Subject: Re: Radon forward projection problem
Posted by mmiller3 on Thu, 24 Apr 2008 16:22:44 GMT
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>>>> > "Wox" == Wox <nomail@hotmail.com> writes:

> Now what is OSEM doing?

OSEM uses a different subset of the data for each iteration. For example, if you were running with 8 subsets, you'd use data from angles 0, 7, 15, ... for the first iteration, the data from angles 1, 8, 16, ... for the second iteration, 2, 9, 17, ... for the third and so on in order - hence the name ordered subsets EM. Each subset is handled using regular EM. Note that each subset must be a reasonably complete measurement by itself. If too many subset are used, the signal-to-noise in each subset will approach zero and the method won't do any thing useful.

OSEM has the advantage of making each iteration take less time then using the full data set each time, so it is computationally feasible compared to EM. I noted that in your original posting, you were asking about interpolating your sinograms before back projecting. If you interpolate subsets to fill in larger sinograms, you will loose some of the speed advantages of OSEM.

When run to "convergence," the OSEM result will sort of oscillate between the subsets. Usually OSEM is stopped before that happens, but the stopping point has to be determined empirically - typically when the images look "good." Since the algorithm hasn't fully converged at that point, there are issues with using OSEM images for quantitative work. The same issues arise with EM, since it will converge on the data, including the noise. Since OSEM uses subsets, it will not even converge on the same result as EM, if both where run to convergence.

In the medical world, OSEM is very commonly used for diagnostic work, though. OSEM takes longer than filtered back projection, but produces nicer/smoother images far more quickly than quantitatively accurate methods such as MAP.

Mike

P.S. Note the use of 0-based indices for choosing angles - still trying to stay on topic for IDL ;-)

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