

# Improving the Production Process through the Implementation of a Rendering Generation Utility

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## Thesis Introduction

How can an idea be improved? How can a tool be better or more functional? Every object, tool, product or service can be improved in many ways. Think about how many times you have found a problem and have asked yourself, “Why isn’t this better or more functional?” Computer Graphic (CG) rendering is a time consuming task. It is almost necessary for the artists to render a new image (or images) after changing values of attributes in any 3D computer software programs. For example; nowadays there is a program called Maya that is one of the leading 3D software programs in the industry. With this program the process that renders images requires a huge investment of time from the artist. The artist must tweak the attribute and then comeback to the rendered image and render again and so on until finally after trying many times, and after spending uncountable hours, find the correct values.

One example could be the process involved in lighting a scene. Arriving at the correct value for a particular light or set of lights requires that the user render several test frames multiple times in order to achieve the best possible illumination; therefore, time becomes an important issue when lighting a single scene. The problem becomes an even more important issue when it is not just one scene but several scenes. To find a solution to this kind of problem, there is a tool now that is fully integrated with Maya that solves these problems. This is done through the *implementation of a rendering generation utility, that creates a series of renders with minimal user interaction giving to the artists the ability to view a range of values, resulting in an improved and better functioning production process.*

The objective of this utility is to give the user more and better options from which to choose. It also shows the best possible combination of attributes working together in a sequence of images giving the artist now the power to compare images and decide which one looks better.

This utility was created for the users, the ones that are behind the keyboard and looking at the computer screen for uncountable hours; and who in many cases, are the ones with the final decisions. Although it was created for the users, that doesn't mean that it can not be used for some other type of users. It also can be used to show art directors the progress on a particular shot where their opinion is important, helping the user to achieve better results with the opinion of the art director, allowing the user and the director to create a better communication network.

### **Basic concepts behind the images**

The concept of generating wedges<sup>1</sup> is not new; the idea has been used in the field of photography for many years. Photo sensitive paper is exposed to different amounts of light in order to give the artist multiple exposures to choose from. The photographer evaluates the exposure wedge and determines the best contrast and color for a particular area of the image.

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<sup>1</sup> **Color wedge:** A series of images that feature incremental alterations in the color of a certain [element](#) (or sometimes the entire [frame](#)) for the purpose of choosing a [final value](#) for the color of that [element](#). <<[http://www.highend3d.com/dictionary/c/color\\_wedge](http://www.highend3d.com/dictionary/c/color_wedge)>>

**Wedge:** 1. A term used to describe the creation of a series of frames that differ only in the parameters that are being tested. For example, an exposure wedge contains incremental steps of brightness; a color wedge might contain steps in red(R) or saturation. 2. The name of the resulting range of image produce from the above wedging process described in definition #1.

**Wedging:** The process of creating a wedge. Also called bracketing.

A variation of this process is also called the *test strip*<sup>2</sup> where the photographer just exposes a particular part of the image blocking the rest and changing the exposure times for each part of the image. Another process that is also used in the field of photography is the creation of the contact sheet<sup>3</sup>. The contact sheet offers to the photographer the possibility to print in a photosensitive paper an image of a series of negatives from where he can visualize the best image based on the negatives. Sometimes the photographer is not sure about the aperture or exposure time for a picture; therefore, the photographer takes several pictures with different combinations of time and exposure. The task of checking each negative by itself is a very tedious process; thus, the contact sheet solves this problem by saving time and providing a visual reference. Now, with this printed image, the photographer is able to see which one is the best image from the contact sheet to create the reproduction of the image in larger formats.

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<sup>2</sup> **Test strip:** A strip of printing paper that is given a series of incremental exposure times (such as 3, 6, 9, 12 seconds) in order to determine the ideal base exposure time.

<<<http://www.vistek.ca/glossary/?st=T>>>

**Test strip:** Method of calculating exposure in photographic printing. A range of exposures are given to a strip of paper, from part of the image, this helps judge the correct exposure for the final print.

<<<http://www.peterashbyhayter.co.uk/glossaryT-Z.html>>>

<sup>3</sup> **Contact Sheet:** A photographic proof made by placing several negatives directly in contact with a sheet of unexposed photographic paper and then processing the print. Typically, an 8x10 a contact sheet will have 8 to 15 images depending on the film format. Contact sheets provide a convenient and economical alternative to single print proofing, especially where large numbers of images are involved.

<<[http://www.sundanceaerial.com/SD\\_Glossary.HTM](http://www.sundanceaerial.com/SD_Glossary.HTM)>>

A contact sheet is created by laying the negatives on a piece of printing paper and exposing them to light to create a set of mini prints the same size as the film frames. The sheet can then be stored with the negatives and is a great aid to help locate individual photos quickly in the future. Contact sheets are also useful to add notes about the photographs. You may add the date they were taken, where they were taken or several other useful bits of information.

<<<http://www.ephotozine.com/article/Making-your-first-contact-sheet>>>

The combination of these two processes saves the photographer a great deal of time because he does not have to produce separate test images for each exposure of light.

Graphic artists use a similar technique to visualize options. When color options are needed for the client or for aesthetics reasons, the graphic designer uses the pantone color guide, which gives a very accurate representation of what to expect for the final outcome. Graphic design authors like Leslie Cabarga<sup>4</sup> demonstrate the use of this technique giving extra information to graphic artists in her publications providing the values that were used to create a specific color or image using the CMYK printing values for massive reproduction purposes or RGB values to provide a reference for how a color can be seen for a web design in a computer screen monitor.

Photoshop is a computer software program that, in its newest versions, had implemented the concept of the contact sheet. Here the user is able to select the folder where the images are located and then, through the interface presented, assign the format in which the user wants to display the contact sheet (fig. 1). The window is divided into 4 parts. The first part is the “Source images” menu. From here the user browses the folder that contains the images that are going to be placed on the contact sheet. The second part is the “Document” menu. From here the user gives a format to the contact sheet that will be displayed. The user also inputs the width, height, resolution and mode (RGB or CMYK). The third part is the “Thumbnails” menu. Here the user determines the format to display the images, how many rows and columns will be used as well as the space between the images. And finally there is the “Use Filename As Caption” menu. Here the program places its name underneath each image.

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<sup>4</sup>, Leslie Cabarga. The Designer's Guide to Color Combinations. Cincinnati, Ohio: North Light Books, 1999.

Another window that Photoshop has is the “file browser”. The file browser is similar to the contact sheet. It gives the user information about what images are stored in a particular folder within the computer, allowing the user to easily find images that can be manipulated within Photoshop’s interface (fig. 2). The window is mainly divided into 4 parts. One part is the folder tab window, from where the user can find easily all the information within the computer and have access to all the folders that contain images. Another part of the file browser is the preview window that places a medium-sized thumbnail with its file name. The main window shows all the images in the form of thumbnails from where the user can easily view all the images contained within that particular folder. And finally there is a small tab called “Metadata” that shows a window that displays the information about that image, such as the file name, the kind of document, date created, date modified, among other useful information.

Another example of the use of the contact sheet is the way in which books or publications present images that show subtle changes in images to better explain the concepts represented.

An image is worth more than a hundred words, and this is true for this concept in particular since the image explains in detail what in words might take several pages. Lopsie Schwartz, in her book *Adobe Photoshop for VFX Artist*, explores this concept amply by explaining visually what with only words it might be almost impossible to explain. There are many more examples. Just grab a book and look carefully, you will be surprised of how many times you will see this same principle being used.

The combination of these concepts can be employed by CG artists in order to quickly determine the best render<sup>5</sup> settings using a rendering utility. What makes this concept fascinating is that no one has tried to use these concepts in this field until now. This utility is mainly created to speed up the process of computer generated imagery, giving the opportunity to change many attributes at the same time and render with all the possible combinations between the attributes selected.

### **Current situation**

The way computer graphics artists work nowadays is by trial and error, which is by changing values and then rendering. If the render is not successful or is not what was expected then the process is repeated by changing the values of the attributes over and over again until after many attempts the artist is able to find the desired value for a specific attribute or attributes. If for any reason the artist wants to change the mood of the scene by changing the environment or the time of the day, then the process must be repeated once again. As is imaginable, this process demands larger amounts of time.

Even though, the creation of 3D imagery is a very passionate area for many artists, so always handy is a new idea or method to improve this creation process. Companies like Autodesk, Alias Wavefront<sup>6</sup>, and Side Effects<sup>7</sup> just to mention a few

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<sup>5</sup> **Render:** (Rendering): The process of creating a 2D based on 3D information, such as the camera, objects, lights, surface attributes and animation curves contained in a 3D database. The field of view (FOV) created by the position of the camera in the scene relative of the location of the various objects determines what portion of the scene will actually be rendered. Any geometry falling within the camera's field of view is mathematically projected onto a plane, just as a real camera projects the image within its field of view onto film. The rendering process must also calculate which objects are obscure by other objects closer to the camera. Once the renderer has determined which surfaces will be rendered and where on the plane they will be projected, the last step it to calculate the actual color of each pixel that is being created in the resulting 2D image.

