Current and future role of artificial insights in cardiac imaging.

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Cardiovascular disease is currently the leading cause of morbidity and mortality worldwide and therefore remains an important focus of both biomedical and technical research. In the age of personalized medicine, cardiac imaging is expected to play an important role in enabling more accurate and sophisticated quantification of structural and functional changes due to cardiovascular disease. However, despite advances in cardiac imaging technologies such as ultrasonography, cardiovascular magnetic resonance, cardiac computer tomography, and nuclear anatomy, the heart is challenging for imaging and evaluation compared to other organ systems. Remains an anatomical organ. The main challenges faced by cardiac imaging include the ongoing heart and respiratory movements, the complex shape of the ventricles, atria and arteries, the oblique orientation of the heart to the body, and the small size of some of the heart's structure. Wide variability of imaging conditions and protocols, including non-contrast and contrast-enhanced cardiac imaging sequences, as well as coronary arteries, trabeculae, and papillary muscles [1].

Therefore, advanced tools are needed to optimize the use of cardiac imaging and support clinicians throughout the cardiovascular care value chain. This includes improved imaging, automated cardiac quantification, cardiac tissue characterization, imaging biomarker discovery, and clinical decision-making support. In this regard, artificial intelligence (AI) such as machine learning and computer vision has emerged as one of the most promising topics in the last five years. AI, coupled with a dramatic increase in computing power, leverages a collection of available cardiac imaging data to develop more robust cardiac imaging algorithms, revealing currently unknown clinical knowledge of cardiac health and illness. And offers an unprecedented opportunity to develop new software tools. Allows clinical progress to affect heart disease. This area is expected to benefit from ongoing efforts to provide the scientific community with access to large-scale, high-quality images. For example, in the United States, existing studies such as multi-ethnic studies of atherosclerosis and Framingham cardiac studies have long collected thousands of cardiac images. Recently, UK Biobank has obtained cardiac MRI images from tens of thousands of individuals in the United Kingdom.

In Europe, the European Commission-funded euCanSHare project is developing a data sharing and analysis platform that facilitates access to large volumes of cardiac and non-imaging data from multiple centres. Increased Similar initiatives and large cohorts are expected to emerge globally in the coming years, further increasing the potential of AI in cardiac imaging and clinical cardiology. To encourage and guide further research and development in the field of AI for cardiac imaging, several experts and leading institutions in this field have recently published position papers and reviews, outlining early achievements and Discusses current challenges and future prospects. By distinguishing between the use of classical AI and advanced approaches, we have summarized the most promising AI techniques for cardiac imaging. By examining each cardiac imaging method individually, we reviewed several clinical applications of AI in cardiac imaging. Focused on the only application of deep learning methods for cardiac image analysis, finally outlined current challenges and new opportunities, emphasizing the importance of addressing non-technical aspects of AI in cardiac imaging such as patient acceptance, privacy, and AI regulation. These papers provided general presentations and publicity in this area, but the purpose of this special issue, entitled Current and Future Roles of AI in Cardiac Imaging, is to cover the entire AI value chain in cardiac imaging [2]. It is to provide a more detailed and focused overview to cover.

Covers cardiac imaging. Specifically, we invited active experts from around the world to reconstruct the heart image, segment the heart image, analyse the shape and movement of the heart, and the heart image [3]. We have submitted a detailed review of some important areas of AI, Computational diagnosis, Integration of image genetics, and Social ethical implications and regulation. This comprehensive special edition consists of a total of nearly 1,000 references in this area, with direct methods, applications, strategies, datasets, tools, hypotheses, for both beginner and experienced researchers. It provides unparalleled resources for scrutinizing limits and opportunities. Investigate the relationship with each aspect of AI in cardiac imaging. Importantly, each paper should provide explanations and discussions to both AI and the clinical audience to facilitate democratization and progress in AI in cardiac imaging, and thus future collaboration and development in this area.

References

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