Special Session:

Artificial Intelligence 'AI' for Cardio Vascular Diseases 'CVDs'

Towards Computer Aided Diagnosis' CAD' as an Advanced Information System Dedicated to Essential Features' Exploring of Cardio Vascular Diseases 'CVDs'

Prof. Rania HAMMEMI (CHU of Sfax TUN, ATMS Lab ENIS Sfax TUN),

Prof. Khalil CHTOUROU (CHU of Sfax TUN, ATMS Lab ENIS Sfax TUN),

Prof. Lamia SELLAMI Ben Hamida (ATMS Lab ENIS Sfax TUN)

Cardiovascular diseases (CVDs) are the leading cause of death globally according to World Health Organization (WHO). Analysis of cardiac function plays an important role in clinical cardiology for patient management, disease diagnosis, risk evaluation, and therapy decision. In recent decades, major advances have been made in cardiovascular research using 'AI' tools and practice aiming to improve diagnosis and treatment of cardiac diseases as well as reducing the mortality of CVD.

Description

Modern medical imaging techniques, such as magnetic resonance imaging (MRI), computed tomography (CT) and ultrasound are now widely used, which enable non-invasive qualitative and quantitative assessment of cardiac anatomical structures and functions and provide support for diagnosis, disease monitoring, treatment planning, and prognosis. These Medical imaging techniques are also enriched with other exploring tools such as 'ECG' records…

Cardiovascular magnetic resonance (CMR) imaging data facilitates reliable analysis of cardiac function and anatomy, clinical workflow mostly relies on manual analysis of CMR images, which is time consuming.

Thus, an automated and accurate segmentation platform exclusively dedicated to pediatric CMR images can significantly improve the clinical workflow, as the present work aims to establish.

AI tools such as Deep learning has become the most widely used approach for cardiac image segmentation in recent years. Various methods have been developed for CMR image analysis and demonstrated utility for use in research and clinical settings. Non-learning based methods heavily rely on hand-crafted features with limited representation capability and generally provide suboptimal performance. Recently, the development and use of deep convolutional neural networks (CNN) has achieved remarkable success for numerous cardiac imaging tasks. With the availability of large annotated datasets and powerful computational platforms, these learning-based methods can automatically learn highly discriminative features through feature abstraction in a hierarchical manner.

The main objective of this special session is to explore various AI tools regarding for example novel U-Net based Deep Learning method for 3D Cardiovascular MRI Segmentation. The proposed research can provide comprehensive information for doctors to make diagnoses of CVDs.

As advanced technology for medicine, i.e the health monitoring of serious pathologies, AI for CVDs concerns the context of cardiovascular diseases with an essential target to provide a useful, advanced, flexible and convivial Computer-Aided Diagnosis 'CAD' Information System that will explore more specifically specific images and other exploring tools (ECGs) of these serious pathologies. The main extracted futures involving essential information could be carefully managed within the targeted software tools.