AbstractID: 8682 Title: Implementation of variable temporal filtering in a high-resolution, region-of-interest, High-Sensitivity, Micro-Angiographic Fluoroscope (HSMAF) detector

Purpose:
Temporal filtering with operator-selectable weighting factor has been implemented in a LabVIEW-based Graphical User Interface (GUI) for use with a new high-resolution, High-Sensitivity, Micro-Angiographic Fluoroscope (HSMAF) in order to enhance visualization during neuro-interventional procedures.

Method and Materials:
The detector which is based on a CsI(Tl) phosphor, a light image intensifier, and a fiber-optic taper coupled to a charge-coupled device (CCD) camera, provides the angiographer with real-time display of high-resolution region-of-interest (ROI) images. The high sensitivity of the HSMAF enables the detector to work in fast frame-rate, low-dose x-ray procedures such as fluoroscopy and roadmapping which are subject to noise. The variable temporal filtering is able to reduce the image noise and improve visualization of details of small structures such as stent struts. The selectable weighting factor which can be set before or even during acquisition, offers a fine adjustment tool for the compromise between motion blurring and noise reduction. The temporal filter weighting-factor can be varied between 1 and12, typically; however, in extremely noisy cases and small object motion it can go up to a higher value.

Results:
Variable temporal filtering and its resulting noise reduction, have significantly improved image quality and the visualization capability of the HSMAF system. The variable weighting factor gave the flexibility to control the amount of noise smoothing, even during the fluoroscopic procedure. Despite the increased processing time needed for temporal filtering, the GUI can still maintain the 30 fps display rate during fluoroscopy and roadmapping.

Conclusion:
The ability of variable noise reduction during roadmapping and fluoroscopy with the HSMAF provides angiographers and interventionalists with a capability of enchanced visualization of small vessel and endovascular device details, such as stent-struts, hence making diagnoses and image guided interventions more accurate.
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