Motivation:

• Semantic segmentation of cardiac structure is an important task in clinical application. For example, segmentation of left ventricles can contribute in computation of cardiac functional indices, such as ejection fraction.

• Traditional segmentation methods are tedious and slow.

• An effective deep learning solution will shorten the time of creating a segmentation and may yield better accuracy.

Approach:

• A fully convolution network (FCN) based on U-Net was chosen as a backbone semantic segmentation network.

• Deep Stack Transformation served as a data augmentation technique (it adjusts the image while preserving the high-level features).

Results:

• Model gives 93% segmentation accuracy on test set.

• Producing a segmentation in milliseconds.

Conclusion & Future Work:

• By applying U-Net based architecture and Deep Stack Transformation, the model gives a very high overall prediction accuracy on unseen data (93%). This result suggests that deep learning has a very high potential in replacing tedious traditional segmentation methods.

• The next immediate work would be to apply the procedure to other parts of the heart other than the left ventricle.

• Collecting more diverse data because the prediction accuracy on ctisus images is only 66.7% compared to 93%.

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