<sup>6</sup> <http://www.autodesk.com/aliasen/Home/homepage.html>

<sup>7</sup> <http://www.sidefx.com/>

companies, are always looking for new ways to speed the rendering process. Any big studio or company related to the visual effects industry has a department that exists just to find new ways to create or speed procedures related to the way movies or commercials are made; therefore, there is always room for new ideas in this field.

It has been mentioned earlier that this utility can increase the speed of rendering in the computer graphics production process; however, there is a price that must be paid in order to get the best out of this utility. Even though, it may sound contradictory, the price to pay is time.

Rendering a single image requires that the computer use almost all its power to create a rendered image. When the user needs to render a sequence of images, then time becomes a very important issue. In order to get the best out of this utility, the user must understand that the render time is not what is improved with this utility. This means that if the render time is one minute, with the utility the render is going to take one minute as well. So, you may now be asking yourself, what is the point of this utility?

The answer is simple: INFORMATION. This new utility gives the user information about how things look when they are rendered in combination with other attributes. It shows the images on a window, similar to the contact sheet that photographers use, allowing the user to see all the changes that the render creates.

It may take several minutes to create the sequence of renders, depending on the complexity of each scene, but in this particular case, time is well invested, because the user is going to have a visual representation of their work allowing the user to make better decisions.

## Rendering with Maya

Maya is one of the leading computer software programs for many fields of the visual effects industry. With Maya, artists can animate characters, create 3D models from any imaginable source, make dynamic simulations, and among other things, artists have the possibility to render their creations in many formats using different materials, textures, surfaces, lights, etc.

A few of the formats available are jpeg, tiff, targa, iff, and png. In other words, what the artist is obtaining from this software are still images or pictures that then go to a postproduction process. Here the images are manipulated in order to achieve specifications of the art director or to make color corrections to blend the images with all kinds of productions, from movies to TV commercials.

There is one option within the render window that was created to try to speed up the rendering process. This option is called the IPR or Interactive Photorealistic Rendering (fig 3). This utility loads colors, bumps and many attributes on the memory ram of the computer, it can be fast or slow depending of how many objects there are and the complexity of the models in the scene. This utility is useful when the changes can be seen within the IPR window. The problem occurs when, for example, users require the use of attributes like Mental Ray<sup>8</sup> shaders. Those shaders are needed to be rendered using

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<sup>8</sup> An integrated plug-in renderer that allows interactive and batch mental ray rendering from within the Maya user interface. Mental ray offers all the features traditionally expected of photorealistic rendering, and includes functionality not found in most rendering software, such as host and network parallel rendering, area light sources for soft shadows, global illumination, and caustics (light patterns).

the mental ray renderer. And it's impossible for the IPR to display these changes in real time. It is for situations like this that this rendering utility was created.

## **Overview of the tool**

### **Features**

The rendering generation utility creates a web page that is fully integrated with Maya user interface through two panels. The first panel is a window that contains the images that were rendered using the utility. Within this window the user can change any attribute directly on the Maya scene by clicking on any of the images. If for any reason the user had to cancel the render operation, the window pops up with all the images that were rendered until that moment.

The second panel from where this web page can be accessed is from the Web Browser Panel which is located as part of one of the panels in the Maya user interface. From any window in Maya one goes to the menu Panels-> Panel-> Web Browser. From this location any attribute can be updated within the Maya interface by clicking on the image or text that is displayed as a link underneath the image.

### **Tool Structure**

This tool is structured with a dynamic code that allows the user to manipulate several attributes at any time. This tool was created entirely with Maya Embedded Language or MEL which is a scripting language. This means that the user can simply type a command and then execute it. MEL is an open source code; this also means that

the user can create applications or procedures using this code. This is the main reason why this utility was created with this computer language.

The utility works with any keyable attribute in Maya. This means that if the attribute is keyable then it can be tweaked. Almost all attributes in Maya are keyable or connectable through the connection editor; therefore, the implementation of this utility is limited just by the user. There are some suggestions that are going to be mentioned later in this document that the user may follow in order to get the best results from this tool.

### **Graphical User interface**

The user interface is divided in two simple panels that let the user define the attributes to be manipulated. For installation instructions of the rendering utility refer to Appendix C. The first panel (fig. 4) displays the attributes that are selected and the ones that are going to be tweaked. There is no limit to how many attributes can be selected at this particular time; however, the nodes or attributes *must* be selected before running the script. The attributes can be from textures, objects, shape nodes, etc. Anything that can be selected in Maya that is keyable, not keyable or through the connection editor, can be used. Within this window the user must select the attributes by clicking on the name of the attribute displayed on the utility (fig. 5). A button labeled “Select Elements” (Fig. 6) is provided to jump to the next panel. The next panel shows all the keyable attributes of the objects selected (fig. 7). Once the attributes have been selected there are two values that need to be entered per each attribute: these are the minimum and the maximum value. Above the Min and Max value also appears the name of the selected attribute so the user knows what attribute is being tweaked (fig. 8). The minimum value tells the

render with what value to start the rendering process and the maximum value with what value has to end the sequence of the wedge.

The field labeled “Number of Samples” (fig. 9) lets the computer know how many samples it will create. Although this tool is designed to work with different attributes it is not recommended that one tweak more than two values at the same time for the following reason. The number of samples is multiplied by itself depending of the number of attributes. For example if the user decides to tweak 2 attributes with 5 samples this will create a wedge of 25 images that is 5 x 5. If the user wants to tweak 3 attributes with 5 samples the wedge will then create 125 images, that is 5 x 5 x 5; therefore, is recommended that one not tweak more than 2 values due to the amount of time that it will take to render all those images. To see examples of rendered images using the rendering utility refer to Appendix A.

There are 5 buttons labeled 10%, 25%, 50%, 75% and 100%. Those buttons define the size for the image to be rendered 10% is 64 x 48 pixels, 25% is 160 x 120 pixels, 50% is 320 x 240 pixels, 75% is 480 x 360 pixels and 100% 640 x 480 pixels (fig. 10).

The button labeled “Save” opens a dialog window to define the location and name of the wedge as a webpage format. It is very important to properly name this web page because if it is not named properly it will create a text file instead of a web page. To avoid this problem the webpage must be finished with the extension >>> .html <<<< in order to work properly (fig. 11).

There is another button labeled “Define render size”. This button allows the user to open the rendering window and select a particular area of the image giving the possibility of rendering just areas and not full frames for testing purposes (fig. 12).

Finally, at the bottom right corner, there is a Render button that executes the render command initializing the render process (fig. 13).

The process can be canceled by pressing the Escape key on the keyboard. If for any particular reason the user must cancel the rendering process, the wedge will show the renders that were created until the moment when the cancel took place. See Appendix B for more details. If the render process has not been canceled, the render utility finishes the render and displays all the images contained in a window as a web page. From the menu Panels in any view inside the Maya interface it is possible to access the panel called “Web browser” from which the user can open the wedge created for the utility. From this window the user can make the appropriate changes to the scene since all the images and values are connected with Maya. All the attributes that were affected during the rendering process are displayed underneath the images. The ways in which these images are shown allow the user to know exactly what values were used in order to create any single particular image or render. The images are numbered so the user can make appropriate notes and the wedge can be saved following individual naming conventions so the user can refer to those images for future reference. For more details and instructions of how to use the tool with non-keyable attributes refer to Appendix D

Here is when the user can make use of the concept of the contact sheet since with all the information displayed on the wedge, the user is able to make better decisions about

how the different values were working together with other attributes making the rendering process more efficient and at the same time speeding the production process.

With this information in hand, the user can then save the wedges and have them as material for future reference. Even though, each project has its own characteristics, this material can be used to show or to demonstrate how different attributes work together. This way the artist can make decisions about what values to choose from, allowing the user to start from a more specific range of values.

## **Conclusion**

The limits of this utility are the rendering time and the user. If the user can spend time rendering images tweaking many attributes at the same time, then the user will have more options from which to choose. If time is a concern, then the limit of attributes to be tweaked always will have to be small; as a recommendation for the designer, no more than two should be selected at one time. Artists have been rendering up to now, with only one attribute, and one render; but now they have the power to create wedges and improve the way in which this process is done.

Michel Fink<sup>9</sup> once said “take the values to the extreme, exaggerate, and don’t be afraid to experiment. Sometimes there, in those extreme values, is where you will find your best choice.”

We live in the era of information. Nowadays it is common to hear that the one that controls the information is the one that controls the world; in other words, information is power. With these words in mind this rendering utility was created

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<sup>9</sup>Michel Fink. Visual Effects Supervisor. Conference at the Savannah College of Art and Design Film Festival 2005

bringing the power of choices to the users so they can make better decisions during the rendering process. We live in a constantly changing world where ideas are in constant evolution, and it's logical to expect changes to this rendering utility to occur in the future from other creative minds since, as mentioned earlier, the concept has been there for many years and never used until now in the visual effects field. Now that it is proven to be working in other areas, it is time to start expanding the possibilities.

