Automated coronary artery annotation using Image Processing Approaches

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Technology description

Technology

Health care spending in the United States accounts for nearly 20% of the gross domestic product. In the changing health care environment, health systems, hospitals, and health care providers must focus on improving efficiency to meet an increasing demand for high-quality, low-cost health care. In response to this growing need to reduce costs, application of artificial intelligence (AI) towards healthcare use cases, which at the core requires bringing together increasingly larger, complex healthcare data assets. The most promising avenues for AI in medicine are the development of automated risk prediction algorithms which can be used to guide clinical care to more precisely phenotype complex disease. Coronary artery disease (CAD) is the most common type of heart disease. It is the leading cause of death in the United States in both men and women. The gold standard of diagnosing CAD is invasive coronary angiography. The standard of care for most acute myocardial infarction is also invasive coronary angiography. During the angiography procedures, an accurate assessment of the lesion of interest as well as the characterization of the global disease burden has important implications in prognosis as well as selection of treatment strategies. While a highly skilled clinicians are capable of analyzing coronary angiogram in a timely and accurate fashion, it is known that subjective characterization of the severity for a certain coronary lesion can be significantly different between individual clinicians. In addition, clinicians often are under time pressure when encountering acute myocardial infarction patients where “time equals muscle” and an accurate global characterization of the coronary anatomy is in theory more difficult. Thus, providing automatic tools to assist clinicians during the diagnosis and assessment task is highly desirable. These types of tools will remove inter-operator variations as well as alleviate potential human error that may occur under pressure for time.

The inventors have described a computerized system that characterizes anatomy and lesions of coronary arteries automatically using image processing methods. The system will provide unbiased assessment of coronary artery lesions to an interventional cardiologist and assist the physician to make the best therapeutic approach to a patient. The system will be able to identify the lesion of the coronary artery of interest. It will also look at global coronary anatomy to provide global assessment of

underlying coronary disease and provide information to the provider of best therapeutic approaches based on current scientific
literature The system will also provide detailed measurements of lesions of interest and suggest actual dimensions of balloon or arterial stents that may optimize therapeutic invention and minimize risk iatrogenic injury.

Application area

Aid in the diagnosis and treatment of coronary artery disease.

Institution

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