Full Spatial Muscle Fiber Orientation Estimation From Ultrasound Images Using a Multitask Deformable Residual Neural Network

Xin Chen[1]
Bin Huang, Zhong Liu, Rui Mao and Siping Chen
[1] Shenzhen University

This paper proposes a multitask deformable residual neural network, for full spatial muscle fiber orientation (MFO) estimation from ultrasound (US) images. It is developed based on the state-of-the-art model of residual UNet (ResUNet), which combines the residual block and UNet for more efficient deep learning. To better capture the characteristics of curved muscle fibers in US images, deformable convolution is used to improve the conventional convolutions in ResUNet. Moreover, along with the detection of MFO, an extra task concerning muscle segmentation is assigned to the model in order to improve the detection accuracy and robustness. Experimental results on an inhouse dataset built upon 10 healthy human subjects demonstrate the superiority of the proposed model for full spatial MFO estimation from US images.