Not everything has been done yet; therefore, it is the responsibility of new generations to make of this world a better place for all, always improving, always creating, and most of all, always imagining.

## Figures

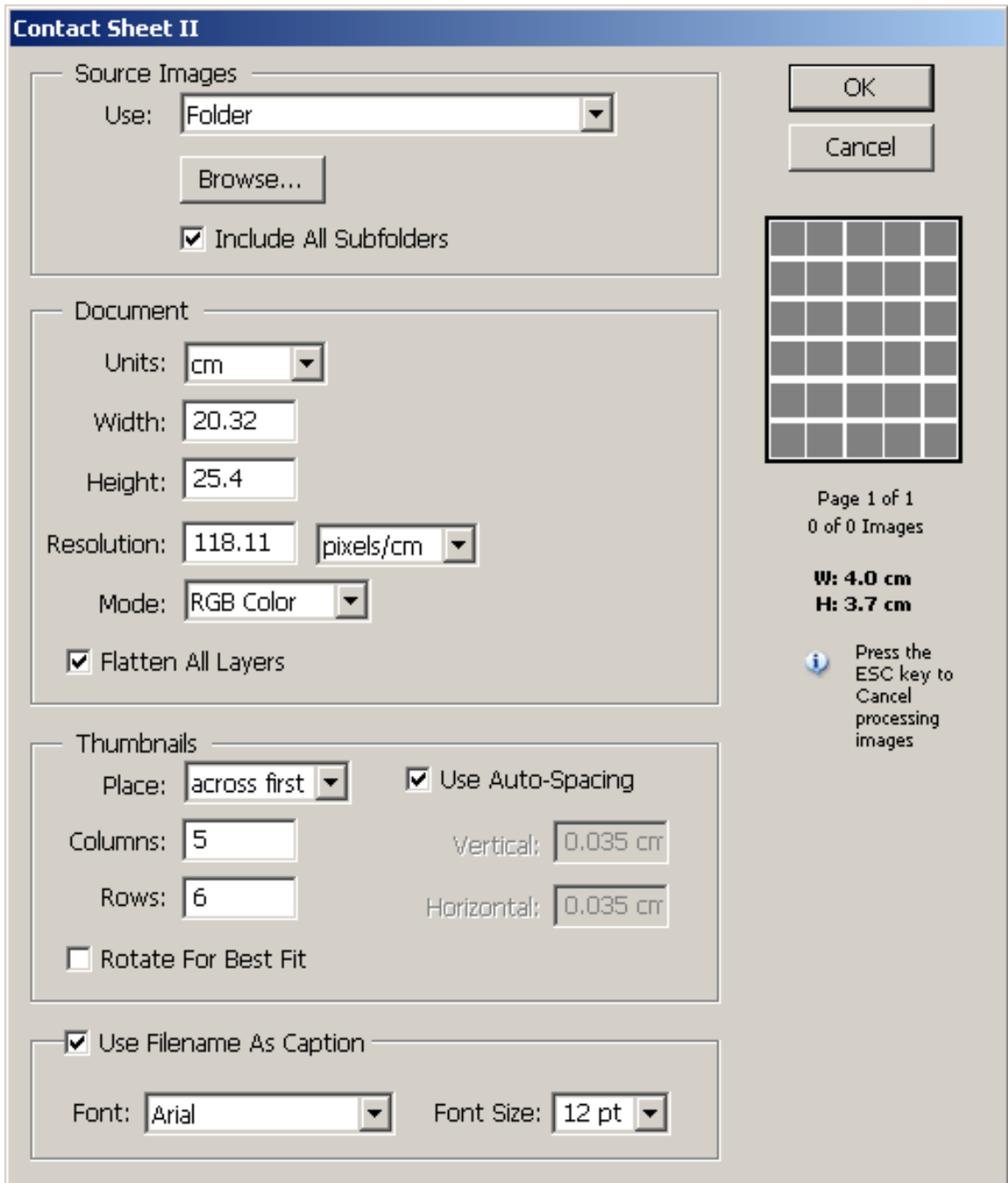


Figure 1. Photoshop contact sheet window settings.

