

RGBN Image Editing Software Manual

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Chapter 1

User Interface

RGBN images are photographs with a color and a normal channel. They are very easy to obtain using photometric stereo and can be used to generate very realistic renderings. On the other hand, the normal vectors cannot simply be edited in regular image processing software. Our system implements many operations with both color and normals in a simple user interface with real-time feedback. Its main features are:

- Gaussian and bilateral filters let the user remove noise while respecting sharp edges.
- A combination tool can merge two RGBN images for adding new details.
- Smudge and sharpen brushes can change the geometry represented by normals.
- Brushes for drawing on the surface let the user create new features like bumps and creases.
- Texture synthesis of color and normals.
- Phong and toon shading rendering.

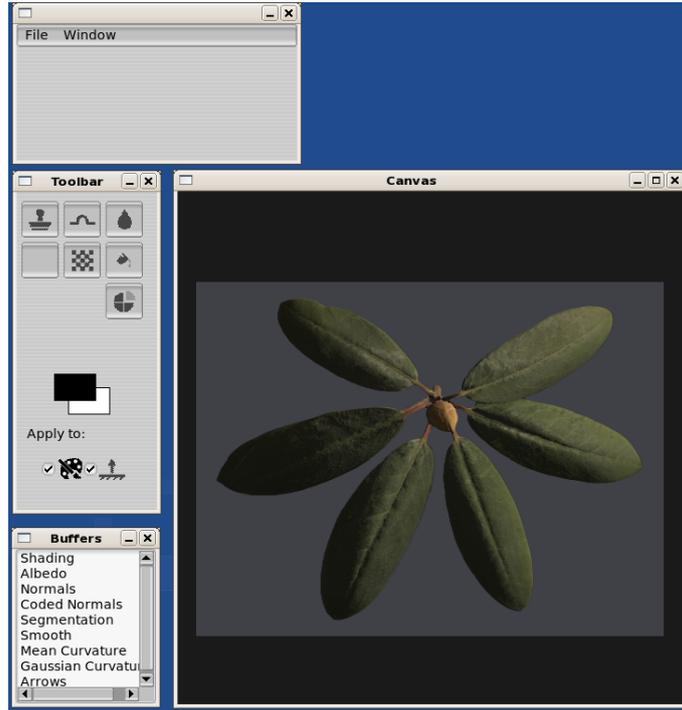


Figure 1.1: The user can select the desired operation in the toolbar, affecting the changes made to the RGBN image in the canvas.

1.1 Work Environment

The software is composed of three basic windows: main window, toolbar window and canvas window.

The main window (Figure 1.1) contains two menu items: File and Window. In the File menu basic functionality can be accessed like New, Open, Save, Save As and Reload. The Window menu lets the use toggle visibility of the auxiliary windows described in the following subsection.

In the toolbar window (Figure 1.1) the RGBN operations can be reached. The user also selects whether editing normals or color (or both). By unchecking the color box, the user will preserve the color image and only affect the normals.

The canvas window (Figure 1.1) is where editing takes place just like a usual image editing software. The main visualization is a shaded RGBN image in which the albedo channel is used for color and the normal channel introduces the shading.

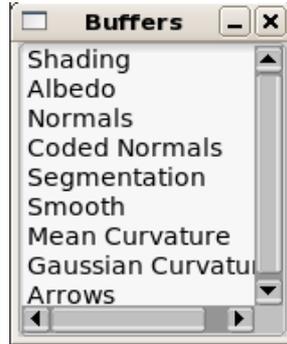


Figure 1.2: Used to select the current viewing mode.

The user can also configure the light position. The ability to change the light while editing is very important since normals are usually perceived through shading.

Other visualizations are also possible (Figure 1.9). In the Window > Buffers menu, the buffers window (Figure 1.2) can be accessed. The current visualization buffer can be selected including: Shaded Image, Albedo, Shaded Normals, Color-coded Normals, Segmentation, Base-level Normals, Mean Curvature, Gaussian Curvature and Normals as Needles.

1.2 File Menu

In the file menu, the user can Open or Save an RGBN image. All RGBN images must satisfy a naming convention. For example, an RGBN image named *hammer* will consist of two files, one for colors and one for normals. The color image must be named *hammer_color.ext* and the normal image *hammer_norm.ext*, where *ext* may be any conventional image format such as jpg, ppm or png. This naming convention is very useful. When opening a file the user can select either the color or normal file, the system automatically infers its twin image and loads it. The same happens for saving images, only one file name is informed.

The following sections details the operations implemented in the system.

