

Multi-channel Image Registration of Cardiac MR Using Supervised Feature Learning with Convolutional Encoder-Decoder Network

Xuesong Lu & Yuchuan Qiao

• Highlights

- A convolutional encoder-decoder network is employed to learn the latent feature representation from cardiac MR images
- The local features containing appearance information is integrated into multi-channel registration framework

• Findings

- The experimental results show that features learned from deep network are more effective than handcrafted features in guiding intra-subject registration of cardiac MR images

• Interesting observations

- In supervised learning, global features containing semantic information are prone to be biased

• Learning experience

- The end-to-end feature learning method is able to improve the performance of multi-channel registration with multi-feature mutual information

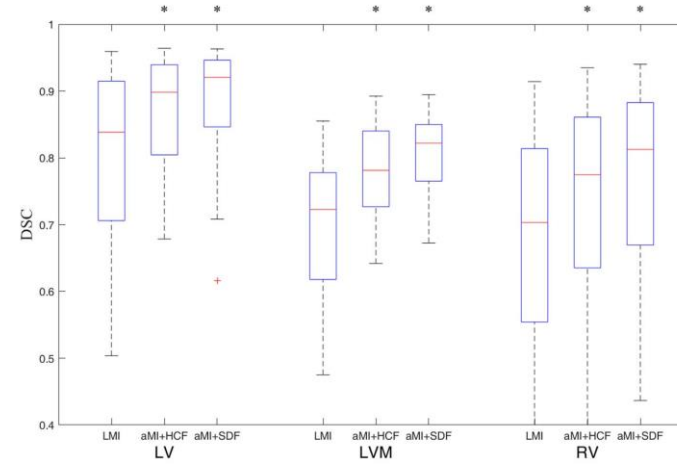


Fig. 1 The boxplot of overlap scores using different methods at different anatomical structures.

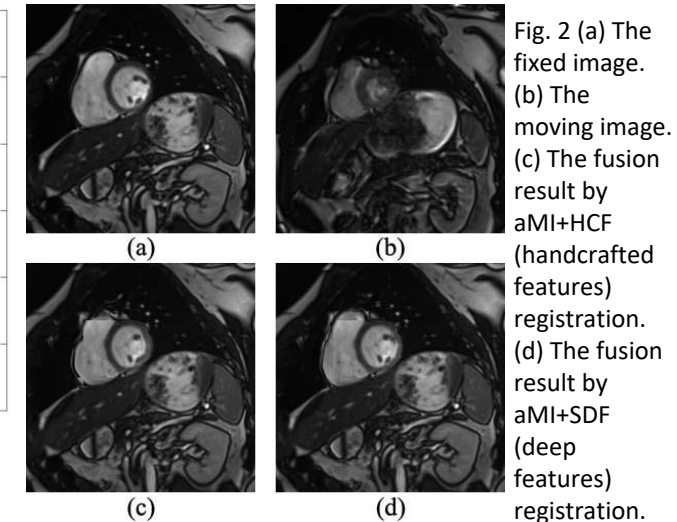


Fig. 2 (a) The fixed image. (b) The moving image. (c) The fusion result by aMI+HCF (handcrafted features) registration. (d) The fusion result by aMI+SDF (deep features) registration.

Structures	Methods	DSC	HD (mm)
LV	LMI	0.797 ± 0.135	12.576 ± 4.111
	aMI+HCF	0.868 ± 0.085	10.072 ± 3.412
	aMI+SDF	0.888 ± 0.080	9.614 ± 3.348
LVM	LMI	0.696 ± 0.104	12.243 ± 3.804
	aMI+HCF	0.776 ± 0.069	10.481 ± 3.260
	aMI+SDF	0.808 ± 0.055	10.009 ± 3.130
RV	LMI	0.680 ± 0.168	19.065 ± 7.503
	aMI+HCF	0.732 ± 0.162	17.745 ± 8.095
	aMI+SDF	0.765 ± 0.155	17.378 ± 7.513