The informative exhibition of diagnostic imaging

Imaging is a critical tool in medical examination and diagnosis including radiology, pathology and so on. Three selected articles are introduced here to demonstrate the state-of-the-art quantitative image analysis developed for medicine. An international research group including Japan, USA, Spain, Italy, and Cyprus submitted “Automated segmental-IMT measurement in thin/thick plaque with bulb presence in carotid ultrasound from multiple scanners: Stroke risk assessment” [1] to standardize carotid intima-media thickness (IMT) measurement for stroke risk assessment. The fully automated bulb detection system combining carotid geometry and pixel-classification achieved 92.67% precision which can be a reference marker for segmental-IMT. The research group integrated images from Japan, Italy and Hong Kong into a mixed database of 649 carotid artery ultrasound images. The well-designed architecture with precise calculation validated by multi-country data is promising in clinical application.

In addition to radiological examination using gray-scale intensity, color image analysis is helpful in ophthalmology. Ophthalmologists do daily diagnosis via color fundus images, fundus fluorescein angiography, and optical coherence tomography. The image features extracted from these imaging modalities can be used in a classifier to establish a computer-aided diagnosis system as shown in “An improved arteriovenous classification method for the early diagnostics of various diseases in retinal image” [2]. A popular public database (DRIVE) is obtained from a diabetic retinopathy screening program. The intra-image and inter-subject differences were firstly regularized and normalized. The following single profile and image patch were especially defined for signal and texture analysis which is a novel use in vessel analysis. The performance achieved an accuracy of 0.915 for artery and 0.929 for vein which is promising for the early diagnostics of various diseases in retinal image. Computer-aided diagnosis is getting popular to be a screening tool.

Eventually, various functions should be integrated in a platform such as “An interactive platform to guide catheter ablation in human persistent atrial fibrillation using dominant frequency, organization and phase mapping” [3]. It is an integrated 3D software platform combining the mapping of both frequency spectrum and phase from atrial electrograms to help guide persAF ablation in clinical cardiac electrophysiological studies. Numerous medical issues are needed to be addressed via image analysis. Additionally, an interactive graphic interface is play an important role in visualization and interpretation.

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References

