Two types of Users will be given with different documentations. The first is for administrative users or users whose main interest is in the how and whys of the program and its usage. The second is called the educational user or the users who wish to gain knowledge by using the program as it was intended.

PICTURE SPREADSHEET CONVERTER DOCUMENTATION -- Admin User

Purpose: The purpose of the Picture Spreadsheet converter is to educate high school students who may be unfamiliar with many basic computational concepts. Viewing an image in a spreadsheet format will allow users to

GUI Design: The graphical user interface, or GUI, is designed so that students who do not know about programming or the inner workings of images can manipulate images. The main window is divided into two sides: Image and Spreadsheet. The program works by taking an image as input and converting the image into a spreadsheet file, which most students are already familiar with from regular school work. The program can also do the reverse and take in the output spreadsheet and convert it into a picture. The spreadsheet is essentially a list of all the pixels in the picture. Each row has an X, Y, R, G, and B column. For example, row 2 has an X value of 0 and a Y value of 0 because it is the top-left corner of the picture. The RGB values are then listed in each respective field. The user can manipulate these RGB values for any pixel, save the spreadsheet, then convert the spreadsheet to an image. The image then would show the changes.

Data Structures: The spreadsheets are saved as CSV files, which are comma delimited. This ensures compatibility with the Picture Spreadsheet program and this filetype may be used with OpenOffice and with Microsoft Excel.

Usage: Once the user starts the program, the user can click on "Load Image". This will bring up a menu to select a valid image type (.png, .jpg, .jpeg, .bmp, .gif) to import. There is also a checkbox to "shrink" the image. This is due to older versions of Excel and current versions of OpenOffice being unable to have spreadsheets with more than 60,000 rows. Shrinking the picture allows it to retain its educational value while displaying a picture of the user's choice. A 300x200 pixel image is just as good for learning how an image works as a 1920x1080 wallpaper. After importing the image, a thumbnail is displayed on the left-hand window panel of the program. The user can then click on "Image -> Spreadsheet" to convert the image into an image file. If the picture's name was "test.jpg", then the spreadsheet's name will be generated as "test.jpg.csv". The spreadsheet is created in the same folder that the program executable is in. From there, the user can open up the spreadsheet in Excel or Calc and edit whichever values he or she wishes. Then the user can save the spreadsheet, close it, then click on "Load Sheet" on the right-hand side of the program. This will bring up a menu so that the user can click on a csv file and import it into the Picture Spreadsheet program. After that, the user can click on "Sheet -> Image" to convert the spreadsheet into a picture. The picture will be created in the same directory as the program executable and the name is based on the name of the spreadsheet. For example, "puppies.csv" would become "puppies.csv.jpg".

PICTURE SPREADSHEET CONVERTER DOCUMENTATION -- Learning User

An Introduction to Images and Pixels

An image is a grid that is composed of individual *pixels*. A pixel is what determines the color at a specific point on the screen. Like mixing paint, computers mix different amounts of light to create all of the different colors that can be seen. In modern computers, the three colors that are mixed in different amounts are *red, green,* and *blue.* If we look at each pixel, we can see that it has both a location (x,y) and color (r,g,b). By taking each pixel and listing them one after the other, another way to view an image could be as a long set of rows where each row is equal to a specific pixel. This might look something like:

x-y-r-g-b
0 0 1 1 1
0 1 2 2 2
….

Taking Numbers in Spreadsheets

If we are looking at an image now as a long set of numbers, we might think of using a tool designed to handle numbers like this such as Microsoft Excel. In this case, the r g b columns each represent the amount of that color that is outputted. If we doubled the r column, for example, the image would look much more red because every pixel would now have twice as much red as it did before. Conversely, if we deleted the red channel, the image would look very blue/green because there would no longer be any red mixed in.

Basic Computational Math Functions and Spreadsheets

Spreadsheets allow people to manipulate numbers in many different ways.
By using some of the below functions:
if
>, <, ==, >=, <=
AND
OR
NOT
many different outputs can be achieved.