Improved Highly Constrained Image Reconstruction (HYPR) Method

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WARF: P07487US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improvement to the HYPR image reconstruction method, which is applicable to images obtained with digital subtraction angiography or X-ray fluoroscopy.

OVERVIEW

The HYPR method, as described in WARF reference number P06088US, reconstructs a composite image from acquired data to provide *a priori* knowledge of the subject being imaged. This composite image then is used to constrain and improve the image reconstruction process. HYPR can be used with a variety of imaging modalities.

Regardless of which HYPR processing method is used, subject motion is an issue when the composite image is formed by integrating acquired images within a time window. If the window is set wide to integrate more image frames and produce a higher quality composite, the composite image may become blurred due to subject motion.

Issues with image quality also are a concern in HYPR applications with fluoroscopy. Digital subtraction angiography (DSA) is a fluoroscopy imaging technique used to obtain real-time moving images of blood vessels in bony or dense soft tissue using an X-ray source and fluorescent screen. Images are produced by subtracting a “pre-contrast image” or mask from later images obtained after a contrast medium has been introduced. A limitation of traditional DSA is the limited signal-to-noise ratio (SNR) obtained for a given amount of contrast and X-ray dose. X-ray fluoroscopy has similar issues.

Improved image reconstruction for applications involving both subject motion and X-ray fluoroscopy or DSA is needed.

THE INVENTION

UW-Madison researchers have developed an improvement to the HYPR process in which a higher quality composite image may be produced when subject motion is present during the scan. The composite image is produced by accumulating data from a series of acquired image frames, and the number of image frames used is determined by the amount and nature of subject motion. Subject motion is determined on a pixel-by-pixel

THE WARF ADVANTAGE

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basis, and the integration of each pixel with the composite image is based on the detected motion. This adaptation allows the best image possible to be produced when the subject moves during the scan.

The method can be applied to digital subtraction angiography (DSA) and X-ray fluoroscopy by acquiring a series of image frames as a contrast agent flows into the area being imaged. The improved HYPR method then is used to form the composite image on a region-by-region basis.

APPLICATIONS

- Highly constrained image reconstruction in situations with a moving subject
- HYPR image reconstruction with X-ray fluoroscopy or digital subtraction angiography

KEY BENEFITS

- Improved signal-to-noise ratio and image quality

ADDITIONAL INFORMATION

Related Technologies

For more information about HYPR image reconstruction, see WARF reference number P06088US.

Tech Fields

Medical Imaging - X-ray
Medical Imaging - Other diagnostic imaging

CONTACT INFORMATION

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