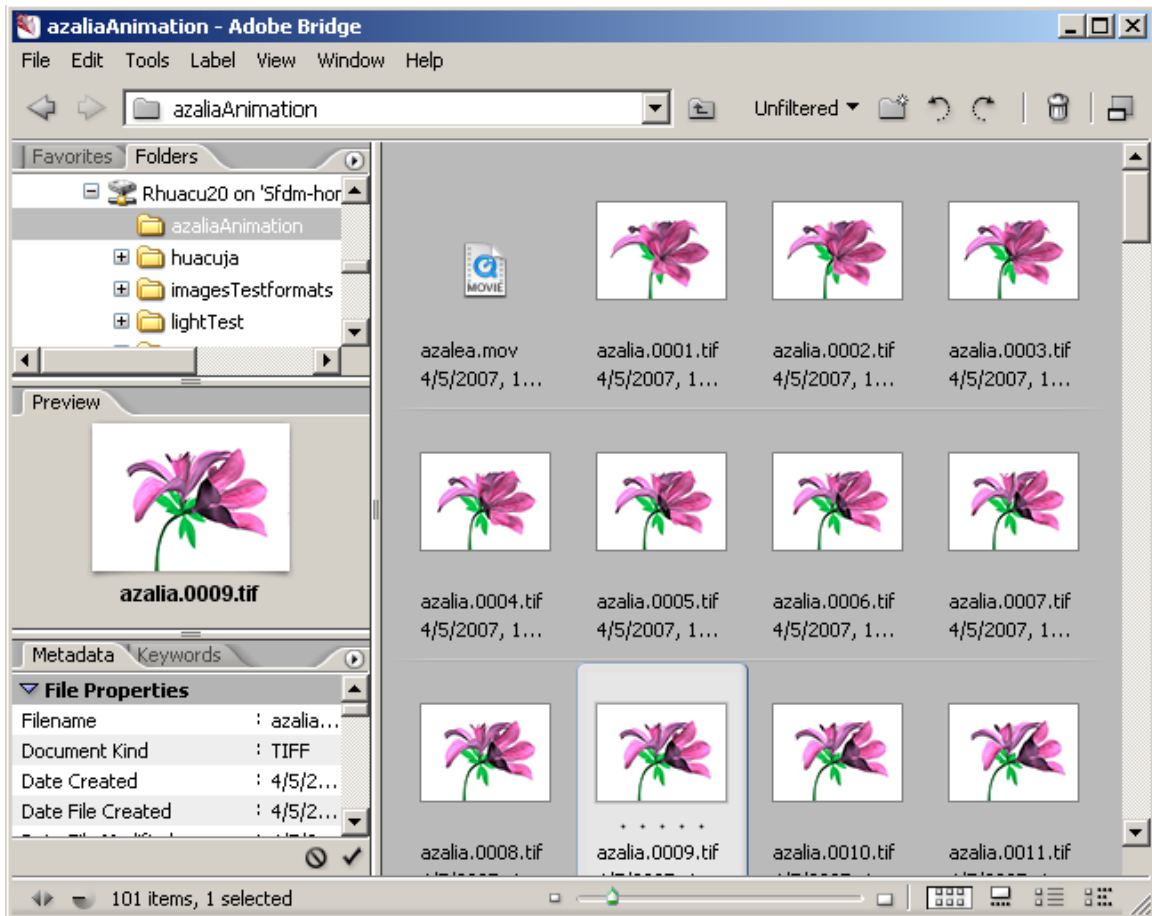


Figure 2. Adobe Photoshop's file browser window

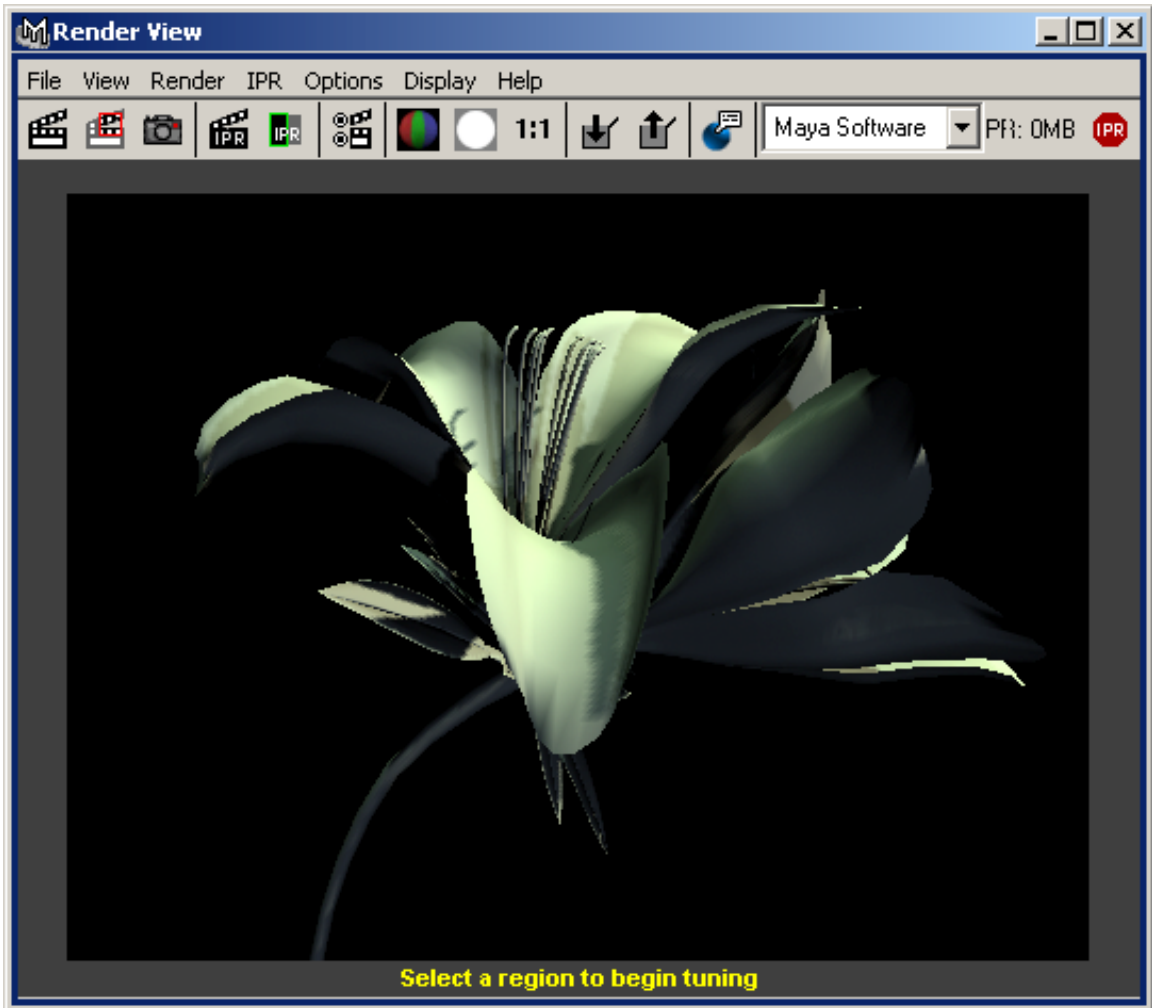


Figure 3. IPR or Interactive Photorealistic Rendering window in Maya

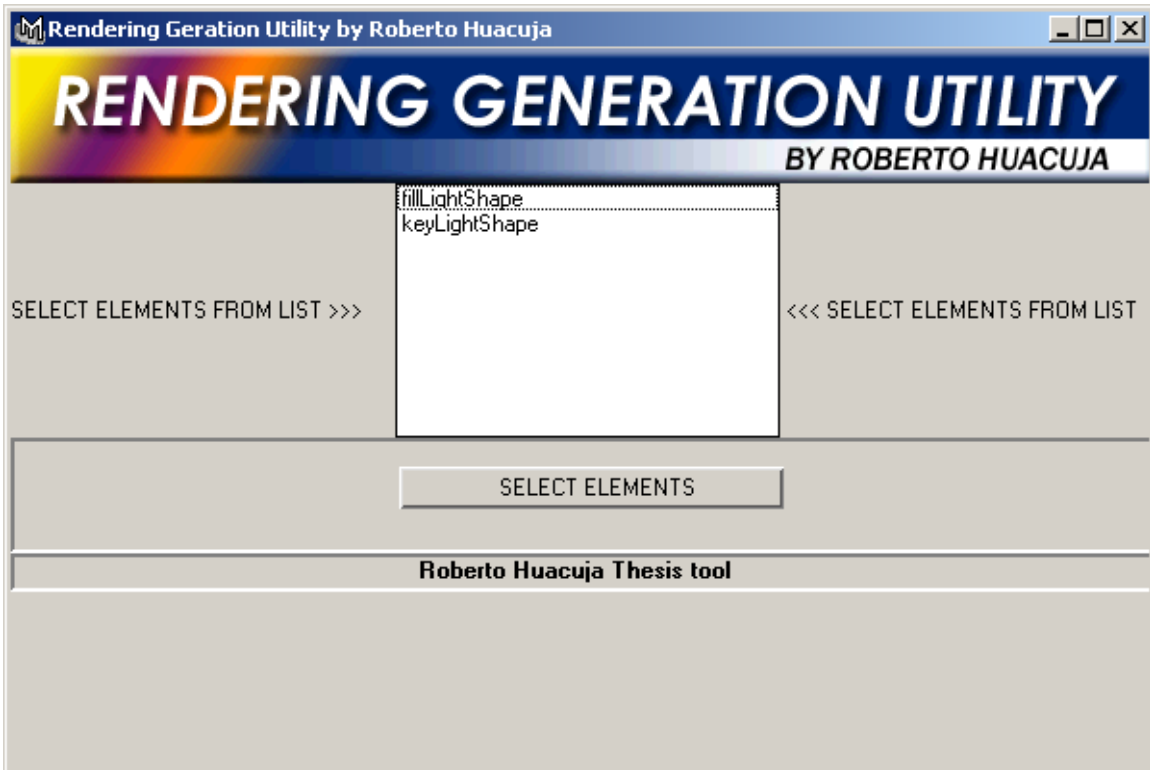


Figure 4. . The first panel displays the attributes that are selected and the ones that are going to be tweaked.

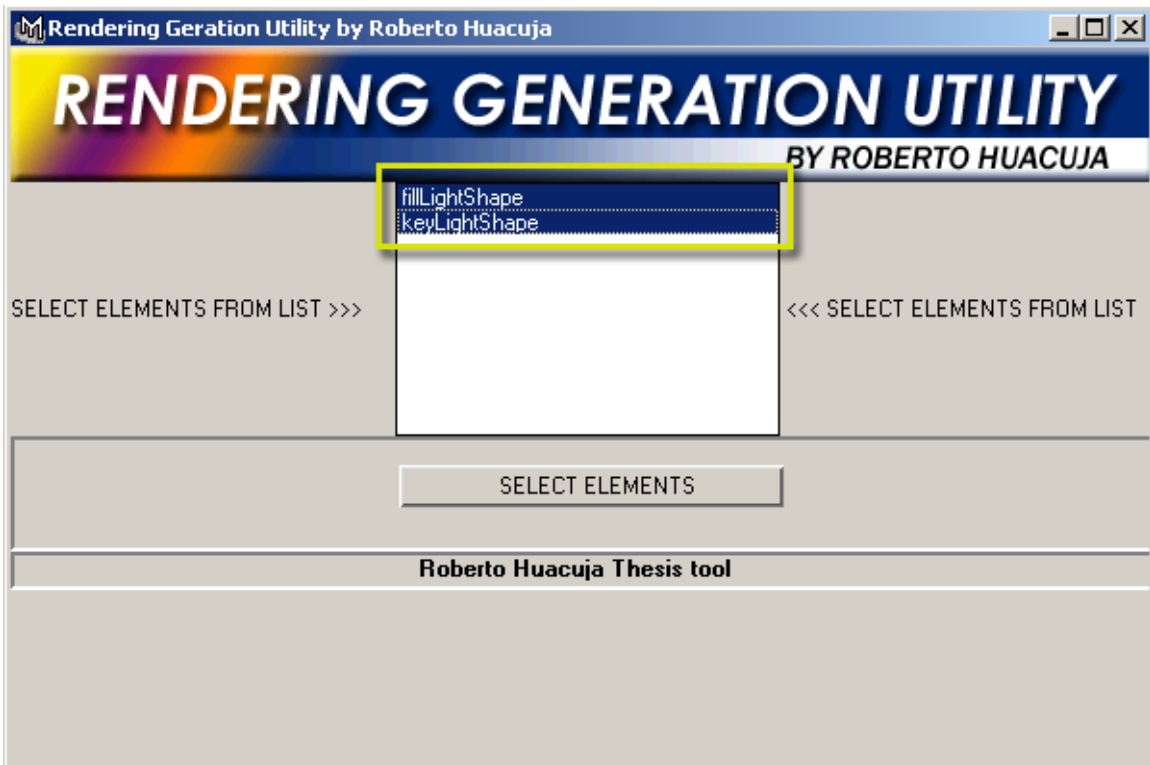


Figure 5. Within this window the user must select the attributes by clicking on the name of the attribute displayed on the utility.

