



Image Enhancement Combined with Reduction of X-Ray Dose During PCI-Operations

Hamed Hamid Muhammed

hamed@sth.kth.se

Technology and Health (STH)

Royal Institute of Technology (KTH)

Project goal

- ▣ To minimize X-ray dose exposure during PCI-operations, in addition to enhancing the acquired X-ray image sequences in real time to achieve high contrast images that can be viewed using ordinary monitors (e.g. LCD TV) without any need for expensive, exclusive, high-dynamic-range displays.

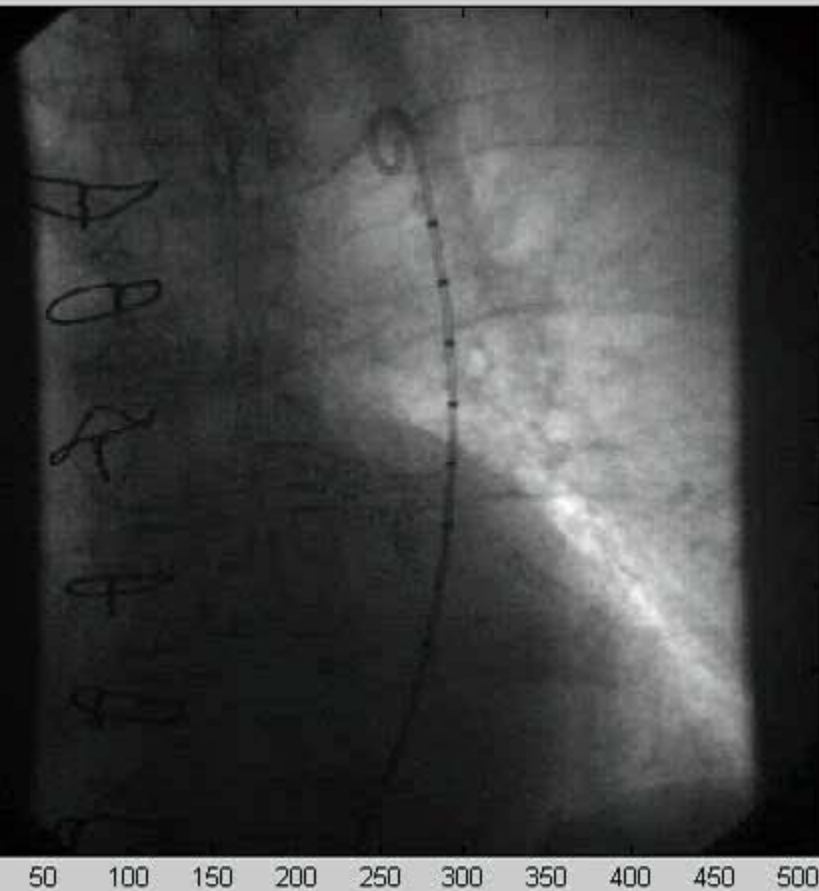
Methodology

- An automatic, adaptive image enhancement algorithm was developed and implemented on GPU to achieve real time performance.

