Unit 30 - Computer Graphics

Assignment 1 - Hardware and Software

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P1

In this section I will be describing the different type of hardware that are used in graphics as well as how these are used when doing graphics. In addition to this I will also be describing the software that it available and how they compare for different tasks. The main components in a computer that are used heavily and required for graphic processing are as follows:

*Monitor
*RAM
*Graphics card
*Processor
*Hard drive

Hardware

Monitor

The main piece of hardware that is used for graphics editing and creation is a monitor, this is used to view the images and that you are using and as such it necessary to complete any graphical work. The ability to view the images well might seem trivial but the only other real alternatives that exist would be to constantly print out the images in order to see what you are doing or use a terminal that can only user ASCII characters and as such this would not be high resolution.

RAM

Another main component that is used in the processing and creation of graphics is computer memory, or RAM. This is used generally for the ability to have many things running at the same time or many things running at the same time and that these programs can have enough space to run all of these things (this is not the processing ability here). Within the context of graphics, the use of more RAM will allow the user to edit larger images quicker (as they can all be stored in RAM and not on the hard drive). In addition to this, having more RAM will also allow the user to apply more effect to an image as these can be stored temporally in RAM and this will make it go smoother.

Graphics Card

Another quite important component in computers that is used for graphics creations and editing is a discrete GPU or a graphics card. This is used to unload processing that would normally go to the CPU and it is sent over to the Graphics card where it can be processed off the main system processing and can be processed faster than normal. This can be processed faster on a GPU than a CPU as the GPU is specifically designed to be faster as processing graphics as it has many more processing cores than a CPU but these are lower clocked ad image processing is normally the same calculation applied to the different pixels of the same image. This will help with image editing and creation as it will allow all of the effects that the user will apply to the images to done done faster and as such they will save time when applying these effect. In addition to this the addition of a GPU

CPU

In addition to the other components that are in a computer a high-end processor is also used in image creations and modification. With a high end processor in a machine that is used for graphics processing the user will be able to do general tasks on the computer as well as simple tasks quickly. In addition to this high end processors will also have the ability to run more things in parallel as they tend to have a higher number of cores and a higher base clock that is used for processing the images and graphics. Furthermore, with a higher end processor in the machine the user will be able to run the whole program faster.

Hard drive / SSD

The final computer component that I will be listing here is the hard drive or really any main storage medium for the computer. The main two examples for this would be a hard drive and an SSD. The main reason for having a large hard drive and the reason that it would be useful for graphics and image editing would be the reason that the user will have the ability to store lots of different images and image files / software. At the moment the size of the average large hard drive would be about 1 to 2 TB and with these you can store many many different types of files. This is also a good idea as it means that you can have a backup of all of the images you make so that you will never lose them in any case and it is also important for what you are uploading images online as you will have to store all of the images on your computer before you can upload them.

With all of these the positives of one can be seen as negatives of when you don`t have one of those components as that benefit is not available.

Software

When actually creating digital images and graphics there are many different types of software packages that you can use, however in this section I will be only explaining a few of them that are available. The main differences between software that you will be looking for is if the software is one for raster or one for vector editing. For this comparison of software I will be comparing MS paint and inkscape.

Inkscape software uses vector graphics and Ms paint uses raster options.

The main difference between these is that inkscape store the equation of the line and the items that are being drawn. This is a positive as it means that the image that is created at the end has the ability to be zoomed in and moved around a lot yet it will still keep its original quality throughout the process. On the other hand the file size when using this type of image can get quite large and the software that it uses is far more complicated in most cases.

On the other hand the alternate type of image format is raster and this used by MS paint. This works by storing an array or a grid of all the colour information for each pixel. This is great as it means that the actual image file is quite small and it can very easily be compressed so that it is even smaller and that it is also very easy for downloading the image through a slow connection or where the size of the download is limited. In addition to this, in most places the software that is

used for raster images is a lot easier to use and as such it is more friendly to beginners. However, on the other hand the software that mainly uses raster images can be a lot simpler and as such not have the same functionality.

In addition to these two pieces of software there are also many other graphics editing software available. One example of this would be the type of software that is available for use within a web browser. A main example of this would be a website called PixlR, this is a website that offers the ability to edit images through their online service with access to a large variety of tools that is similar to Photoshop. These types of software can generally be both used for both raster and vector graphics due to the fact that they are offered in the web browser and that they will not have the most advanced features available. Finally, these pieces of software that run online are also generally available for free due to the fact that the software contains a lot of adverts inside of it and that the company will also take the customers information and get money off of that .

