A pipeline for converting 3D model files in Blender to optimised (multi-brick) Lego LDraw .ldr files

You will need:

Blender - https://www.blender.org/ (I'm using v2.79b)

Poly2vox - http://advsys.net/ken/download.htm

Goxel and Magica Voxel - http://guillaumechereau.github.io/goxel/ (and https://ephtracy.github.io/) - both voxel model editors

ColouredVoxel2Ldr (my Python script) - https://github.com/pennyforge/

LDRAW (and LDView) - http://ldview.sourceforge.net/

Sud.io - if you want to render nice pictures - https://www.bricklink.com/v3/studio/download.page

All the above are freely available to download.

The pipeline goes something like this

1. View your 3D file in Blender with textures (as .png file) - make sure you can see the textures correctly in Blender - Make sure ALL the textures conform to the 8.3 filename system

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2. Export .3ds file from Blender

v

3. Convert the 3ds file to voxels using poly2vox.exe (make sure you still have the 8.3 png texture file in the same folder as the .3ds file

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4. Import the resulting .vox file into Goxel - The orientation in Goxel will match the final orientation of the Lego mode - also do any minor clean up if you want

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5. Export the .vox file from Goxel (this is important - my script only reads .vox files exported from Goxel)

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6. Process the exported .vox file using my script

v

7. Make a cup of tea

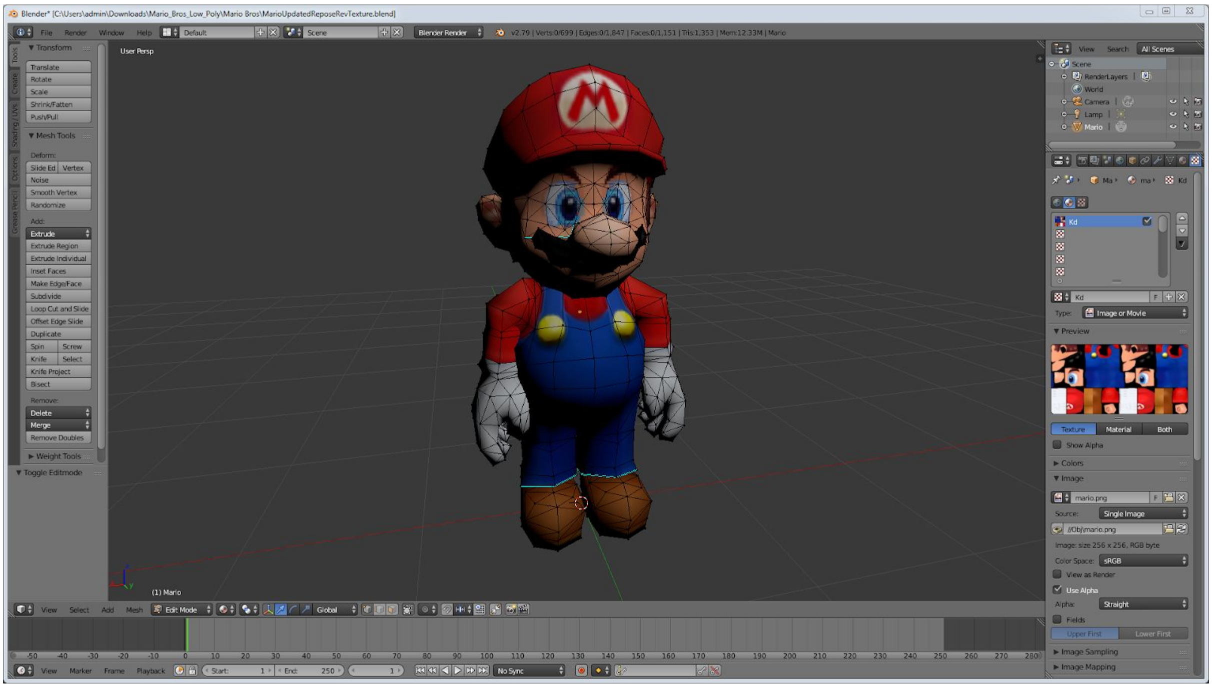
v

8. Open the resulting .ldr file to see the final output!

I'LL NOW GO THROUGH EACH OF THE PIPELINE STEPS IN A LITTLE MORE DETAIL...