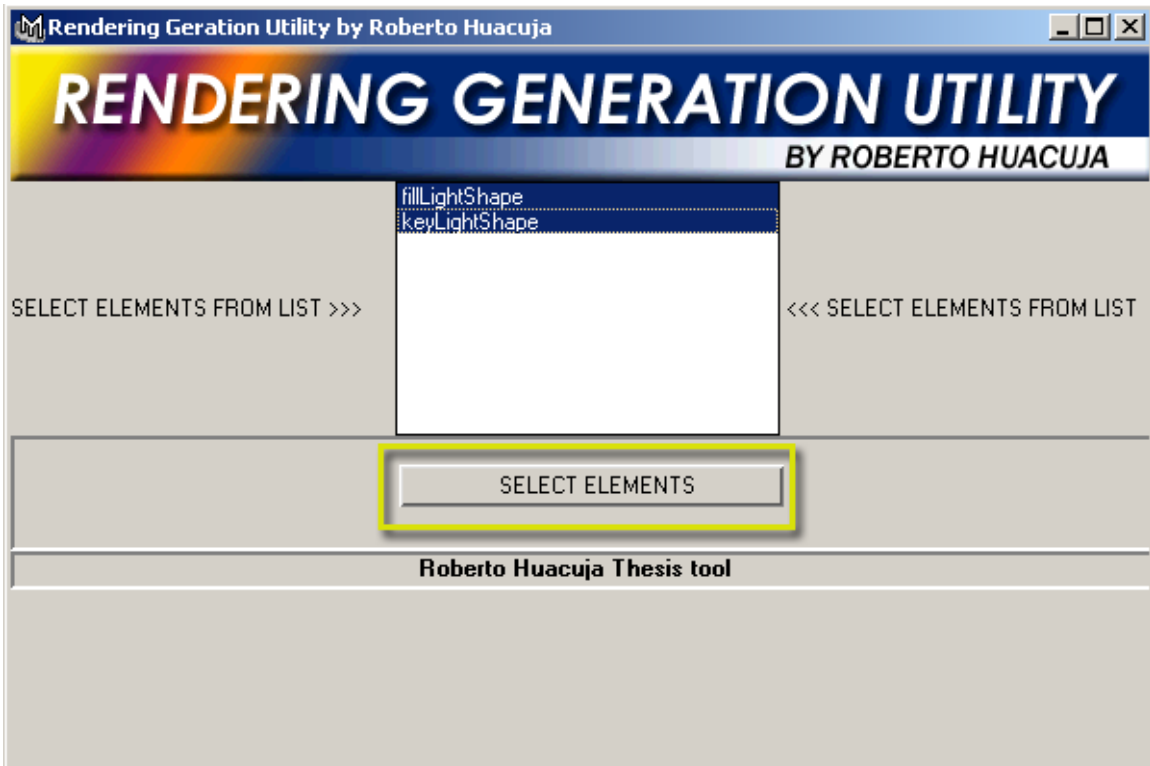


Figure 6. A button labeled “Select Elements” is provided to jump to the next panel.

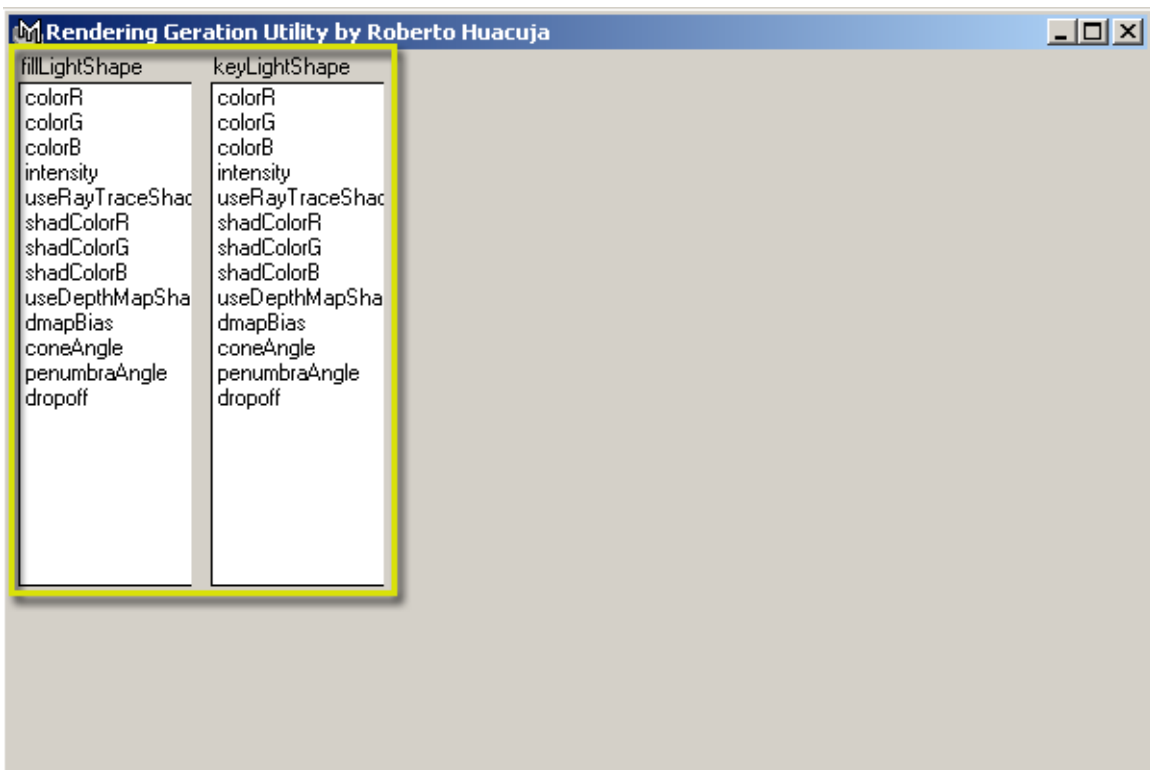


Figure 7. Window that shows all the keyable attributes of the objects selected.

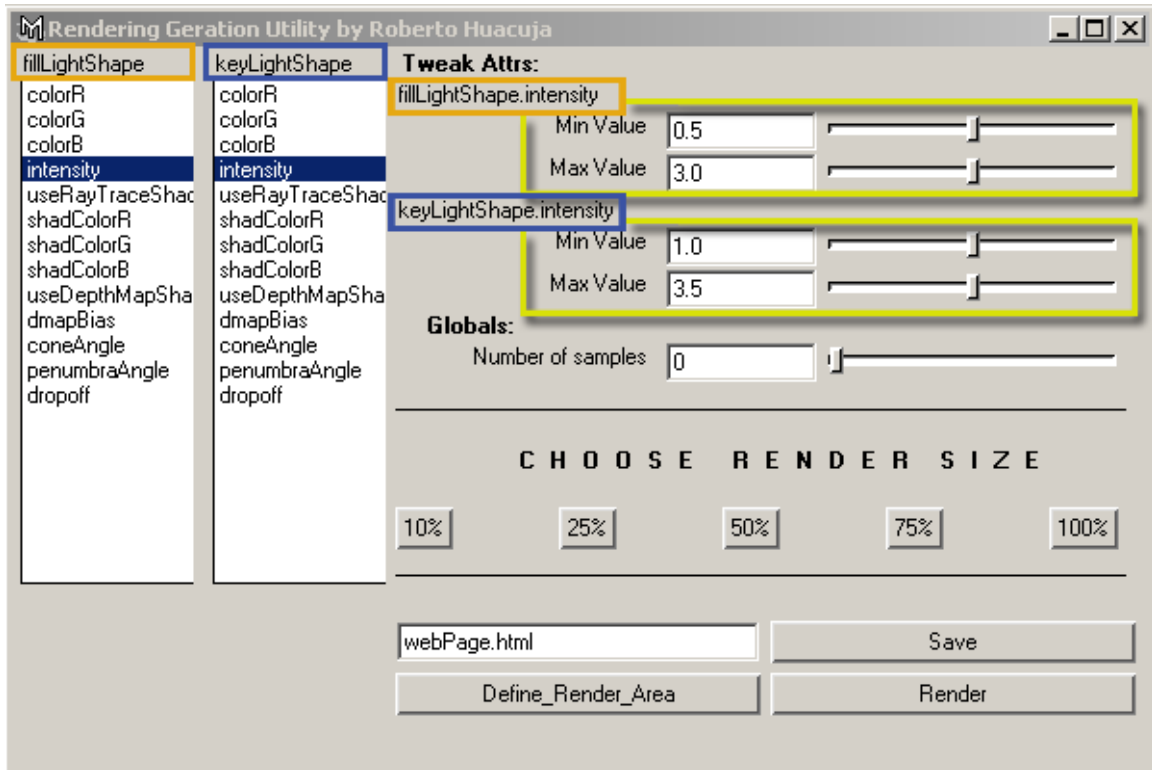


Figure 8. Here the user can see the name of the attributes that are going to be modified as well as the Min and Max Value for those settings.