1.3 Stamp

This window (Figure 1.3) opens when the user selects the stamp tool from the toolbar. Three parameters must be specified in this window. First, in the textbox size, the user can inform the size of the brush in pixels. Second, the height parameter determines a scale factor for the normals that has the effect of scaling the applied object in the z coordinate. Negative values of height are allowed and they have the effect of converting between elevations and holes. Finally, in the File button the user can select an RGBN image to use as a brush. Brushes of different shapes can be used by providing a third file. It consists of a black and white image named in the format *filename_mask.ext*.

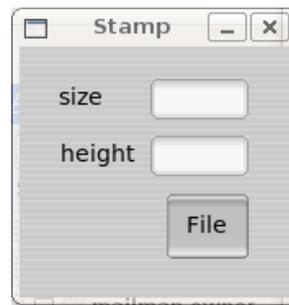


Figure 1.3: Stamp parameters.

1.4 Pen

This window (Figure 1.4) opens when the user selects the pen tool from the toolbar. It is very similar to the stamp parameter window. Three parameters must be specified in this window. First, in the textbox size, the user can inform the size of the brush in pixels. Second, the height parameter determines a scale factor for the normals that has the effect of scaling the applied object in the z coordinate. Negative values of height are allowed and they have the effect of converting between elevations and holes. Finally, in the File button the user can select a profile image to be used as a brush. The profile image is a 1xN grayscale image where each pixel

value is interpreted as a height function. The profile image is only one pixel tall. The color of the brush can be selected in the toolbar window. Additionally, color editing may be disabled.

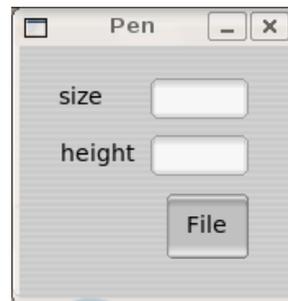


Figure 1.4: Pen parameters.

1.5 Nudge

This window (Figure 1.5) opens when the user selects the nudge tool from the toolbar. Three parameters must be specified in this window. First, in the textbox size, the user can inform the size of the brush in pixels. Second, the rate parameter determines the strength of blurring. Finally, in the sharpen checkbox the user can toggle between blurring, the default mode, and sharpening to enhance details.

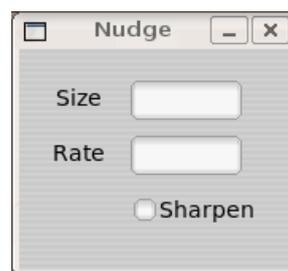


Figure 1.5: Nudge parameters.

1.6 Bilateral Filter

This window (Figure 1.6) opens when the user selects the filter tool from the toolbar. Three parameters must be specified in this window. First, in the textbox sigma domain the user controls how much blur he wants. A typical value is two. Bigger values lead to more blur and also take more processing time. The other two parameters are sigma color and sigma normal. Small values of sigma color/normal will lead to better preservation of edges defined by color/normal. Typical values are one.

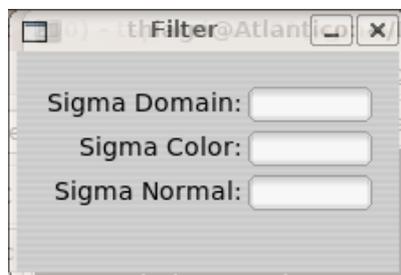


Figure 1.6: Filter parameters.

1.7 Texture

This window (Figure 1.7) opens when the user selects the texture synthesis tool from the toolbar. The color alpha parameter controls the blending between the color from the synthesized texture and the existing color on the RGB buffer. The height parameter can enhance or soften the deformation applied to the normal channel. Note that this value can be made negative, allowing for valleys to be created. Scale controls the relative size between the RGBN and the sample from which the texture was extracted. Patch is used to control the expected patch size, as detailed in the technical report, it does so by affecting p the probability of random jumps during synthesis. A typical value is one. By changing the angle, the user can rotate the synthesized pattern. Finally, the File button asks the user to inform an RGBN image as exemplar and also the associated jump-map file (.map).

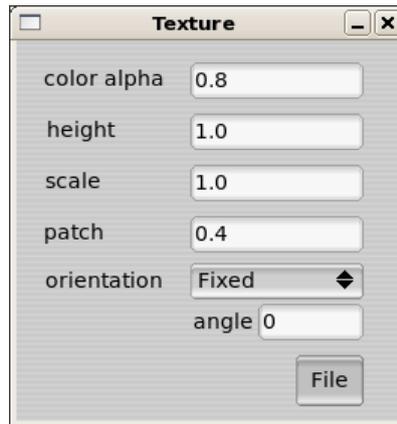


Figure 1.7: Texture synthesis parameters.

