VOXELIZER FOR UNITY 3D

OVERVIEW

Voxelizer Plugin uses Physics.Raycast method to transform any 3D model into a set of voxels, i.e. cubes. Voxels are created at edges of a model and optionally also inside it. Voxels are rendered in a single draw call providing they are of the same size, same or shared material, and texture has no transparency.

INSTALLATION

After importing Voxelizer package, please save your scene. This will enable a new menu item called Voxelizer. Also, in your Assets folder a new folder called Voxelizer will appear.

PRECONDITIONS

In order for a GameObject to be successfully voxelized, following conditions must be met:

- Object has to have MeshRenderer component attached.
- Object has to have MeshFilter component attached with nonempty Mesh.
- Object has to have Collider component attached.
- Object coordinates in each axis have to fit into range (-9999, 9999).

In addition:

- To prevent objects that are intersecting or are close to each other from being voxelized you need to put them in separate layers.
- Material_From_Object mode requires specific Collider component – MeshCollider.

All attached components must be active.

USAGE

You can use Voxelizer in two ways – by running Voxelize Wizard from Unity Editor Menu. The second option is to attach SpawnVoxels script to a GameObject and enter Play mode.

EDITOR

You can find Voxelize Wizard in GameObject Menu in Unity Editor. There are following options in the wizard:

- Script – it contains SpawnVoxelsE.cs and has to remain unchanged.
- Object_To_Voxelize – an object you would like to voxelize. It is advised to choose it from Scene, not from Assets.

- Prefab_Voxel – a voxel prefab from which voxels will be instantiated. You can find predefined prefabs in Voxelizer/Prefabs folder. You can freely change size of prefabs and create your own ones. However, please remember to use one of two predefined meshes located in main Voxelizer folder:

  Voxel_mesh_master_24x12
  Voxel_mesh_master_54x48

  Mesh Voxel_mesh_master_54x48 contains more vertices and triangles. It is useful if you want to obtain better quality of material derived from object to voxelize (see Material_From_Object).
  The minimum scale of voxel prefab is 0.001.
- Voxel_Material – Material_From_Object. This will assign material from object to edge voxels based on raycast method hit. In order for this to work, a MeshCollider component has to be attached to GameObject.
  In this mode each voxel's mesh is saved into Voxelizer/Meshes folder. After some time of working with Voxelizer number of files in this folder may become large. It is therefore advised to delete unused mesh files from time to time. If you want to preserve voxels that you created, it's best to copy their mesh files to a separate folder.
- Voxel_Material – Custom_Material. A material to be assigned to edge voxels. You can freely manipulate it from code, in script SpawnVoxelsE:

```
// Here you can manipulate material of voxels at the edges
     voxel.renderer.material = Voxel_Material;
```

- Fill_Object – Fill. With this option checked voxels will be created also inside object.
- Fill_Object – Fill_Material. A material to be assigned to inner voxels. You can also change it from code, in script SpawnVoxelsE:

```
// Here you can manipulate material of voxels that fill object
     voxel.renderer.material = Fill_Material;
```

- Voxel_Components – Add_Rigidbody. This will add a RigidBody component to each voxel.
- Voxel_Components – Add_Collider. This will add a Box Collider component to each voxel. You can add your components to voxels from code, after lines 1339 (to edge voxels) and 1386 (to inner voxels).
- Voxel_Joints – Create Joints. This will add FixedJoint components to all voxels that have other voxels as neighbors. Neighbor is defined in terms of distance. If distance is less than 1.1 of x of voxel scale then two voxels are neighbors.
- Voxel_Joints – Connect Rigidbody. If checked, all voxels will be connected to neighboring voxels via connectedBody property of FixedJoint component.
- Voxel_Joints – Break Force. This value is used to specify breaking force of voxel joint. By default it equals to infinity.
- Leave_Object – with this option checked, object will remain in the scene after voxelization, if unchecked – object will be deleted.
- Info – with this option checked, information will be displayed in Console after voxelization including object name, number of created voxels and processing time.

After at least choosing object to voxelize and voxel prefab, please click Voxelize button.

IN-GAME

The second way of usage is to attach Voxelizer/SpawnVoxels.cs script to a GameObject. The script parameters are the same as above with one exception –Execute Mode. When it is set to:

- OnAwake – voxelize method is called in Awake function.
- OnStart – voxelize method is called in Start function.
- Manual – you have to call voxelize method yourself in the following way:
  `ExampleObject.GetComponent<SpawnVoxels>().Voxelize();`

EXAMPLE SCENE

There is example scene included in Voxelizer/ExampleScene. Please open it and hit Play. You can view scene code in ExampleCode.cs.

MISCELLANEOUS

1. After cancelling voxelizing process in the Editor you may experience Unity user interface freeze. To fix this issue please run Window/Layouts/Revert Factory Settings.
2. Voxelization of skinned meshes is currently not supported.
3. In order to process parent-child objects, voxelizing script has to be added to parent and all children separately.
4. Rotation of game object has influence on the way it is voxelized. In Material_From_Object mode it also has influence on materials assigned to voxels.