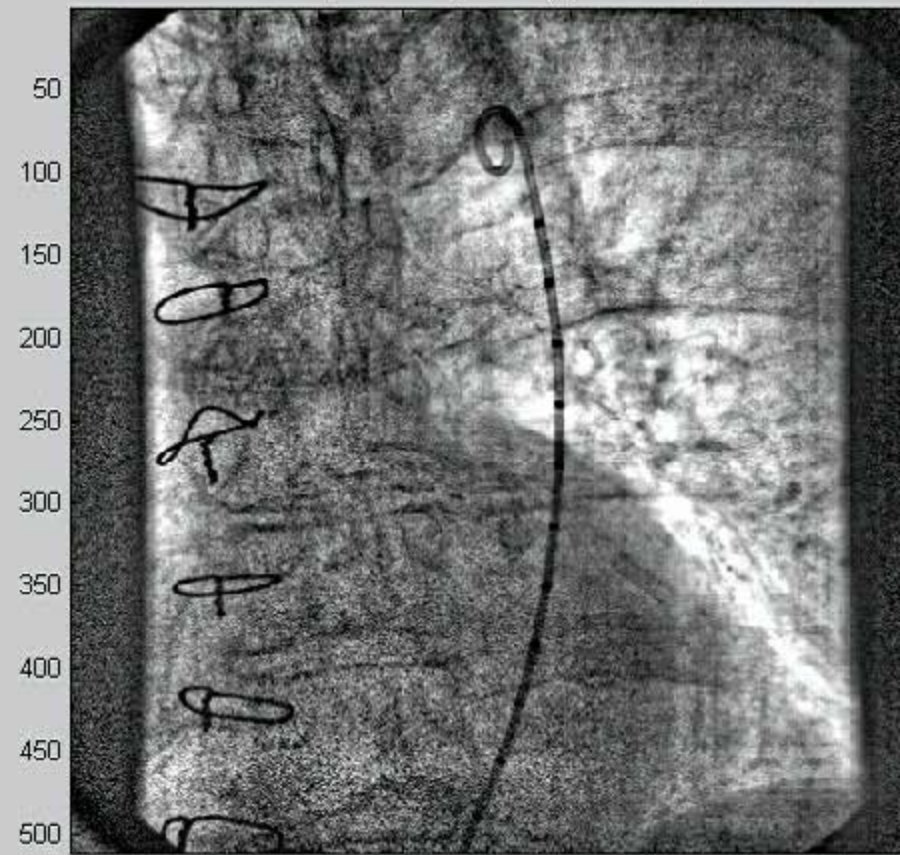
Result: Better image quality

Frame 1 of 103

Hamed Muhammed, KTH-STH, hamed@sth.kth.se, Tel: 08-7904855



50 100 150 200 250 300 350 400 450 500



50 100 150 200 250 300 350 400 450 500

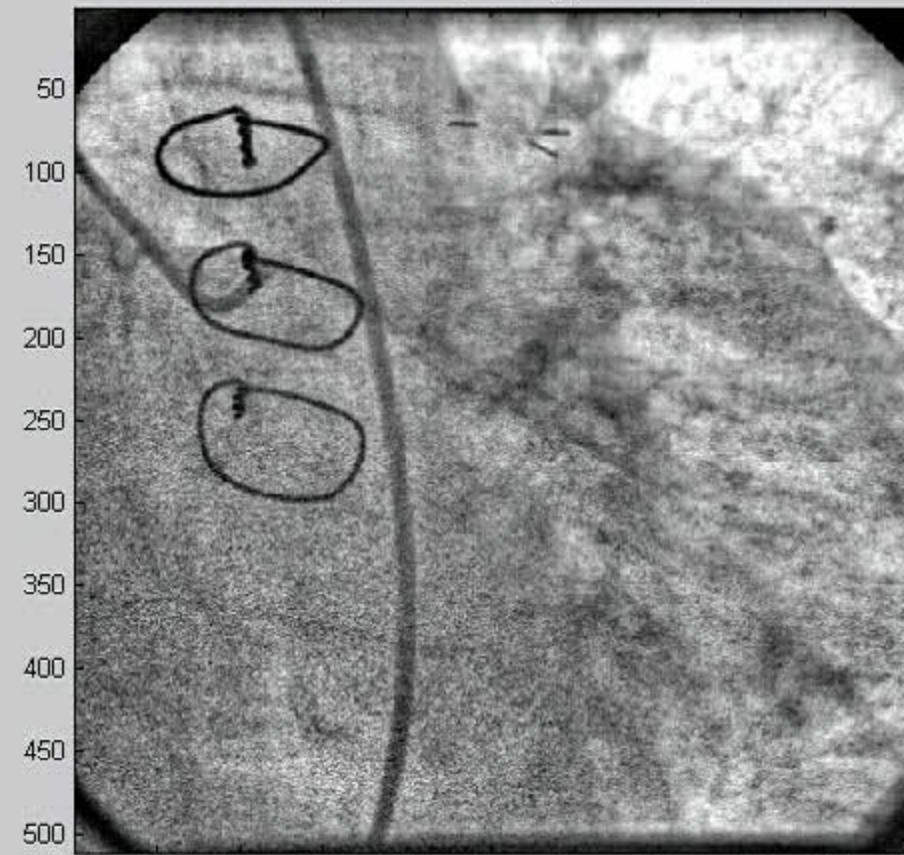
Result: Less contrast agent use

Frame 1 of 58



50 100 150 200 250 300 350 400 450 500

Hamed Muhammed, KTH-STH, hamed@sth.kth.se, Tel: 08-7904855



50 100 150 200 250 300 350 400 450 500

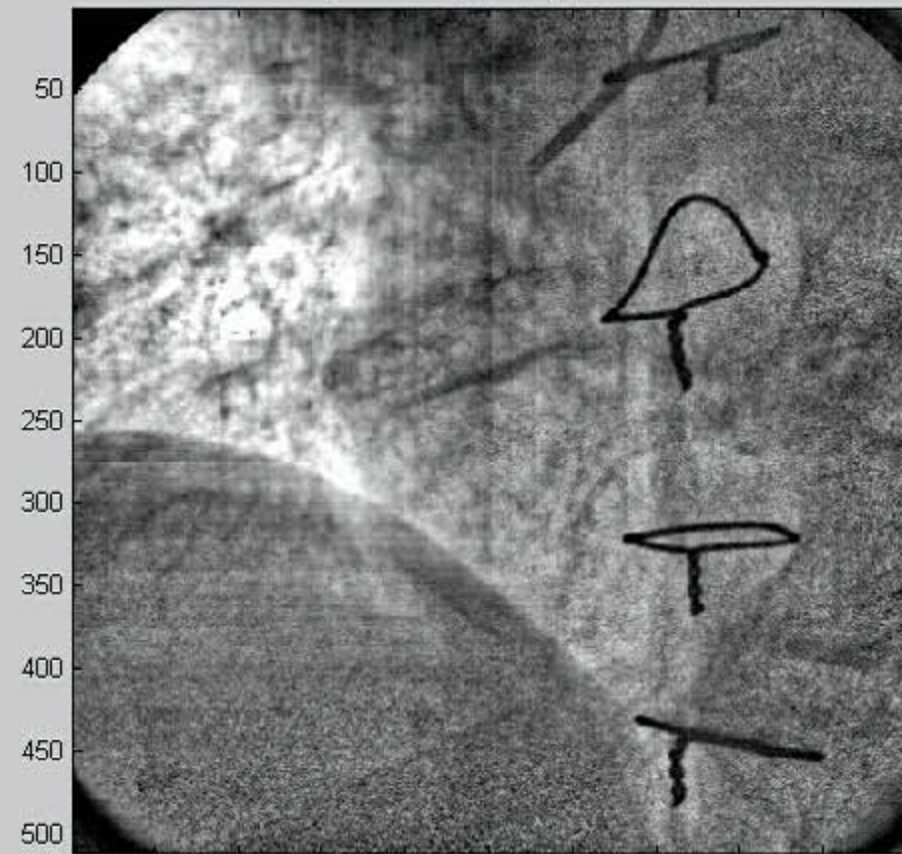
Result: Minimum X-ray dose

Frame 1 of 81

Hamed Muhammed, KTH-STH, hamed@sth.kth.se, Tel: 08-7904855



50 100 150 200 250 300 350 400 450 500



50 100 150 200 250 300 350 400 450 500

What we gain

- ▣ Less X-ray dose to everybody in the operation room, which can lead to lower risk level of physical damage (e.g. cancer) and psychological damage (e.g. stress) to the health of both the patient and all involved healthcare personnel.
- ▣ Make it easier to recruit new personnel into the field of Radiology.

What we gain

- Better image quality which can lead to better surgery result (due to reduced stress to the healthcare personnel), shorter operation time, and consequently even less X-ray dose.
- In addition to that the resulting images can be viewed using ordinary monitors (e.g. LCD TV) without any need for expensive, exclusive, high-dynamic-range displays.

What we gain

- ▣ Less use of harmful and expensive contrast agent, which can cause allergic reactions and damage to the kidneys (especially in elderly cases).