1.8 Segmentation

This window (Figure 1.8) opens when the user selects the segmentation tool from the toolbar. As described in the technical report, normal and color information can be used in different ways yielding different segmentations. The criteria dropbox offers the options: Weight, Min and Max. If weight is selected, a slider is enabled to select the proper weight. The Min Region Size parameter can be used to eliminate very small regions. It informs the minimum region size in pixels.

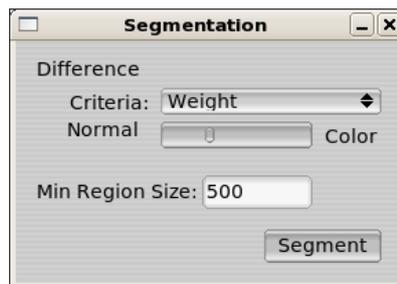


Figure 1.8: Texture synthesis parameters.

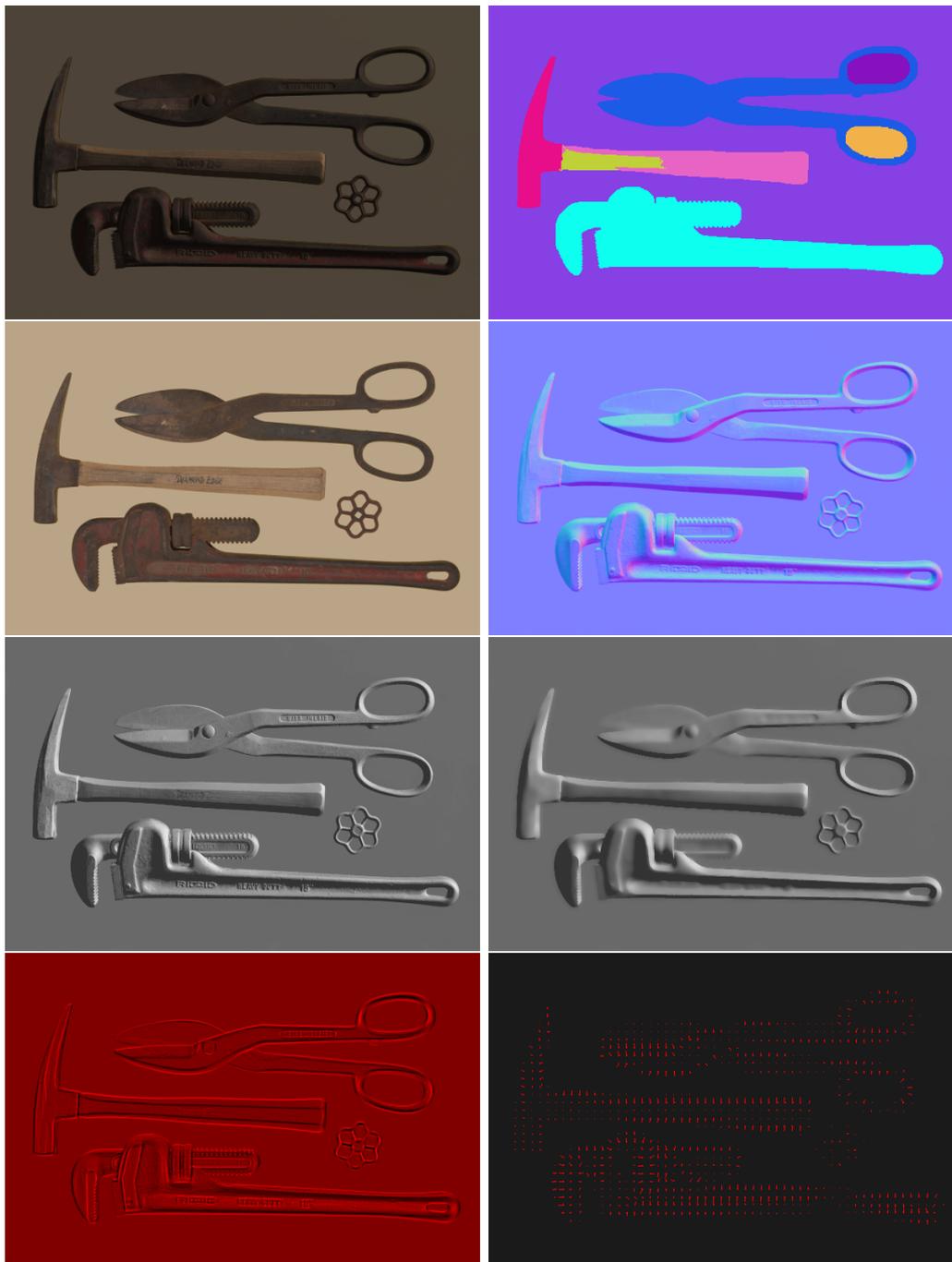


Figure 1.9: The system provides different visualizations of an RGBN.