1. View your 3D file in Blender with textures (as .png file) - make sure you can see the textures correctly in Blender - Make sure ALL the textures conform to the 8.3 filename system

Make sure you can see your textures in Blender - I'm using Blender 2.79b



Blender* [C:\Users\admin\Downloads\Mario_Bros_Low_Poly\Mario Bros\MarioUpdatedReposeRevTexture.blend]

v2.79 | Verts:0/699 | Edges:0/1,847 | Faces:0/1,151 | Tris:1,353 | Mem:12.33M | Mario

mario.png

Source: Single Image

//Obj\mario.png

Image: size 256 x 256, RGB byte

Color Space: sRGB

☐ View as Render

☑ Use Alpha

Alpha: Straight

☐ Fields

TurboSquid has lots of free textured 3D models - Mario and Yoshi can be found here…

https://www.turbosquid.com/3d-models/free-mario-bros-3d-model/621837

But the texture naming for Mario needs fixing if you plan to use these specific Mario and Yoshi files from Turbo Squid

2.Export .3ds file from Blender

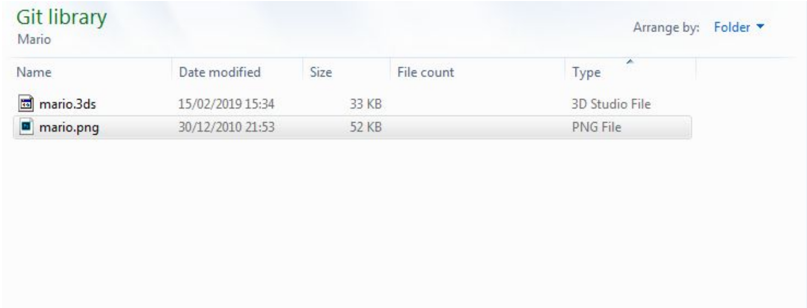
As we're going to be using .3ds files to when we convert from textured polys into voxels, all texture .png file names need to be in the old DOS 8.3 filename format BEFORE you export the .3ds file from Blender.   If you don't do this all your voxel models will come out white. The 8.3 texture filename is a limitation of the .3ds format (which is fairly old now). However for our purposes .3ds works really well.

3.Convert the 3ds file to voxels using poly2vox.exe (make sure you still have the 8.3 png texture file in the same folder as the .3ds file

As a starting point use the command…

```
poly2vox.exe mario.3ds mario.vox /v32
```

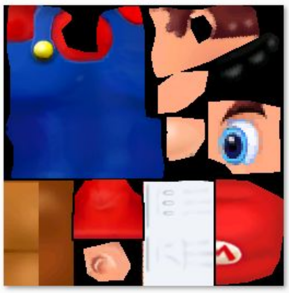
This will make a voxel file 32 units high -



Git library
Mario

Arrange by: Folder ▾

Name	Date modified	Size	File count	Type
mario.3ds	15/02/2019 15:34	33 KB		3D Studio File
mario.png	30/12/2010 21:53	52 KB		PNG File

