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Software for Carotid Intima-Media Thickness Measurements

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Invention Description

Carotid Intima-Media Thickness (CMT) measurement is a sensitive, and highly reproducible technique for cardiovascular risk stratification. CMT measurements are based on region of interest (ROI) in end-diastolic ultrasound frames (EUFs). Currently, ROIs and EUFs must be manually selected which is both tedious and time consuming, with variable accuracy and speed depending on the user's experience and level of expertise. There are some CMT measurement programs available; however, with the increased demand for CMT screening, a more user-friendly and time efficient solution is needed.

Researchers at Arizona State University in collaboration with researchers from the Mayo Clinic have developed a novel software system for quickly measuring CMT. This system automatically selects EUFs and determines ROIs in ultrasound videos, significantly cutting down on the time required for determining CMT. This software system was evaluated on 23 subjects, each having 4 videos, with 3 EUFs selected in each video for a total of 272 ROIs. The results were compared with a reference provided by an expert for both frame selection and ROI detection and achieved 92.9% sensitivity and 97.6% specificity for EUF selection and 81.2% accuracy in ROI detection.

This software system reduces user-dependency by automating and standardizing the CMT measurement process. The results compare favorably to those achieved by an expert but with a system that is much more user friendly and significantly faster.

Potential Applications

- Carotid intima-media thickness measurements for cardiovascular risk stratification

Benefits and Advantages

- 92.9% sensitivity and 97.6% specificity for EUF selection
- 81.2% accuracy in ROI detection
- The selected frame may be manually modified if automatic detection is not optimal by a simple mouse click
- The edge line may be manually modified if the automatic detection is not optimal