P2

In this section I will be explaining how different types of graphic images relate to file formats and how these are used. To start off with I will be listing the main types of graphic file formats and how they store the information for the image file and how these files are then used for graphics editing.editing. After this I will then give examples on the file formats That can be used to save each type of image (raster and vector).

Raster Graphics

As explained before there are two main ways that images are stored and worked on and these are vector and raster graphics. The main difference between these is that raster graphics works by storing the information about each of the pixels in the image with their Red, Green, Blue and Brightness values so that they can be projected to any screen and the image would look exactly the same. This will then store up to 8 bits for each pixel in regard to their red green and blue elements. This will then mean that there are up to 255*255*255 different values for each pixel (not counting the brightness) and this will represent the image on a screen. Due to the way that this is done the files can be compressed quite easily as a lot of the image will be the same colour and as such it can be compressed down with a loop saying that this general area is just green and this is how lossy compression works. In addition to this due to the fact that the image is stored based on individual pixels the resolution and therefore overall quality of the image will be limited based on this. This can then become a problem when the image needs to be blown up in size and all of a sudden all of the individual pixels can be distinguished and the image when viewed close up will not look pleasant.

Vector Graphics

On the other hand the other main type of image storage is vector graphics/images and as the name suggests, these use vectors to store the information about the image. These work by storing mathematical calculations about the image as well as what area are filled in with what colour and the equations of all of the lines in the image and their direction and so on. The main advantages of this is that the image can be broadcast and blown up to a large size without losing any of the quality as the equations will just scale up to the correct size and work just as well as they would do at a lower scale. Unfortunately due to this the file sizes of thus type of image are in most cases larger than their raster counterpart due to the fact that they cannot be compressed easily as the equations have to be exact without any loss and so these files are often compressed in a lossless form. Furthermore due to the way the images are stored they cannot easily be read by all programs and as such they may have some compatibility issues with lower end software for editing graphics.

With either of these different methods there are certain file types accosted with them in the form of the file extension at the end of the file and the way the raw data will be read by programs in order to be decoded.

File formats

SVG (Vector)

The main type of vector graphics file format that is used is SVG and this stands for Scalable Vector Graphics and it a format that stores the information about the lines and the fill colour within an image to fit into the vector graphics standard. This is by far the most common standard, but even still its use is limited aside from the advanced graphics side of graphics editing and creation due to the other limitations that the file contains and the fact that you need quite a complex parser for the file in order to read its data and get the image on screen. In additon to this the standard for SVG is all open and the way that the data is stored is through the use of .xml files and because these are plain text files they can eaily be edited

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M1

In this section I will be comparing the different pieces of hardware and software for use with graphics editing. To start off with I will be comparing the different hardware that is used to capture images to be used for photo editing. When capturing images there are different ways that they can be captured/produced. The 2 main ways that I can think of would be:

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* Photography with a camera
   * Film
   * SLR
* computer render
   * capture card
   * Desktop render
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The main and most predominant way that photos can be captured and then edited it a computer is through the use of a camera and then loading this into a computer. For this there are two main that the images them selves can be taken, and this is through either the use of a (D)SLR camera or a film camera. With these pieces of hardware the user will need to take a picture and then transfer that image to the computer, this can be done a few different ways and it depends on the hardware type. For the film the user will have to take the negatives of images that they have in the camera, develop that and then they will be able to scan it into the computer. With this method the resolution and quality of the scanner will probably be the main factor / limiter to the quality of the image. After this it is

then on the computer. For a (d)SLR camera the process is very simple as you just have to take out the storage medium (normally a SD card) and put that into the computer to read the information off of it. The main differences in actual camera performance between the film and DSLR is that the film cameras don`t have their image size limited by pixels but instead they have them limited by grain as the pictures is captured as chemicals in the film rather than pixels in a sensor and as such when the image is blown up the image will look splotchy rather than pixilated.