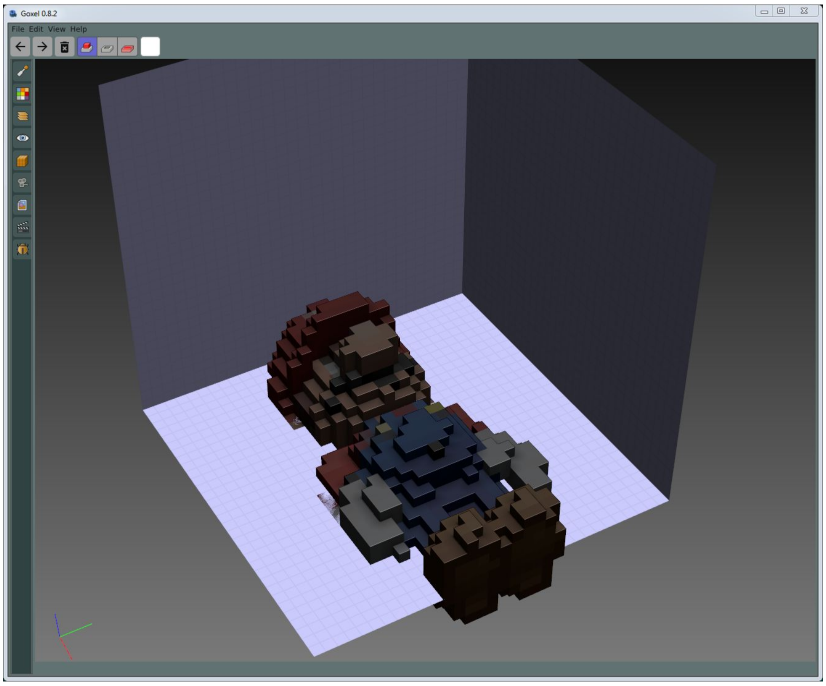


And note that the .png texture file for mario (mario.png) is in the 8.3 format - Type the following for the poly2vox help list (to see other options):

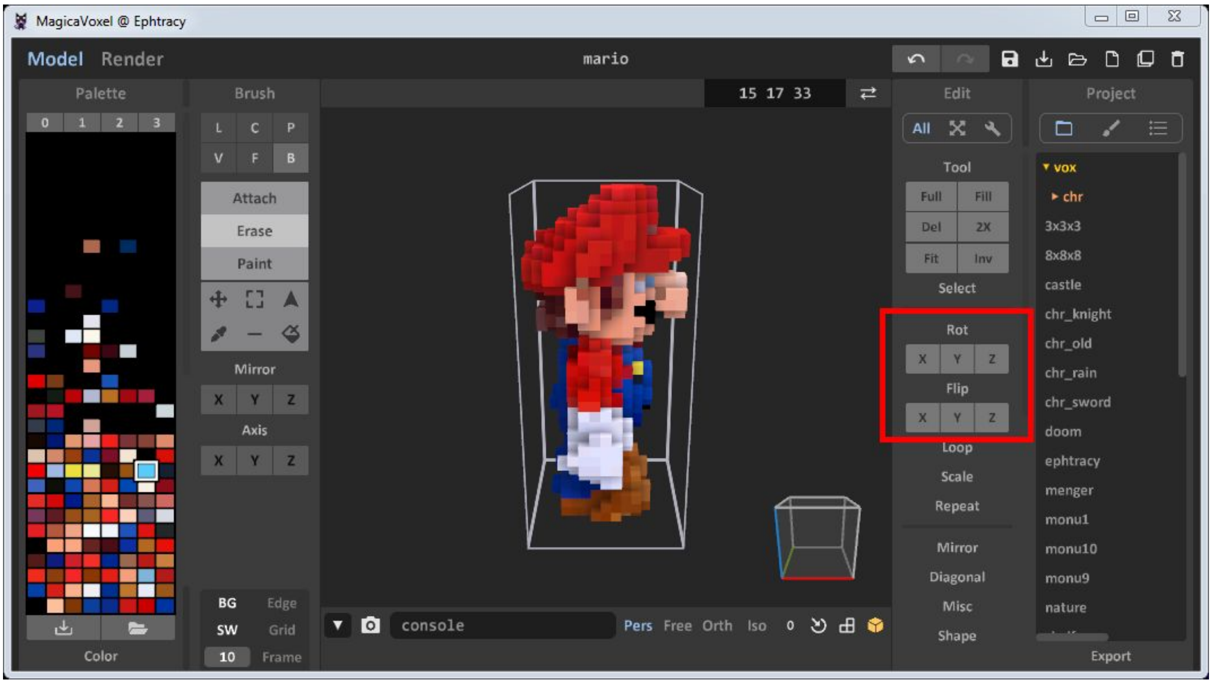
```
poly2vox.exe /?
```

4. Import the resulting .vox file into Goxel - The orientation in Goxel will match the final orientation of the Lego mode - also do any minor clean up if you want