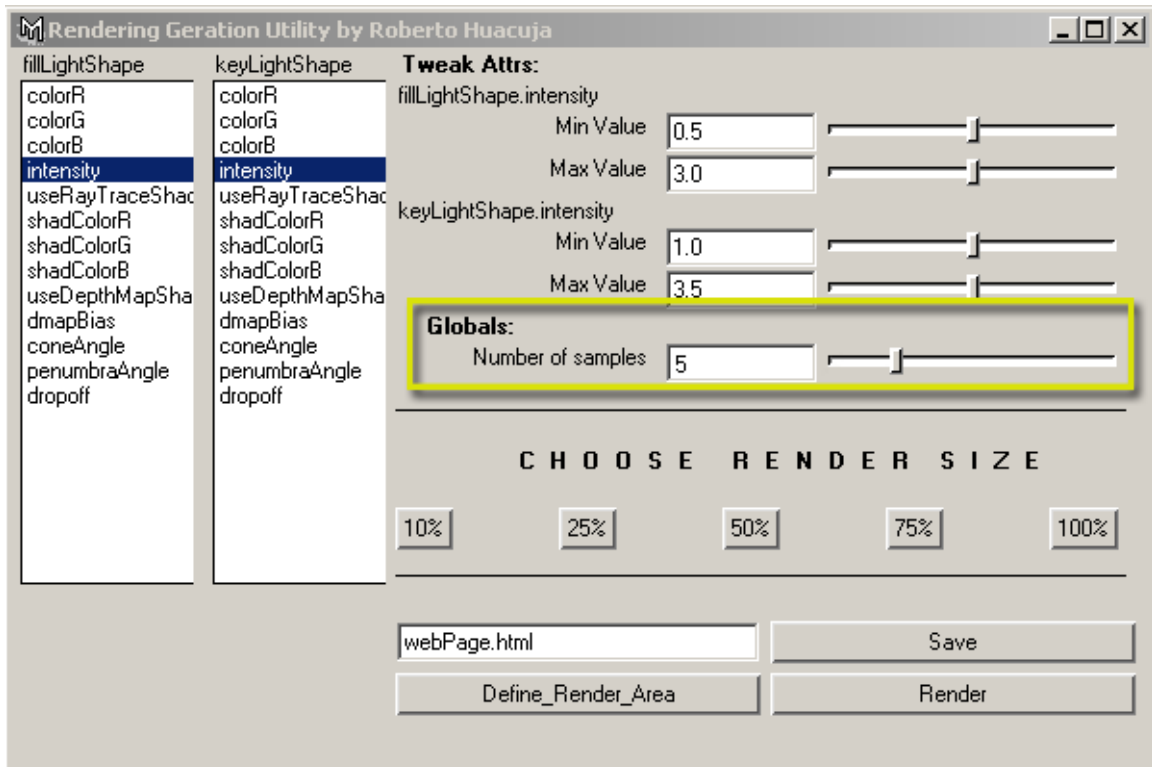


Figure 9. Here the user selects the number of samples that are going to be created

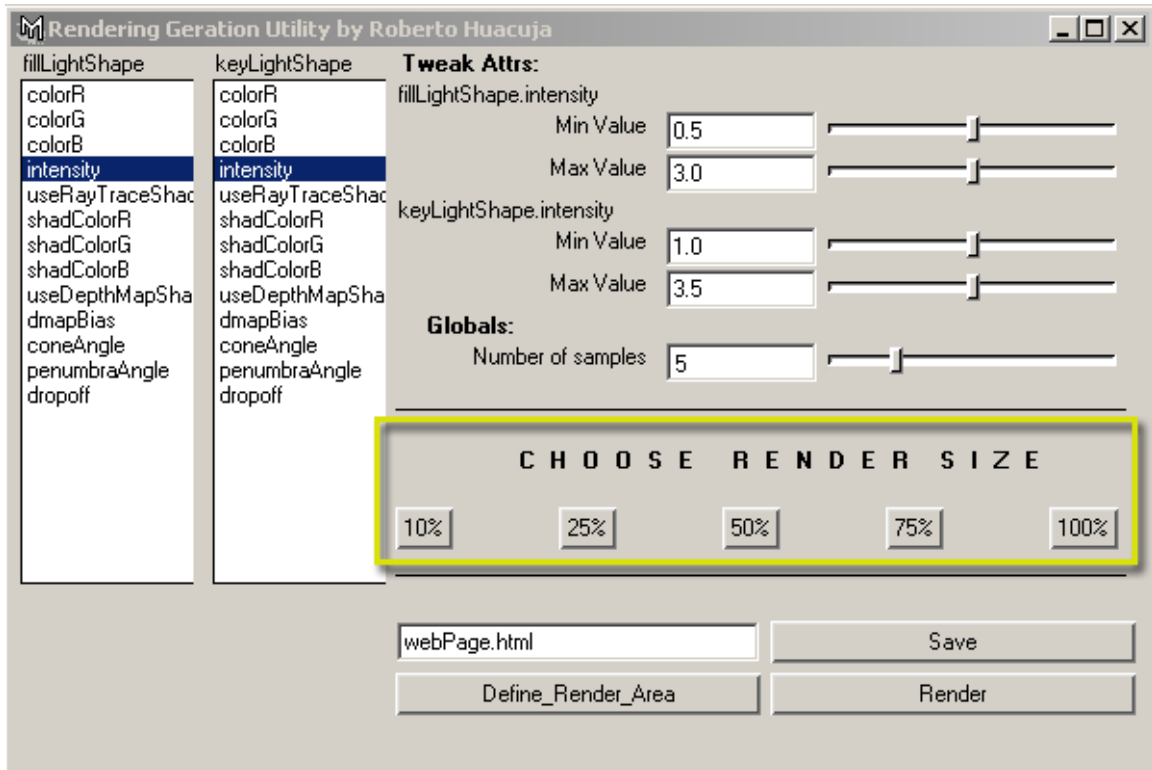


Figure 10. Here the user selects the size for the render image.

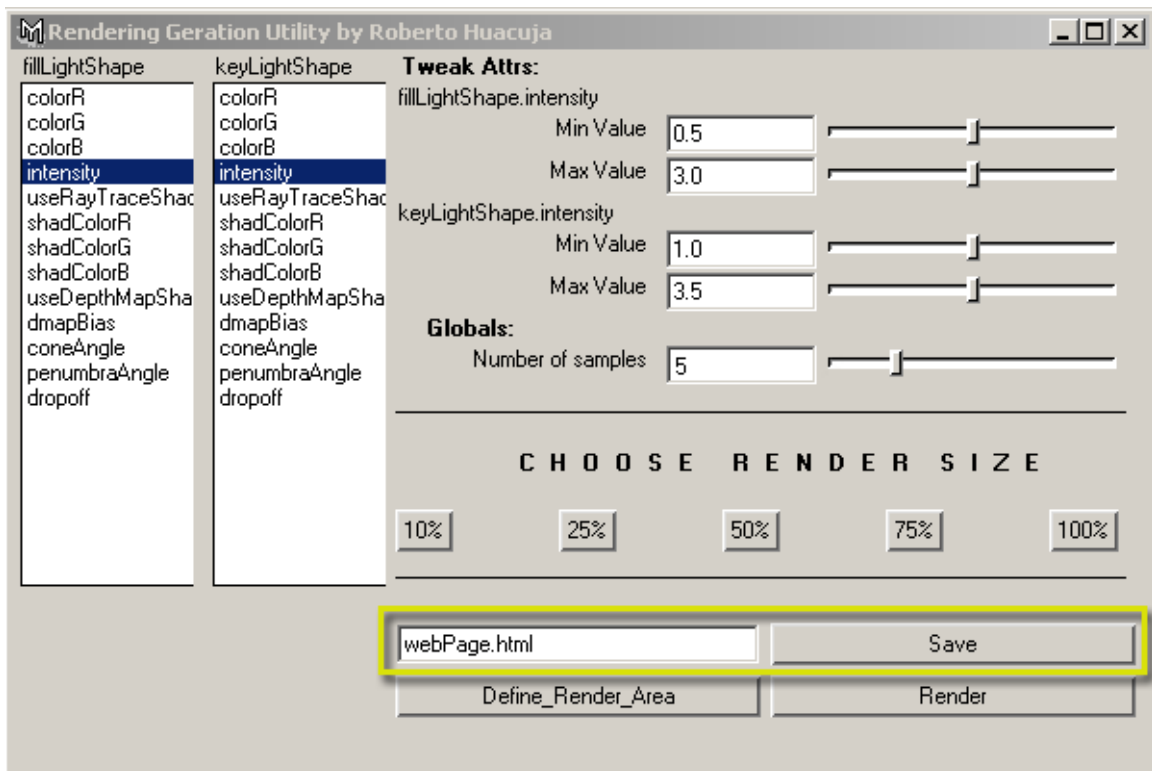


Figure 11. In this field the user saves the file as a .html so that utility can create a web page with all of the rendered images.

