

Virtual Coronary Cineangiography

Iztok Lebar Bajec¹, Primož Trunk², Nikolaj Zimic¹, Damjan Oseli²

¹ Faculty of Computer and Information Science, Tržaška cesta 25, SI-1000 Ljubljana, Slovenia

² Faculty of Electrical Engineering, Tržaška cesta 25, SI-1000 Ljubljana, Slovenia

Cardiology students are required to distinguish between a healthy patient and a patient with high risk of cardiac arrest, using only simple greyscale images of coronary arteries. These images are usually obtained by means of coronary cineangiography. The students achieve the required skill mostly through laborious trial and error based examining of existing coronary cineangiographies. In the process the instructor shows the images to the student and the latter is asked to show the location of coronary thrombosis that present high risk for cardiac arrest. Sometimes the student is also requested to show the possible bypass location.

The advancement in computing power and especially in graphics processing of the modern computers presents a challenging area of research. In the past there was a lot of research done merging medicine and computer sciences. In the process of developing surgical training tools virtual reality, as a special field of computer graphics, was mainly used. With that virtual surgical training tools became available, for instance virtual dissection in microgravity, and virtual endoscopy. Such tools brought us to the idea of developing a training tool for the earlier mentioned students. In this poster we present the student and instructor scenarios for the learning and evaluating processes of the localisation of coronary thrombosis as well as the obstacles which we became aware of during the design. Such a tool enables the instructor to induce a virtual thrombosis in the three dimensional model of coronary arteries, which is based on a three dimensional model of a heart by Viewpoint Corporation. The computer calculates a virtual coronary cineangiography, which is then presented to the learning student. The latter is then requested to localise the induced virtual thrombosis. The instructor can, in case of the student's localisation failure, show them where in the full three dimensional model the induced virtual thrombosis is located. A discussion can follow explaining to the student why they failed the localisation.

Another possible usage scenario for the virtual coronary cineangiography that presents itself is the explanation of the procedure to the patient scheduled for the operation. By means of a full three dimensional image the surgeon can show the patient the location of the coronary thrombosis and which regions of the heart are affected by that. Thus they are told why they need the operation, and showed what exactly is going to happen during the procedure.