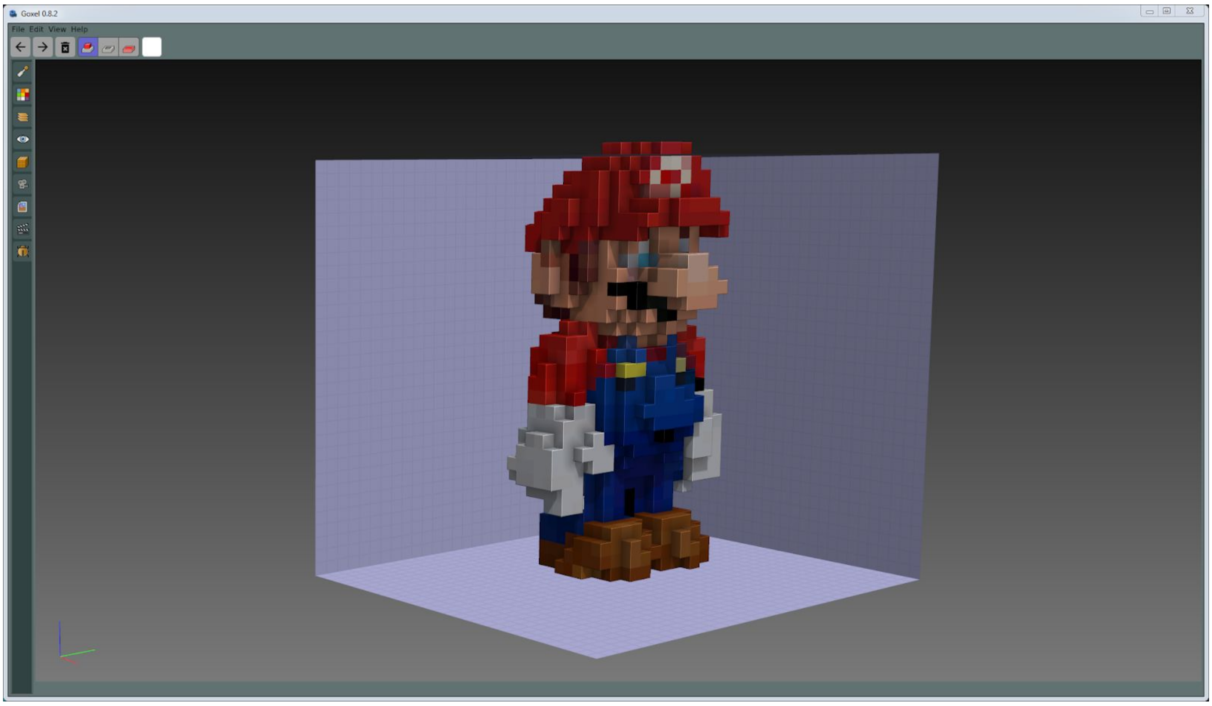
Make sure you check the orientation of the model in Goxel - What you see in Goxel will be how you see the model orientated in Lego bricks - so in the image below - Mario would be lying down!



You can use Magic Voxel’s “Rot” and “Flip” tools to re-orientate Mario.

