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Subject: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.  
Posted by [Piers](#) on Sun, 10 Feb 2013 14:26:38 GMT  
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Hey, thought some of you would find this interesting.

I recently stumbled across Mandelbulb 3D. Its a 3D fractal generator that has some really awesome features. Its been around for a while so has a healthy community of contributors (Fractal Forums.com) and above all its free.

(FIG.1) is an image demonstrating how you can keep zooming in and the algorithms will keep generating infinite detail. Lighting , Fog, depth of field can all be adjusted

(FIG.2) Whats more amazing is that the program features Voxel Stacking. This basically means you can generate an editable/printable file from what you can see in your viewport. I tried loading the slices from Mandelbulb into 3D Slicer, but had no luck (there maybe a way though).

Mandelbulb creates the slices and Fiji sequences them and creates the 3D mesh as a .Obj. Blender is simply the mesh editor I chose. (Zbrush, and Mesh labs are also a good option). Its a good idea to start small when using voxel stacking. Test to see what your computer can handle. You can create a 5Gb .OBJ but Id be surprised if you could open it.

NOTE: Mandelbulber hasnt got voxel stacking. Although it seems a little more user friendly if you just want to fly around fractals for rendered images.

[Download Mandelbulb 3D](#)  
[Download Fiji](#)

Here are the tutorials I used to get started. Thanks to Don Whitaker for doing these.

1 - 2 - 3 - 4 - 5

Number 5 is the one regarding voxel stacking.

(FIG.3) is just some images I found while exploring.

Enjoy!

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### File Attachments

1) [Mandelbulb-overview.gif](#), downloaded 369 times

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.

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Posted by [virtox](#) on Wed, 13 Feb 2013 08:16:03 GMT  
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Very cool!

Voxels are awesome

edit: Lol, this triggered me to finally retry the Mandelbulb in my own voxel engine, thanks for the re-inspiration!

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.  
Posted by [Piers](#) on Wed, 13 Feb 2013 19:06:33 GMT  
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Wey! Glad too see someone else thinks this is cool

Managed to get my own variation of Menger3 to a printable state. But will have to put it on the backburner as its been priced at 1000GBP. Not too surprising when the volume is 1500cm<sup>3</sup>. (only 30cm diameter )

Is your engine available for dl?

Ps GJ on the price calculator.....fingers crossed for a standalone version

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.  
Posted by [virtox](#) on Wed, 13 Feb 2013 19:24:00 GMT  
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Lol, well the idea is to release my engine one day, but for now it is quite the hack job, it only compiles to 64bit windows exes which frequently crash my system. Typical jobs run with 16Gb and over. So it only tends to run nicely with a lot of TLC  
And I constantly hack changes for a particular projects, but perhaps one day

Regarding the pricing calculator, Thanks  
Hmm yes, standalone would be nice. But cross platform would be useful.  
And I hate java, so that is out

I imagine it should be possible in javascript?

Owh yes Menger, another one of those frustratingly fun fractal  
Never got past the basic shapes and variations. Tried a few hollow ones, but as yet unfinished.  
Did you see the alternate distorted Menger versions on fractalforum using IFS?

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.  
Posted by [Piers](#) on Fri, 15 Feb 2013 17:15:36 GMT  
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Ha! yeh thats a bit out of my systems reach! Ill just have to wait for this 'one day' you speak of  
So how is your re-inspiration going? Found any interesting designs?

To be honest im a physical modelmaker moving over to printing so script, etc isnt really my area.  
But lets hope so.

Nope, can you send the link? Sounds interesting. I have had a play combining with the ' \_ '  
formulas. Infact the Menger above is using \_AmazingBoxSSE2.  
But most of the time when I add a second formula it goes a bit crazy. I need to do some more  
reading on fractal forums to better understand what is happening when I change the numbers.  
Heres an interesting variant, Annoyingly I didnt save the scene. When/if SW get the multi-material  
printer you could print something similar to this within the transparent material. (Like Objets ship in  
a bottle)

Have nice weekend  
Piers

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#### File Attachments

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1) [fds.jpg](#), downloaded 245 times

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.  
Posted by [virtox](#) on Fri, 15 Feb 2013 19:18:45 GMT  
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The Menger sponge, at the bottom of this page:  
<http://www.fractalforums.com/ifs-iterated-function-systems/kaleidoscopic-%28escape-time-ifs%29/>

Would be cool to one day get an actual sponge like that

For now I am tweaking the basic Mandelbulb rendering formulas as this kind of "rendering" works best with a good distance estimator, as this allows for a smooth density field to polygonize against. Helps alot against dust, spikes and artifacts.

So far only three simple bulb attempts:

<http://www.shapeways.com/model/921847/mandelbulb-001.html>

<http://www.shapeways.com/model/922158/mandelbulb-001b.html>

and latest:

<http://www.shapeways.com/model/924146/mandelbulb-002.html>

Coloring is chosen based on r, theta and phi from a lower iteration.

All are still rough estimates as the original colored meshes are in the 6 million poly range.

I have a script somewhere to reapply the colors after the mesh has been decimated.

But I also still have to work on hollowing them out etc.

What might work well for that render of yours is to get it laser etched in glass

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Subject: Re: Mandelbulb - 3D fractal generator to 3D Print via voxel stacking.

Posted by [Piers](#) on Mon, 18 Feb 2013 18:43:31 GMT

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oO yeh they are really nice! Will have to have a play with those when i get a free moment. Thanks

Your render looks great....Very smooth! . seems like the fog helps fill the deeper pits aswell. What do you mean by, ' works best with a good distance estimator'?

Yeh I have alot of problems with dust and spikes when using 3D Slicer. it has a few tools to help with this but am still getting the hang of it.

My way for deleting internal geometry then hollowing out the bones I print is uber basic, but works. Turn on Limit selection to visible > Invert selection > delete > Export > Open in Magics/Netfabb.....let it repair the file (I only do this because the process isnt perfect and it tends to create holes) > Export > Open in Blender > Boolean subtract. Again very basic for my needs it works.

Thats true.....although always thought the 3D laser engraving looked a bit cheezy It invokes

images of couples faces, roses and kitschy landmarks in souvenir shops

Piers

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