The other hardware that it used for capturing images would be through computer rendering and then capture. This can cover many different types of images and image types. For example, with this you could have the option of a high quality 3D render or a digitally created painting and with all of these they may use other images that were actually taken on a camera but the final image is one that has been rendered and created on a computer. In addition to this these images may also be taken from other computer systems that don`t support the ability to actually output these images in a useable format, and in these cases a capture card will be able to take the output that they would send to a monitor and then save the file in such a way that it can be saved and used for other purposes. With these type of images and image creation the main limit to the quality and depth of the image is the power of the computer performing the rendering of the image and the complexity and level of detail that the program can provide and the user puts into it. With these computer renders and generation the final image can look like anything that the user wants it to and is not constrained by real world realities and features, as such they can contain many more interesting things, however because of this the images can look quite fake and this is undesirable for these images and they will be considered bad. These can be, in most cases, be considered better than normally photographs however some people consider them always worse as they are not original images.

In addition to this, (as mentioned before) there are many different types of software that you can use to edit and to manipulate images and in this section I will be explain and describing the differences between them and how they work. For this comparison I will be comparing the abilities and the functionality of both MS paint and adobe Photoshop.

To start off the comparison I will be comparing the features of the different programs and their ability to edit they actual images. When talking about MS paint you will see that there are not many different features that are available for the user to use so that they can edit the image. From looking at the bar at the top of the screen you can see that there are only simple option available like the ability to add in colours with a few simple and different brushes and simple shapes. In addition to this MS paint also has the ability to add in simple shapes to the image that can be in a few different colours. A finally thing that MS paint can do that is worth mentioning is that it has the ability to also do selections within the image that you can then use to move around the within the image and also save as a separate image. This selection functionality can also be used to select an area that you only want to be able to draw in so that you can have defined borders when you draw so you only edit a certain part of the image.

From this you can see that MS paint is very limited in what it can do as it only contains a limited amount of features in the software and as such con only be used for very very basic editing. This can be shown as it does not have the main ability to have multiple layers (a main staple for editing software) which limits its functionality a lot. Furthermore this software is also limited by the fact that it only has access to basic editing options in terms of brushes for paining and the shapes that it can use.

When this is compared to adobe Photoshop the program cannot be compared by the features that they have due the fact that Photoshop has so many more features that are also all far more advanced than MS paint, however this is to be expected because MS paint is free and included with all versions of the windows operating systems while Photoshop costs a lot of money and is a professional application. The main features that Photoshop has that MS paint does not have is the ability to have different layers that can show through each other and each contain afferent images. This allows there to be far more complexity in the image as all the different layers can be created individually and this allows for them to be thought of as images themselves. Furthermore Photoshop also supports far more complicated selection and processing tools that allow the end picture to be much more defined and precise without the user having to go all the way down to the pixel level. These selection modes can select between the same colour all throughout an image as well as selecting an area in general through its rough shape as well as the ability to apply advanced effects throughout the whole image.

However, although it may seem like it could have no possible limitations there is one main one and that is the availability that people have to buy it. Due to the fact that it has all of these features the program is very expensive to buy and as such not everyone can have access to it unless they pay a lot of money.

From this comparison you can easily see that Photoshop is the more advanced and full fledged image editor when compared to MS paint. However, this is expected but it would be better to also compare Photoshop with PixlR due to the fact that PixlR is designed to be more of competitor with Photoshop due to the features that it has and the audience that it presents to.

With PixlR there are many features that it has which are the same as Photoshop like the ability to have layers as well as the abundance of tools that you can have to change certain aspects of the images. However, due to the fact that this software is being offered in the browser and the fact that the software does not cost any money to use the software is not as powerful as the full version of Photoshop. Whilst it still does have a lot of the more advanced features like the ability to have multiple layers and the ability to select certain areas of the image the features are not as defined / precise as they could be and they have a limited functionality. This also shows that PixlR is more advanced than MS paint as it has all of these features and the fact that it is free shows that it is available for the same people as MS paint would be for. Furthermore the fact that PixlR is only available if you have an internet connection is another limiting factor as this means your computer has to be connected to the internet if you want to edit an image.

With these different types of software the most frequently used for actual work would have to be Photoshop by far due to the fact that it has all of the functionality of any software program like it and because it is is popular everyone knows about it and so everyone uses it when they can. After this would have to be PixlR due to the fact that it has a lot of functionality even if it is not fully complete up to Photoshop standards and because it does not cost anything and is free. Finally there would have to be MS paint because it has not a lot of functionality even though it is free and comes with the most popular operating system.

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