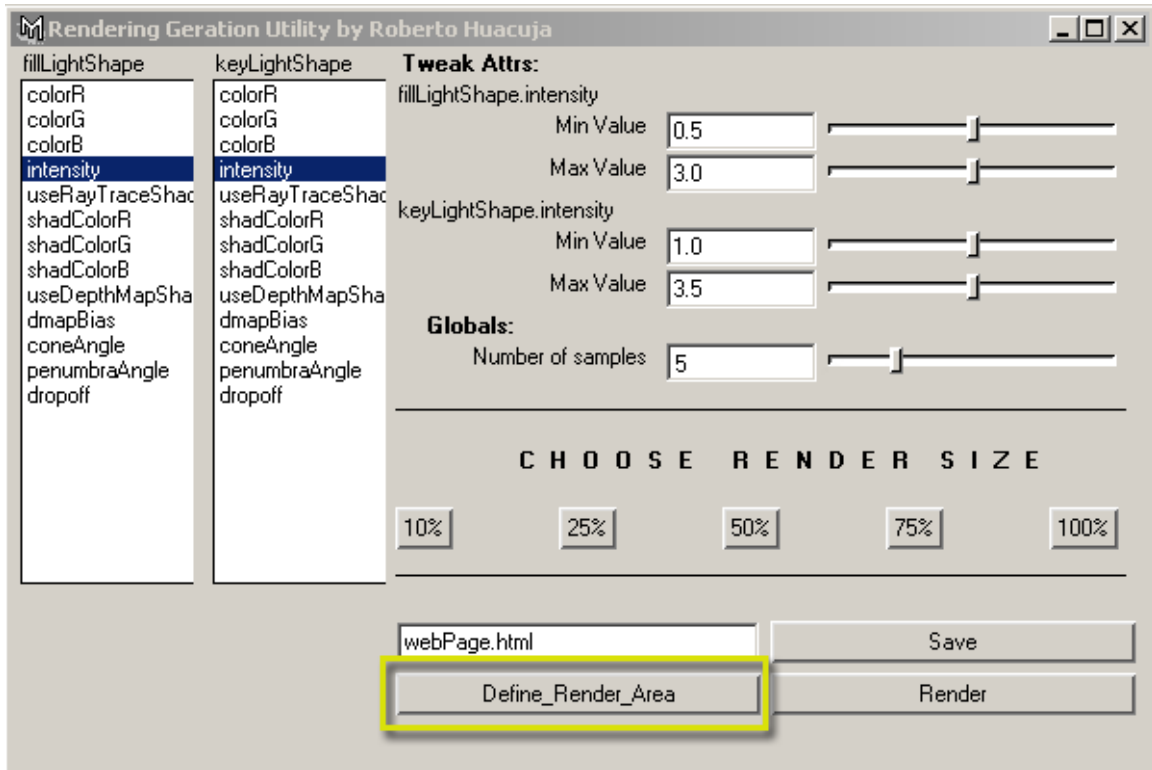


Figure 12. By pressing this button the utility opens the render window and the user selects the area to be rendered.

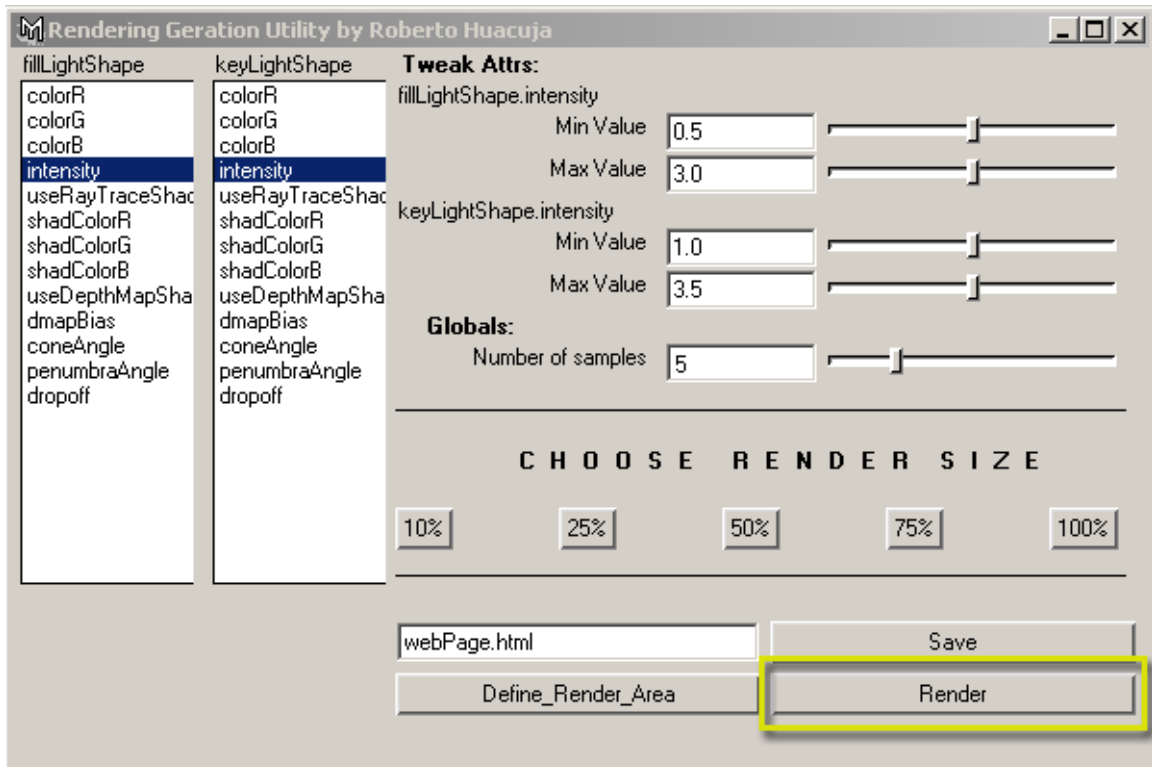
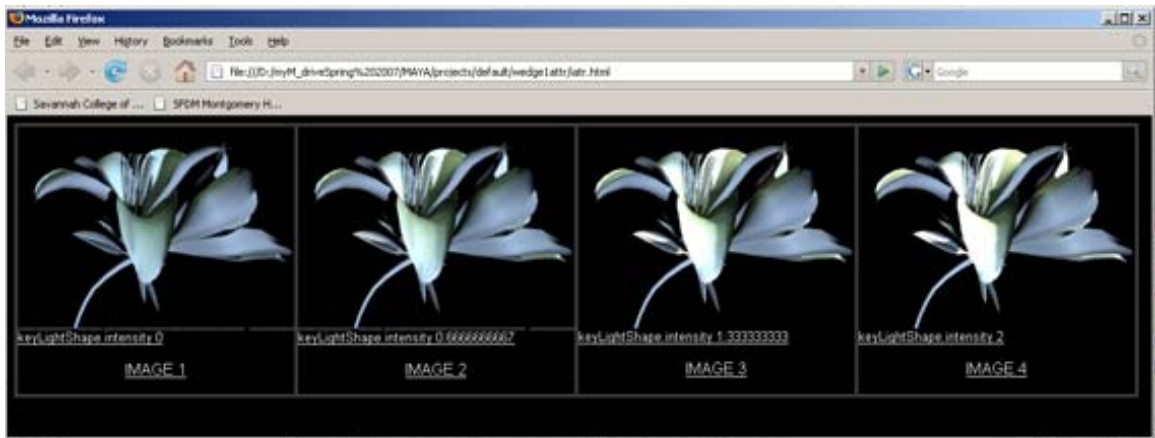


Figure 13. The Render button starts the rendering process.

