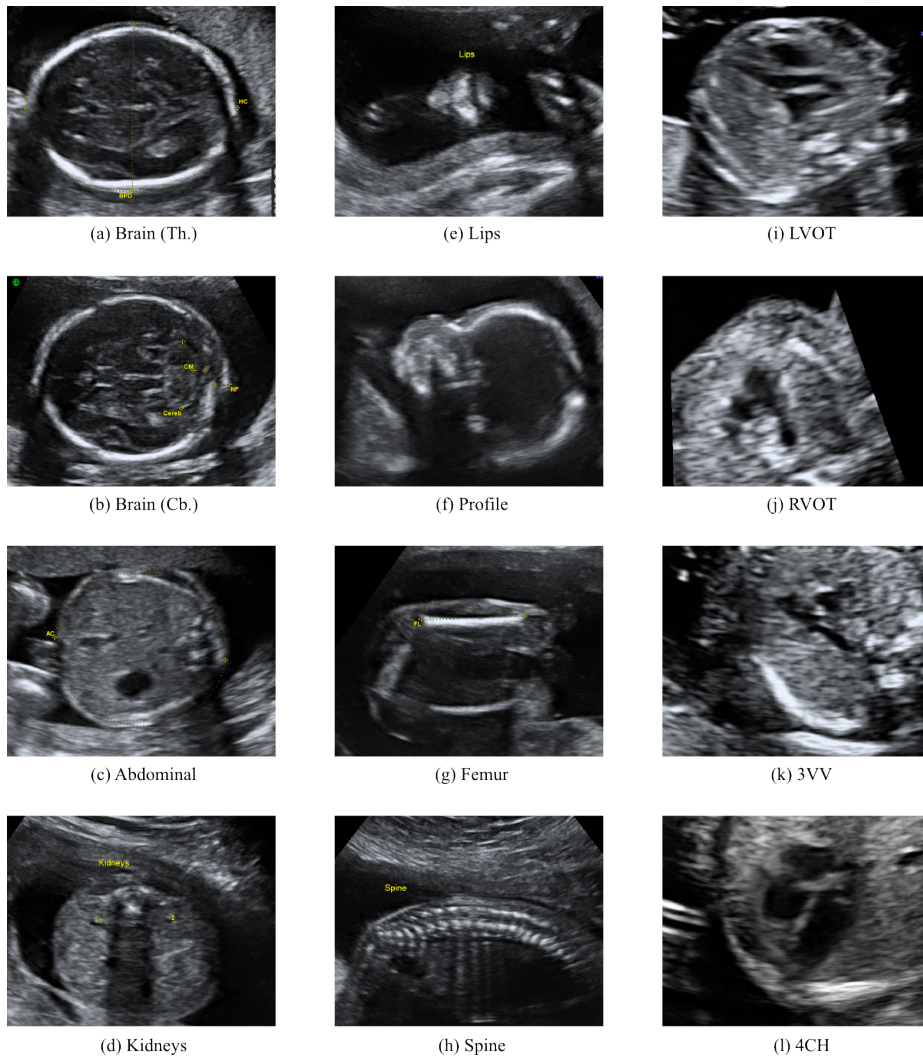(g) Femur

(k) 3VV

(d) Kidneys

(h) Spine

(l) 4CH

Fig. 1. Examples of all the modelled fetal standard scan planes chosen from the annotated ground-truth frames.
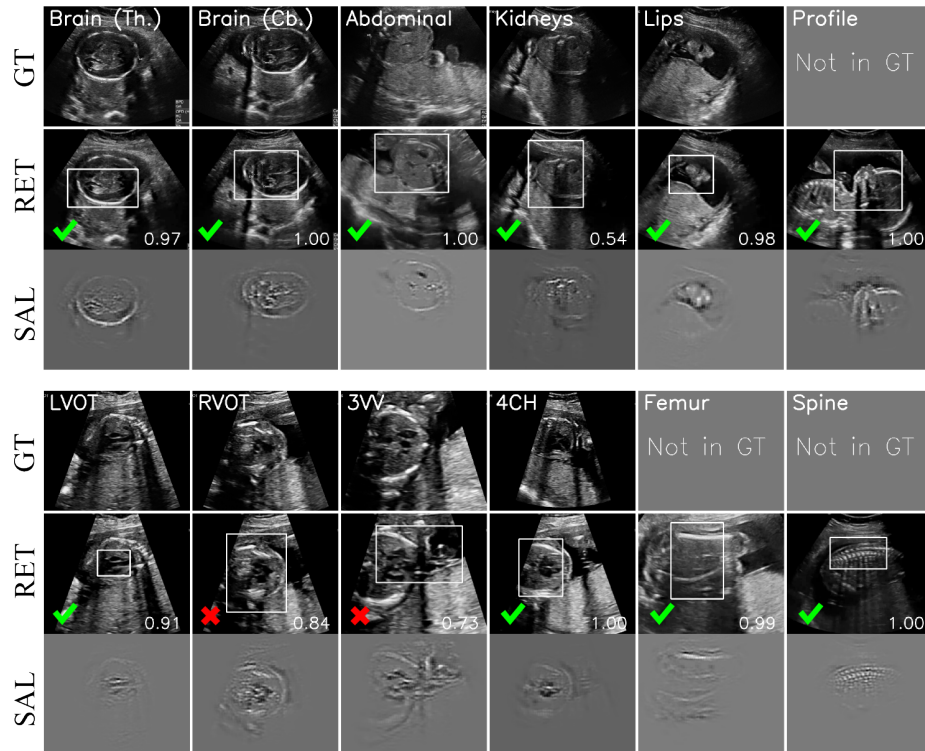
Fig. 2. Retrieved standard frames (*RET*), *GT* frames annotated and saved by expert sonographers and respective saliency maps (*SAL*) for one volunteer. Correctly retrieved and incorrectly retrieved frames are denoted with a green check mark or red cross, respectively. Frames with no GT annotation are indicated. The confidence is shown in the lower right of each image. The results of the our proposed fetal anatomy localisation approach are shown as white boxes in the *RET* rows.