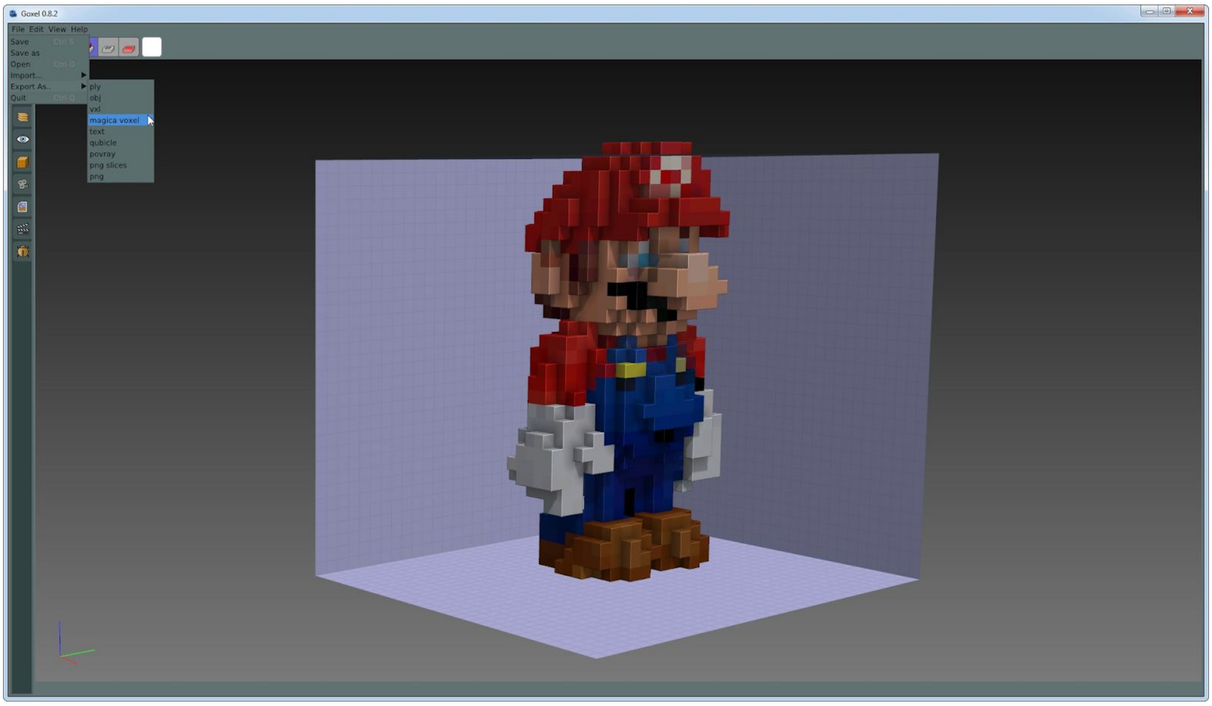


This re-orientation can be a bit hit and miss - I sense there is a problem with the initial orientation when it’s exported from poly2vox. Flipping it around in Magica Voxel and resaving it seems to work - just make sure you check the final orientation in Goxel - What you see in Goxel is what you’ll get in LDraw. This is also the time if you want to manually tweak any of the voxels or colours.



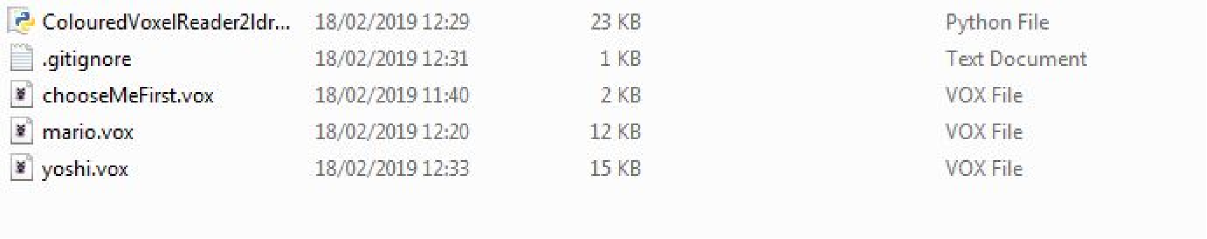
5. Export the .vox file from Goxel (this is important - my script only reads .vox files exported from Goxel)

I'm not sure why this is - I use py-vox-io (https://github.com/gromgull/py-vox-io) to actually read the .vox file, so it's not something I have a lot of control over. However using File>Export>Magica Voxel in Goxel is an easy workaround.



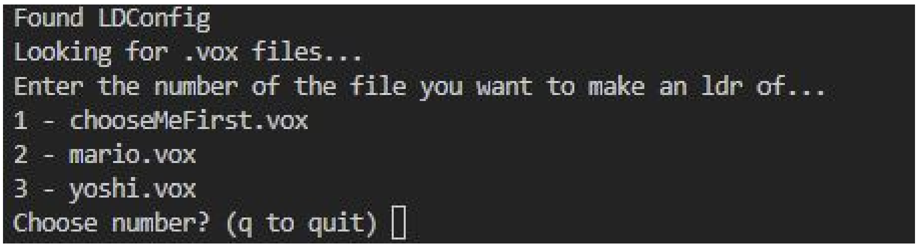
6. Process the exported .vox file using my script

Put the resulting .vox file in the same folders as my script and then run my script



ColouredVoxelReader2ldr...	18/02/2019 12:29	23 KB	Python File
.gitignore	18/02/2019 12:31	1 KB	Text Document
chooseMeFirst.vox	18/02/2019 11:40	2 KB	VOX File
mario.vox	18/02/2019 12:20	12 KB	VOX File
yoshi.vox	18/02/2019 12:33	15 KB	VOX File

The script should find the .vox file when you run it...

