



Figure 1. User interface (UI) of MeshNCA demo. **Canvas and Render Controls** section displays the stylized mesh and provides basic shading controls. **Interactive Controls** panel allows the users to interact with and control the synthesized texture in different ways **Texture and Mesh Selection** panels allow the users to choose between 72 different textures and 47 different meshes.

1. User Interface

Figure 1 shows the user interface of our online demo. Here, we describe the role of each element in our UI. There are 3 main parts in our user interface: 1- Canvas and Render Controls, 2- MeshNCA Interactive Controls, and 3- Texture and Mesh Selection.

1.1. Canvas and Render Controls

The canvas displays the synthesized texture on the target mesh. We also provide a few options for the users to control the rendering shader.

- On the upper left part of the canvas, we show the number of MeshNCA steps per second **steps / sec**, controlled us-

ing the speed slider, and the number of rendered frames per second (fps), **frames / sec**. Ideally, the fps should match the maximum fps of your display. In case of lag, try decreasing the speed using the speed slider or decreasing the subdivision level.

- The **Vis Mode** selection box is shown on the top right part of the canvas. The available options are *Color*, *Albedo*, *Normal*, *Height*, *Roughness*, *AO (Ambient Occlusion)* and *Graft weights*. The Albedo, Normal, Height, Roughness, and AO options allow the users to visualize the corresponding synthesized texture maps by the MeshNCA model. The Color visualization mode combines all the texture maps and renders the mesh using a

physically based rendering (PBR) shader. Choosing the *Graft Weights* option allows the users to visualize the graft weights used for interpolating between two textures. The graft weights change when the user paints on the canvas using the grafting brush.

- The checkboxes on the bottom left part of the canvas allow the users to disable/enable the corresponding texture maps in the shading process. When enabled, we use the texture maps (**AO**, **Normal**, **Roughness**) synthesized by MeshNCA for shading, and when disabled, we use a constant map for shading resulting in a more uniform appearance.
- On the bottom right part of the canvas we provide some utilities to visualize the stylized mesh including **snapshot**, **camera lock/unlock**, and **zoom in/out buttons**. The screenshot button will save the current content of the canvas as a PNG image. The camera lock/unlock button toggles the click events between camera-rotation/paint-brush. When the camera is locked, a click/drag on canvas will be interpreted as the use of the brush tool (either in Regenerate or Graft mode). When the camera is unlocked, a click/drag on the canvas will result in changing the viewpoint by rotating the camera around the origin. The zoom-in/out buttons simply bring the camera closer/further to the object. Notice that on personal computers, the camera can be controlled without these buttons and using shortcuts (shift key and mouse scroll wheel).

1.2. Interactive Controls

As discussed in the main paper, MeshNCA enables several real-time interactive controls for the users to manipulate the synthesized 3D texture. Here, we describe and summarize a list of these controls.

- **Play/pause, Reset and Benchmark** buttons. The play/pause toggle button allows the users to stop and resume the iterations of the MeshNCA update rule. The reset button sets all the cell states with the seed state and resets the graft weights to zero. The benchmark button allows the users to benchmark the performance of MeshNCA on their device.
- From the **Subdivision Level** section users can select the mesh subdivision level and control the synthesized texture's density. Notice that changing the subdivision level restarts the MeshNCA from the seed state.
- **Speed Slider** allows the users to change the number of MeshNCA update steps per second. More steps per second will result in faster-evolving textures with more salient motion.
- **Orientation Slider** allows the users to control the orientation of the synthesized texture. The angle given by this

slider is used in the perception stage to rotate the spherical harmonics basis for each vertex around the surface normal. This operation rotates the orientation of the synthesized texture.

- **Bumpiness Slider** The state of this slider together with the synthesized height map, is used to change the underlying geometry of the mesh by simply displacing the vertices along the surface normal by the given bumpiness value.
- **Brush Mode** The brush mode toggle allows the users to switch between **Graft/Regenerate** brushes. When the brush is in the graft mode, the users can also select the desired grafting texture from the drop-down texture list.
- The **Brush Size** section allows the users to manage the size of the painting brush used for grafting or regeneration purposes.

1.3. Texture and Mesh Selection

The two right panels of the user interface allow the users to select between 72 different textures and 47 different meshes. Below the mesh selection panel, we show the main and the grafting textures. The weights of our pre-trained MeshNCA models for all 72 target textures are stored in a single JSON file of 8MB in size. We download this file once when the web page is loading.