Date: Jan 20, 2022

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| **Title** | Tromp J, Seekings P J, Hung C L, et al. Automated interpretation of systolic and diastolic function on the echocardiogram: a multicohort study[J]. The Lancet Digital Health, 2022, 4(1): e46-e54. |
| **Area info** | * Echocardiography is the diagnostic modality for assessing cardiac systolic and diastolic function to diagnose and manage heart failure. * However, manual interpretation of echocardiograms can be time consuming and subject to human error. * We developed a fully automated deep learning workflow to classify, segment, and annotate two-dimensional (2D) videos and Doppler modalities in echocardiograms; * We developed the workflow using a training dataset of 1145 echocardiograms and an internal test set of 406 echocardiograms from the prospective heart failure research platform. * **We validated the workflow** against manual measurements in a curated dataset from **Canada** (Alberta Heart Failure Etiology and Analysis Research Team; HEART; n=1029 echocardiograms), a real-world dataset from **Taiwan** (n=31 241), the **US**- based EchoNet-Dynamic dataset (n=10 030), and in an independent prospective assessment of the **Asian** (ATTRaCT) and **Canadian** (Alberta HEART) datasets (n=142) with repeated independent measurements by two expert sonographers. * **The human workflow for performing echocardiographic measurements** consist of: (1) identifying the correct 2D or Doppler modality view; (2) manually segmenting and drawing annotations on 2D videos to outline cardiac chambers, or annotating Doppler modality views for specific measurements; and (3) manually referring to standard reference guidelines to identify if any of the potentially dozens of measurements performed fall within the normal range of values for sex and age. |
| **Notes** | * automated measurements showed good agreement with locally measured values, with a mean absolute error range of 9–25 mL for left ventricular volumes, 6–10% for left ventricular ejection fraction (LVEF), and 1·8–2·2 for the ratio of the mitral inflow E wave to the tissue Doppler e’ wave (E/e’ ratio); and reliably classified systolic dysfunction (LVEF <40%, area under the receiver operating characteristic curve [AUC] range 0·90–0·92) and diastolic dysfunction (E/e’ ratio ≥13, AUC range 0·91–0·91), with narrow 95% CIs for AUC values. |
| **Comments** | * This is a multi-center study. |

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| **Title** | Lasek J. The Impact of Data Preprocessing on the Accuracy of CNN-Based Heart Segmentation[M] //Progress in Image Processing, Pattern Recognition and Communication Systems. Springer, Cham, 2021: 173-180. |
| **Area info** | * Manual segmentation is very time consuming (even 6–10 h) for each image * Challenging issue due to the high variability of subjects, such as differences in cardiac anatomy, pathological and physio- logical changes, and the transition of heart shape during systole and diastole; * Another problem associated with CT images is the variability in image appearance and quality; this might depend on the type of scanner, acquisition parameters, motion artifacts, differently contrasted heart chambers, or artifacts caused by the presence of artificial elements in the heart; |
| **Notes** | * This paper proposes SDA as a preprocessing step before image segmentation using convolution neural networks. * It has been shown that image preprocessing using SDA can increase the accuracy of automated heart chamber segmentation with U-Net. |
| **Comments** |  |