SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

ACCELERATION OF ITERATIVE IMAGE RECONSTRUCTION FOR X-RAY IMAGING

PhD Preliminary Research Examination

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Abstract: Three-dimensional image reconstruction for scanning baggage in security applications is becoming increasingly important. Compared to medical x-ray imaging, security imaging systems must be designed for a greater variety of objects. There is a lot of variation in attenuation and nearly every bag scanned has metal present, potentially yielding significant artifacts. Statistical iterative reconstruction algorithms are known to reduce metal artifacts and yield quantitatively more accurate estimates of attenuation than linear methods. For iterative image reconstruction algorithms to be deployed at security checkpoints, the images must be quantitatively accurate and the convergence speed must be increased dramatically. There are many approaches for increasing convergence; two approaches are proposed in this work. The first approach includes a scheduled change in the number of ordered subsets over iterations and a reformulation of convergent ordered subsets that was originally proposed by Ahn, Fessler et. al. The second approach is based on varying the multiplication factor in front of the additive step in the alternating minimization (AM) algorithm, resulting in more aggressive updates in iterations. Each approach is implemented on real data from a SureScan x1000 Explosive Detection System and compared to straightforward implementations of the alternating minimization algorithm of O'Sullivan and Benac with Huber-type edge-preserving penalty.

DATE: Monday, March 30, 2015
TIME: 4:00 p.m.
PLACE: Green Hall, Room 0120

Thesis advisor:
Dr. Joseph O'Sullivan

This seminar is in partial fulfillment
of the Doctor of Philosophy degree

Washington University in St. Louis
SCHOOL OF ENGINEERING & APPLIED SCIENCE