## Appendix A

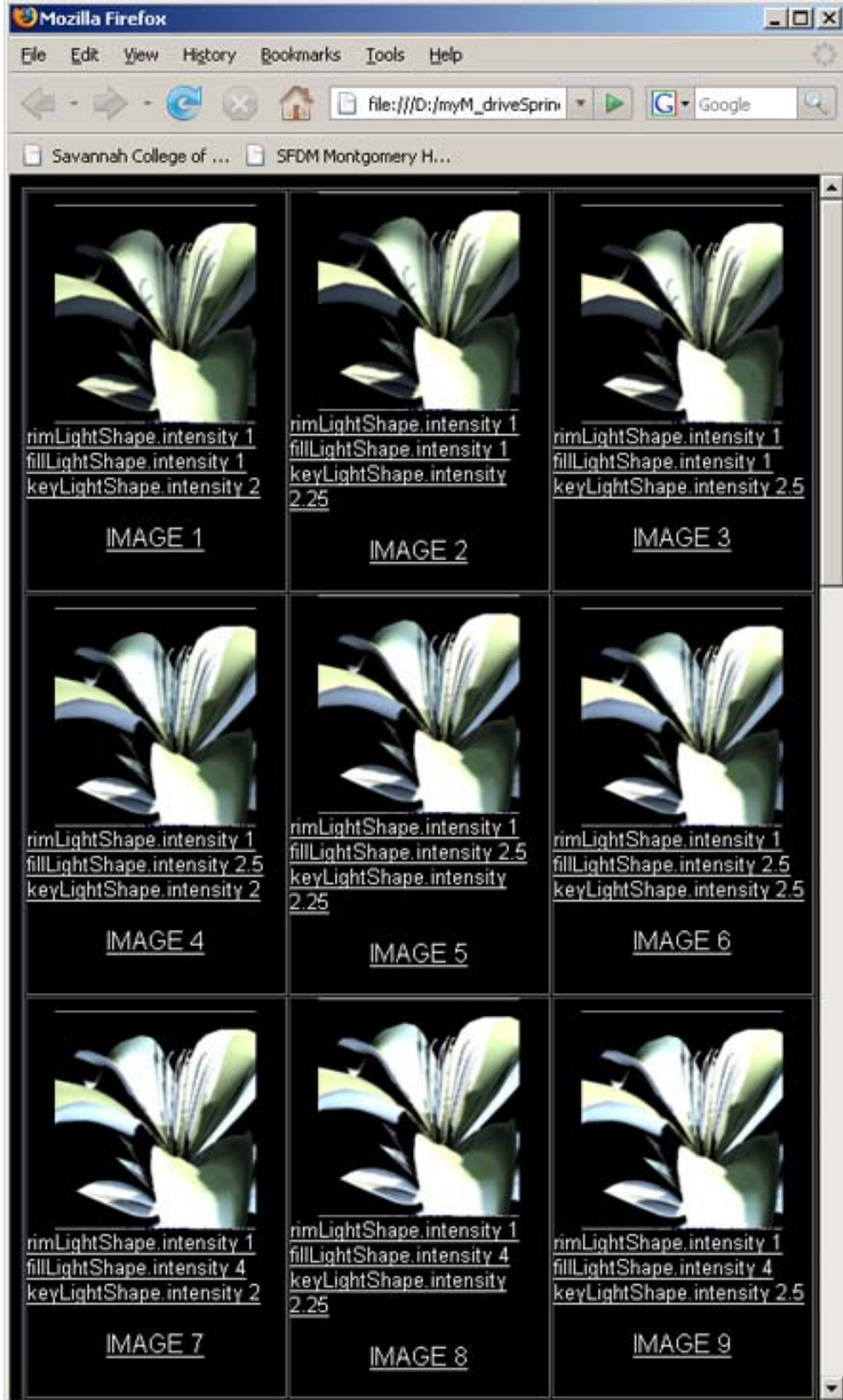
Rendered frames. Images rendered by using the tool



Rendering 1 attribute



Rendering 2 attributes



Rendering 3 attributes

## Appendix B

### Beta testing - feedback and changes documentation

The tool has been tested by Jack Evans and Professor Malcom Kesson. Both came with several modifications in order to make the tool more user friendly.

	<b>User feedback</b>	<b>Fix/Comment</b>
1	The user has to wait until the render has finish in order to visualize the wedge. What if the user doesn't want to wait and cancels the rendering process and sees the result up to the cancellation point?	A code was created in the script that allows the user to cancel the rendering process at any time pressing the ESC key on the keyboard allowing him to visualize the rendered images up to the cancellation point.
2	Why not add a progress bar that would allow the user know how long it would take to create the renders?	A progress was implemented on the script to allow the user to have an idea of how long it would take to render the images to create the complete wedge.
3	Make the background dark on the webpage, so the rendered images can have a more neutral color, similar to the Maya background or Shake.	The background color of the web was changed in order to achieve this more professional look and the font was painted white to give a better contrast with the images and background.

## Appendix C

### Installation process

1. The first step is to install the icons of the tool. Inside your Maya folder find the folder called “Icons” and place the image called WelcomeImage.bmp.  
This example shows the route that you may use in order to find the folder.

M:\MAYA\7.0\prefs\icons  
Or C:/MAYA/7.0/prefs/icons

2. Now close and restart Maya.
3. The next step is to place the Maya Script called “Rendering\_UTILITY.mel” inside the scripts folder located inside the Maya folder:

M:\MAYA\7.0\scripts  
Or C:/MAYA/7.0/scripts

4. Now from the Maya user interface go to the menu Window>General Editor>Script Editor
5. Choose File>Open Script and find the script called “Rendering\_UTILITY.mel”
6. Go to the shelves menu and create a new Shelf and call this shelf “Rendering Utility Shelf”.
7. Select all the content of the script by pressing Ctrl A on your keyboard and with your middle mouse button drag the script the shelf you just create called “Rendering Utility Shelf”.
8. Go to the Shelf Editor..., and type inside the field called “Icon Name”: Render Utility.
9. Click on the button “Save all Shelves” and now you are ready to start using the utility.

## Appendix D

### Help Manual

#### *Rendering with one attribute*

- Open the Outliner, the Hypergraph or just select the element you want to manipulate on your scene.
- Click on the shelf called Rendering Utility and click on the button called Render Utility.
- Select the element you want to manipulate from the window and click on the button labeled “Select Elements”
- Now select the attribute you want to tweak from the list
- Introduce the min and max values as well as the number of samples to be created by the wedge.
- Save the wedge in the location of your preference and name it with the extension .html
- Choose your render size for your images or select the region to be render with in the render window and click of on the render button to start the rendering process.

Note: If for some reason the process has to be cancelled, press the ESC key on your keyboard and the process will be cancel showing the rendered images until the moment of the cancellation.

#### *Rendering with two or more attributes*

- Open the Outliner, the Hypergraph or just select the elements you want to manipulate on your scene.
- Click on the shelf called Rendering Utility and click on the button called Render Utility.
- Select the elements you want to manipulate from the window and click on the button labeled “Select Elements”.
- Now select the attributes you want to tweak from the lists. To select several attributes from one list press the control key and click on the name of the attribute.

- Introduce the min and max values per attribute and the number of samples to be created by the wedge.
- Be aware of the number of samples and the number of attributes. Remember that this utility will create all the possible combinations between the attributes selected therefore the number of samples is very important. To explain this follow the next examples:
  - If the user wants to tweak **2 attributes** and wants to create **5 samples** this will create **25 renders**. That is  $5 \times 5 = 25$
  - If the user wants to tweak **2 attributes** and wants to create **4 samples** this will create **16 renders**. That is  $4 \times 4 = 16$
  - If the user wants to tweak **2 attributes** and wants to create **3 samples** this will create **9 renders**. That is  $3 \times 3 = 9$

If the user wants to tweak 3 attributes or more the rendering process then becomes more complex and is not recommended because of the time that I will take to create the wedge and the amount of images rendered.

For example:

- If the user wants to tweak **3 attributes** and wants to create **5 samples** this will create **125 renders**. That is  $5 \times 5 \times 5 = 125$
  - If the user wants to tweak **3 attributes** and wants to create **4 samples** this will create **32 renders**. That is  $4 \times 4 \times 4 = 32$
  - If the user wants to tweak **3 attributes** and wants to create **3 samples** this will create **27 renders**. That is  $3 \times 3 \times 3 = 27$
- Save the wedge in the location of your preference and name it with the extension ***.html***
  - Choose your render size for your images or select the region to be render with in the render window and click of on the render button to start the rendering process.

Note: If for some reason the process has to be cancelled, press the ESC key on your keyboard and the process will be cancel showing the rendered images until the moment of the cancellation.

### ***Rendering with not-keyable attributes***

- Add a locator to your scene and add a new attribute
- Go to the menu Modify ->Add Attribute
- Name the attribute properly with some name that will remind you what attribute is driving.
- Select the “object” in the outliner or the “shape of the object” and open the connection editor.
- In order to see “Shapes” of Objects you must open the Outliner and under the dropdown menu labeled “Display” select Shapes.
- The connection editor has a window divided in two. In one side are the outputs and on the order side are the inputs.
- On the Outputs part of the window load the locator and select the attribute that you previously create. To do this first select on the outliner the “object” or “shape of the object” and then click on the button labeled “Reload Left” or “Reload Right” depending on which side the window the outputs are.
- For the inputs side of the window select the “object” or “shape of the object” on the outliner that have the non-keyable attributes and make sure you choose Show Non-Keyable from the drop down menu of the inputs on the connection editor.
- Connect the attribute making click in the name of attribute, you will notice that that attribute is connected because the name appears *italic*.
- Make sure you have select the locator as one of the attributes to be tweaked from the outliner and follow the same steps listed before to change 1 or 2 attributes with the rendering utility.

Have a happy time rendering. :)

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