**Assignment(1)**

**Class:MCA-II(Sem-III)**

**Subject: Computer Graphics**

**Topics:**Computer graphics and applications,Area filling techniques

**Submitted To:**

Vibha Gupta

Prof.of Comp.Sci.Department

**Ques1:Definition of Computer Graphics and Applications of Computer Graphics?**

**Ans.** Computer Graphics involves technology to access. The Process transforms and presents information in a visual form. The role of computer graphics insensible. In today life, computer graphics has now become a common element in user interfaces, T.V. commercial motion pictures.

Computer Graphics is the creation of pictures with the help of a computer. The end product of the computer graphics is a picture it may be a business graph, drawing, and engineering.

In computer graphics, two or three-dimensional pictures can be created that are used for research. Many hardware devices algorithm has been developing for improving the speed of picture generation with the passes of time. It includes the creation storage of models and image of objects. These models for various fields like engineering, mathematical and so on.

Today computer graphics is entirely different from the earlier one. It is not possible. It is an interactive user can control the structure of an object of various input devices.

**Definition of Computer Graphics:**

It is the use of computers to create and manipulate pictures on a display device. It comprises of software techniques to create, store, modify, represents pictures.

**Why computer graphics used?**

Suppose a shoe manufacturing company want to show the sale of shoes for five years. For this vast amount of information is to store. So a lot of time and memory will be needed. This method will be tough to understand by a common man. In this situation graphics is a better alternative. Graphics tools are charts and graphs. Using graphs, data can be represented in pictorial form. A picture can be understood easily just with a single look.

Interactive computer graphics work using the concept of two-way communication between computer users. The computer will receive signals from the input device, and the picture is modified accordingly. Picture will be changed quickly when we apply command.

# Application of Computer Graphics

**1. Education and Training:** Computer-generated model of the physical, financial and economic system is often used as educational aids. Model of physical systems, physiological system, population trends or equipment can help trainees to understand the operation of the system.

For some training applications, particular systems are designed. For example Flight Simulator.

**Flight Simulator:** It helps in giving training to the pilots of airplanes. These pilots spend much of their training not in a real aircraft but on the ground at the controls of a Flight Simulator.

### Advantages:

1. Fuel Saving
2. Safety
3. Ability to familiarize the training with a large number of the world's airports.

**2. Use in Biology:** Molecular biologist can display a picture of molecules and gain insight into their structure with the help of computer graphics.

**3. Computer-Generated Maps:** Town planners and transportation engineers can use computer-generated maps which display data useful to them in their planning work.

**4. Architect:** Architect can explore an alternative solution to design problems at an interactive graphics terminal. In this way, they can test many more solutions that would not be possible without the computer.

**5. Presentation Graphics:** Example of presentation Graphics are bar charts, line graphs, pie charts and other displays showing relationships between multiple parameters. Presentation Graphics is commonly used to summarize

* Financial Reports
* Statistical Reports
* Mathematical Reports
* Scientific Reports
* Economic Data for research reports
* Managerial Reports
* Consumer Information Bulletins
* And other types of reports

**6. Computer Art:** Computer Graphics are also used in the field of commercial arts. It is used to generate television and advertising commercial.

**7. Entertainment:** Computer Graphics are now commonly used in making motion pictures, music videos and television shows.

**8. Visualization:** It is used for visualization of scientists, engineers, medical personnel, business analysts for the study of a large amount of information.

**9. Educational Software:** Computer Graphics is used in the development of educational software for making computer-aided instruction.

**10. Printing Technology:** Computer Graphics is used for printing technology and textile design.

### Example of Computer Graphics Packages:

1. LOGO
2. COREL DRAW
3. AUTO CAD
4. 3D STUDIO
5. CORE
6. GKS (Graphics Kernel System)
7. PHIGS
8. CAM (Computer Graphics Metafile)
9. CGI (Computer Graphics Interface)

**Ques2: Explain the Area Filling Techniqes with algorithms?**

**Ans.** Region filling is the process of filling image or region. Filling can be of boundary or interior region as shown in fig. Boundary Fill algorithms are used to fill the boundary and flood-fill algorithm are used to fill the interior.

**Boundary Filled Algorithm:**This algorithm uses the recursive method. First of all, a starting pixel called as the seed is considered. The algorithm checks boundary pixel or adjacent pixels are colored or not. If the adjacent pixel is already filled or colored then leave it, otherwise fill it. The filling is done using four connected or eight connected approaches.

Four connected approaches is more suitable than the eight connected approaches.

**1. Four connected approaches:** In this approach, left, right, above, below pixels are tested.

**2. Eight connected approaches:** In this approach, left, right, above, below and four diagonals are selected.

Boundary can be checked by seeing pixels from left and right first. Then pixels are checked by seeing pixels from top to bottom. The algorithm takes time and memory because some recursive calls are needed.

**Problem with recursive boundary fill algorithm:**

It may not fill regions sometimes correctly when some interior pixel is already filled with color. The algorithm will check this boundary pixel for filling and will found already filled so recursive process will terminate. This may vary because of another interior pixel unfilled.

So check all pixels color before applying the algorithm.

**Algorithm:**

1. Procedure fill (x, y, color, color1: integer)
2. **int** c;
3. c=getpixel (x, y);
4. **if** (c!=color) (c!=color1)
5. {
6. setpixel (x, y, color)
7. fill (x+1, y, color, color 1);
8. fill (x-1, y, color, color 1);
9. fill (x, y+1, color, color 1);
10. fill (x, y-1, color, color 1);
11. }

# Flood Fill Algorithm:

In this method, a point or seed which is inside region is selected. This point is called a seed point. Then four connected approaches or eight connected approaches is used to fill with specified color.

The flood fill algorithm has many characters similar to boundary fill. But this method is more suitable for filling multiple colors boundary. When boundary is of many colors and interior is to be filled with one color we use this algorithm.

In fill algorithm, we start from a specified interior point (x, y) and reassign all pixel values are currently set to a given interior color with the desired color. Using either a 4-connected or 8-connected approaches, we then step through pixel positions

## Algorithm:

1. Procedure floodfill (x, y,fill\_ color, old\_color: integer)
2. If (getpixel (x, y)=old\_color)
3. {
4. setpixel (x, y, fill\_color);
5. fill (x+1, y, fill\_color, old\_color);
6. fill (x-1, y, fill\_color, old\_color);
7. fill (x, y+1, fill\_color, old\_color);
8. fill (x, y-1, fill\_color, old\_color);
9. }
10. }