

## The Possible Applications of Artificial Intelligence in Cardiology that Offer Directions for Future Development

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Artificial intelligence (AI) in medicine consists in using machine learning models to search for medical data and uncover insights in order to improve overall outcomes and patient experiences. AI is already an integrated part of modern healthcare and various algorithms and other applications that it are currently being developed in order to provide an improved clinical decision support and imaging analysis [1].

It is indeed true that not all medical areas are prone to use AI in their everyday practice, but we believe that cardiology is an exception. The potential that AI has in the future of cardiology is once again demonstrated through a series of recent developments used nowadays to predict overall cardiovascular outcomes and one example in this regard is represented by a series of wearable devices that can correctly detect various arrhythmias and are even recommended by the current clinical practice guidelines [2].

Neural networks are a subcategory of machine learning and represent the foundation of deep-learning algorithms. In cardiology, they can help with the MRI and CT autonomous image processing, including left and right ventricular segmentation, identification of cardiac tissue and anatomical structures, therefore, improving the overall data analysis process. Neural networks can also perform ECG analysis and they have been previously used to identify certain ischemic changes, atrial fibrillation, hypertrophic cardiomyopathy, silent arrhythmias, and non-cardiac abnormalities that may be difficult for the human eye to see [3].

Moving beyond image analysis, other data forms like text and tabular laboratory analyses are employed to improve heart failure predictions by using natural language processing and classical machine learning, respectively. Access to each patient's medical history helps prevent cardiac decompensation. Moreover, artificial intelligence (AI) algorithms can be used in remote monitoring of the patient outside hospital premises in the emergent domain of telemedicine.

Artificial intelligence can also be employed in the large-scale analysis of the general population to identify the risk of CVD through the fusion of clinical measurements with social and lifestyle indicators.

We currently include AI in all our research projects, one of them being set on providing a better, easier and faster decision-making algorithm for treating coronary lesions (either interventional or conservative). We set out to incorporate routine angiographic images into a cloud platform, in order to provide efficient treatment recommendations that may lead to the development of a standardized method of

interventional treatment. Due to the scarcity of data regarding the integration of coronary angiography (CA) images in a cloud database, we believe this will offer us a proper way to obtain valuable information that can provide safer treatment for each patient [4].

We set out to develop a fully automated proposal, based on a cost function computed from the before and after percutaneous coronary intervention (PCI) values obtained through wall shear stress (WSS) and fractional flow reserve (FFR). The main purpose of the study is to achieve post-PCI FFR values as close to one as possible, while using the smallest number of stents possible. Furthermore, we are working towards creating a normal range for the WSS values within the entire coronary circulation. The optimal PCI approaches will be validated and then set side by side with the ones generated based on the CA database.

In the fast-paced world that we live in, time is precious and limited and there is an increasing demand for a better, more effective triage of patients, clinical evaluation, and accurate decision-making in order to make the right diagnosis and treatment strategy. We strongly believe that AI will be an integrated part of every cardiologist's day-to-day practice. However, the ethical dilemma of incorporating AI into the decision process still stands and should be further taken into consideration.

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