FASTFORWARD
medical innovation

Computer-Aided System Automates Coronary Angiogram Analysis

Coronary heart disease is the single largest cause of death in the United States. Currently, examining coronary angiograms largely relies on visual examination by physicians, making interpretation prone to human error. As a result, some patients are exposed to unnecessary, invasive procedures while other patients fail to receive appropriate treatments.

The Solution

University of Michigan faculty Kayvan Najarian, Ph.D., and Brahmajee Nallamothu, M.D., are developing a system to utilize advanced image processing and machine learning techniques to analyze coronary angiograms independent of human input.

Preliminary results show that the new platform has the potential to zero in on a specific part of the vascular tree for more intense study, estimate the width of the blood vessels, and quantitatively identify the presence and percentage of blockages in each blood vessel. This objective data will help cardiologists with clinical decision making regarding the need for a stent or other interventional treatments.

The fully-automated computer platform could lead to new quality review and decision-support tools that are scalable and cost-effective, while at the same time promoting novel educational and support resources that will result in increased surgical accuracy.

MTRAC

This project was funded by the University of Michigan Translational Research and Commercialization (MTRAC) for Life Sciences Innovation Hub. MTRAC works to "fast forward" projects that have a high potential for commercial success, with the ultimate goal of positively impacting human health. MTRAC has been made possible by the Michigan Economic Development Corporation, the Michigan Institute for Clinical and Health Research, and the generosity of friends of the University of Michigan.

New, fully-automated computer platform analyzes coronary angiograms in real time using image processing and machine-learning algorithms.

Significant Need

Existing computer-based techniques that assist cardiologists in interpreting coronary angiograms require significant human input, create time delays that disrupt workflow, and consume substantial resources.

Compelling Science

A fully-automated computer platform that utilizes advanced image processing and machine learning techniques to analyze coronary angiograms.

Competitive Advantage

Currently, angiogram examination largely relies on visual examination by human operators. A fully-automated system guides real-time clinical diagnosis as well as quality assurance without the limitations of human input.

Kayvan Najarian, Ph.D.

Brahmajee Nallamothu, M.D.

> MTRAC provides the critical support we need to develop this digital health technology. It gives us the ability to refine the system, validate it against a larger database of coronary angiograms, create a proof-of-concept product, and formalize our industry partnership.

MTRAC Project Key Milestones

- Collect and annotate coronary angiograms
- Further develop and optimize the "Stabilization and Motion Artifact Removal" algorithm
- Further improve the "Detection of Artifacts" algorithm, develop and improve the "Segmentation of Blood Vessels" algorithm, and further improve and optimize the "Detection of Vessel Thickness/Stenosis algorithm
- Validate results
- Design graphical user interface
- Work with partner company to address any potential issue towards commercialization and regulatory procedures

Overall Commercialization

Intellectual Property
Invention disclosure filed.

Commercialization Strategy
Form a start-up company.

Regulatory Pathway
Follow a 510K pathway.

Engage Investors
There is interest from a large venture capital group.

Product Launch Strategy
License to an existing image analysis or medical auditing group.

10/2016

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