Purpose:To implement real-time adaptive temporal filtering based on amount of motion detected for an object of interest during fluoroscopy. For a stationary object, higher-weight temporal filtering is used and during movement the weight is reduced in real-time.

Methods:A phantom consisting of two stents (stainless steel and nitinol) mounted on a linear stage, and a stationary third stent (nitinol stent with platinum markers) was assembled. The stent strut sizes ranged between 80 to 100 micron. Fluoroscopy was done using the custom high resolution Micro Angiographic Fluoroscope (MAF) with an x-ray spectrum hardened by a head equivalent phantom. The stainless steel stent was selected as the object of interest and was localized using a pattern matching algorithm available as a part of LabVIEW IMAQ Vision software. A real time adaptive temporal filter was developed. When the stent was found to be stationary, the temporal filtering weight was increased. Depending on the amount of motion the weight was reduced; more the motion, lesser the weight.

Results:
Without temporal filtering, the nitinol stent could not be seen. When the stents were stationary, and the temporal filter weight was increased, the nitinol stent could be clearly visualized due to the quantum noise reduction. When the same temporal filter was used while the stents were in motion, then motion blur reduced the visibility of the nitinol stent and the struts of stainless steel stent also could not be distinguished from each other. In this case when the temporal filtering weight was reduced the stainless steel stent struts were visualized better.

Conclusions:Motion based adaptive temporal filtering can be implemented to aid during interventional procedures by tracking the motion of the high contrast interventional device to improve the visualization of lower contrast neurovascular objects.

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