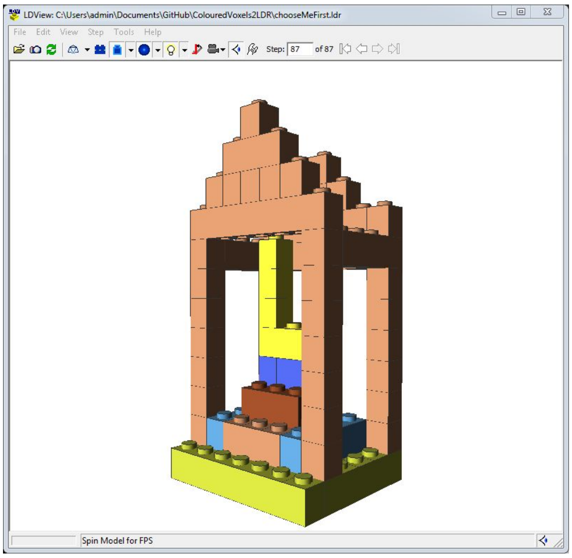


```
Found LDConfig
Looking for .vox files...
Enter the number of the file you want to make an ldr of...
1 - chooseMeFirst.vox
2 - mario.vox
3 - yoshi.vox
Choose number? (q to quit)
```

I'm using Python 3.7 (32 bit) on a Windows 7 PC. You'll also need numpy and py-vox-io installed for your version of Python. You will also need a copy of LDConfig.ldr (which is part of LDraw and ideally installed in C:\LDraw) as the script uses this file to build the Lego colour code dictionary.

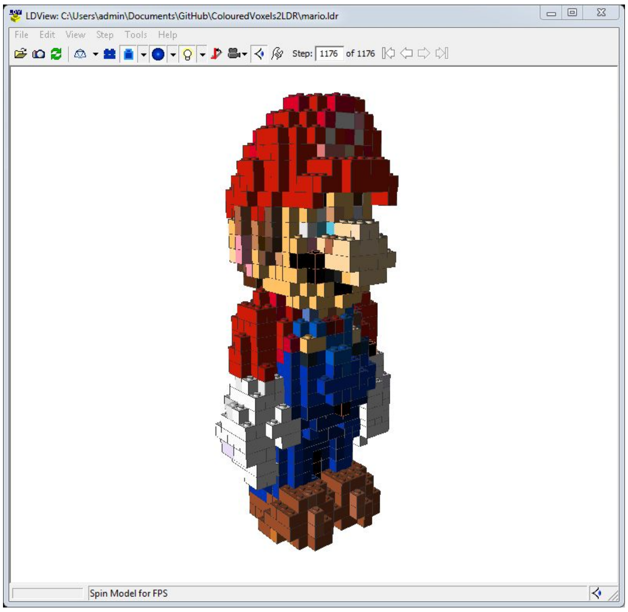
7. Make a cup of tea

It can take anywhere between a few minutes and a few hours to process the .vox file - the chooseMeFirst.vox file should process in a few minutes. It should look something like this:


LDView: C:\Users\admin\Documents\GitHub\ColouredVoxels2LDR\chooseMeFirst.ldr
File Edit View Step Tools Help
Step: 87 of 87
Spin Model for FPS

8. Open the resulting .ldr file to see the final output!

Once the script completes you should have an ldr file in the same folder, and with the same name, as your .vox file


LDView: C:\Users\admin\Documents\GitHub\ColouredVoxels2LDR\mario.ldr
File Edit View Step Tools Help
Step: 1176 of 1176
Spin Model for FPS

Generally, the resulting LDraw models are reasonably stable but they may not be perfect, you can check using the stability checker in Stud.io - plus there are still a few issues and bugs that I'll cover in the next section.

ISSUES AND BUGS…

1) There is an issue where coloured edge voxels (with the same colour) are replaced by 1x1 bricks - you can see it in all the resulting models - this relates to the way the script analyses each voxel slice. I should be able to do a second pass on each slice to isolate 1x1 bricks of the same colour which are next to each other and fix them - it's on the 'to be fixed' list

2) Currently no alpha > transparency support - It's on the 'to be fixed' list

3) There seems to be a problem around 1 million voxels (this is not as big as you might think - think of a 100x100x100 lego grid - it's big but it's not massive. For some reason the script simply exits on my workstation and I don't know why - I get no error message, just an incomplete .ldr file - I'm thinking about it!

4) My script could be a lot more efficient in a number of areas, in the way it determines colour matching for example - I already think there is a much better way of doing this. For now it generally works but if you find any major problems just let me know and I'll see what I can do..

Neil Marsden - 17 Feb 2019 - info@cultofthebrick.com

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