IN224-SD-TUA1

Clinical Validation of Direct Volume Estimation for Left Atrial Aneurysm

Tuesday, Nov. 29 12:15PM - 12:45PM Room: IN Community, Learning Center Station #1

FDA Discussions may include off-label uses.

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CONCLUSION

Our proposed method for the first time enables automatic volume estimation of left atrial aneurysm without segmentation and experimental results demonstrate our method achieves high estimation accuracy with a CC of 0.91 with those obtained manually by experienced doctors, which is clinically significant, indicating its potential use in the clinical diagnosis.

Background

The left atrial aneurysm is a severe heart disease, which can produce compression symptoms with diverticulum oppressing neighboring atrium and ventricle leading to arrhythmias, embolic manifestations and heart failure. Accurate volume estimation of left atrial aneurysm plays an essential role in the early diagnosis and therapy planning.

Evaluation

To handle the high variabilities and variations, we propose a new multi-view semi-supervised manifold learning (MSML) algorithm, which fuses multiple complementary features to generate compact, informative and discriminative aneurysm image representation by leveraging both labeled and unlabeled data. Based on the obtained image representation by the MSML, we adopt random regression forests to conduct direct and efficient volume estimation without segmentation. Experiments are conducted on a clinical dataset of 67 subjects with a total of 1220 images. Three evaluation metrics, correlation coefficient (CC), mean deviation (MD), and standard deviation (SD), were computed based on our direct volume estimation and ground truth manually labelled by clinical experts.

Discussion

The proposed direct estimation method achieves MD of 158.172, SD of 24.448, and a high CC of 0.91 with ground truth and largely outperforms other methods. It demonstrates the effectiveness for aneurysm volume estimation and reveals its clinical application of the proposed method. This study opens a new direction on automatic analysis of the left atrial aneurysm by providing a large annotated clinical dataset.