

Re: Accelerating the Buddhabrot with the Metropolis–Hastings algorithm

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- *From:* Roger Bagula <rlbagula@xxxxxxxxxxxxxx>
 - *Date:* Sun, 03 Sep 2006 15:42:44 GMT
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Steckles wrote:

Hi Guys,

Last weekend, I got to wondering if the Metropolis–Hastings sampling algorithm (http://en.wikipedia.org/wiki/Metropolis–Hastings_algorithm) couldn't be used to render zoomed in regions of the Buddhabrot quickly. Metropolis sampling has been used to great effect in the acceleration of global illumination ray tracing algorithms, and rendering of small sections of the Buddhabrot is a very similar kind of problem.

I went ahead and banged out a quick program and was surprised at just how well it works. It's no more efficient than the "dumb" method for renderings of the entire set, but will render high magnifications (I've gone up to 10000x without problems) with little loss of speed.

Rather than select points at random, the program works by finding a point whose orbit passes through the screen and then sampling nearby points. New "mutations" to the initial point are proposed and then accepted or rejected based upon some kind of crazy statistical voodoo. Many of the parameters (the transition probability in particular) have been chosen on an ad–hoc basis, and I'm sure that someone with a bit more grounding in this stuff could come up with better ones.

Anyway, I'm not sure if the Metropolis–Hastings algorithm has been applied to calculating the Buddhabrot before, although a quick search on my part indicated that it either hasn't or has not be widely discussed. I've uploaded a few images and the source for a simple program in the hopes that someone will find it useful. I'm sure there are a few lurking buglets in the program, but it should serve for demonstration purposes.

You can find everything at <http://www.steckles.com/buddha>

–Alex

Re: Accelerating the Buddhabrot with the Metropolis–Hastings algorithm

Alex Steckles,

Looks like good work to me.

Pictures sort of look like Hubble pictures of a nebula or something.

A little more contrast in the colors might help.

You are using a blue to yellow color transition:

if you alternate with a red –green transition maybe

you'd get better contrast (be able to make out details better)

but might not look as artistic.

Roger Bagula

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