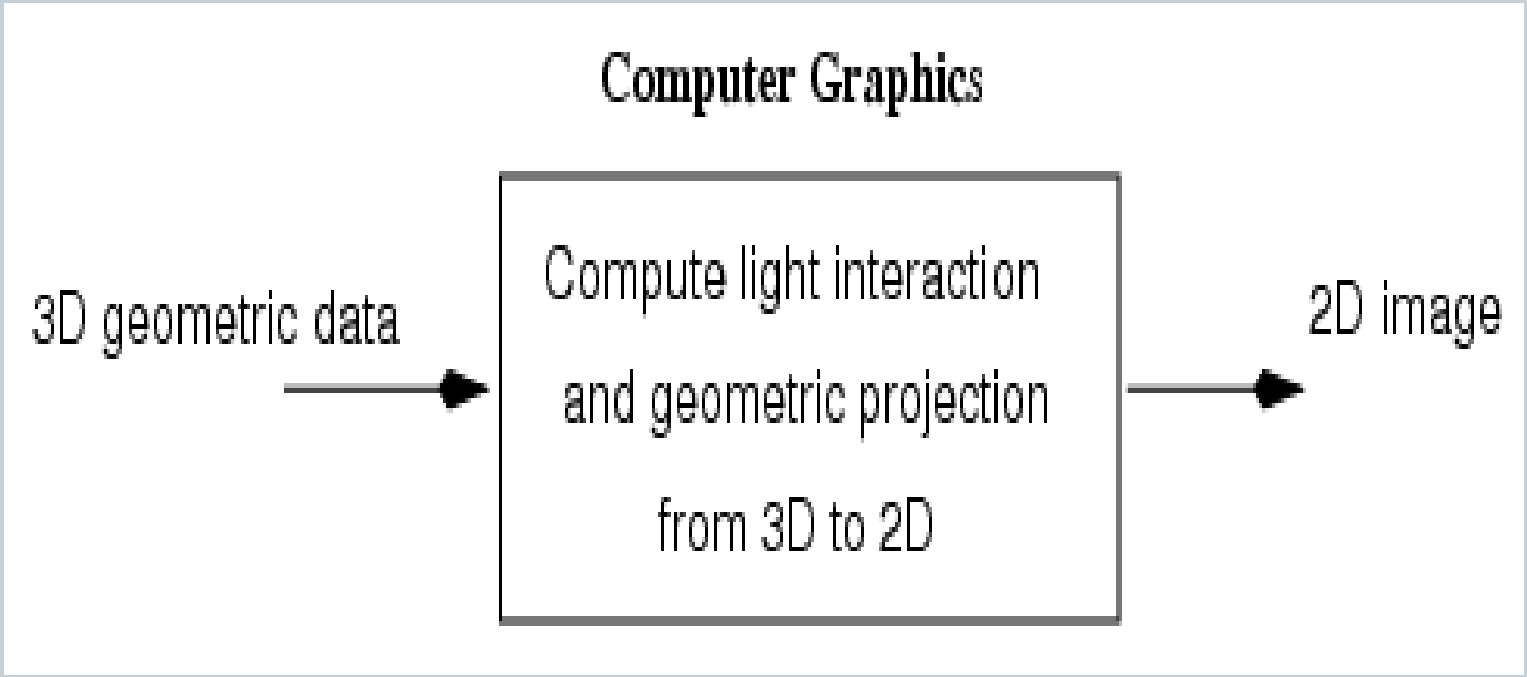
Computer Graphics

- INTRODUCTION
- ADVANTAGES
- AREAS OF APPLICATION

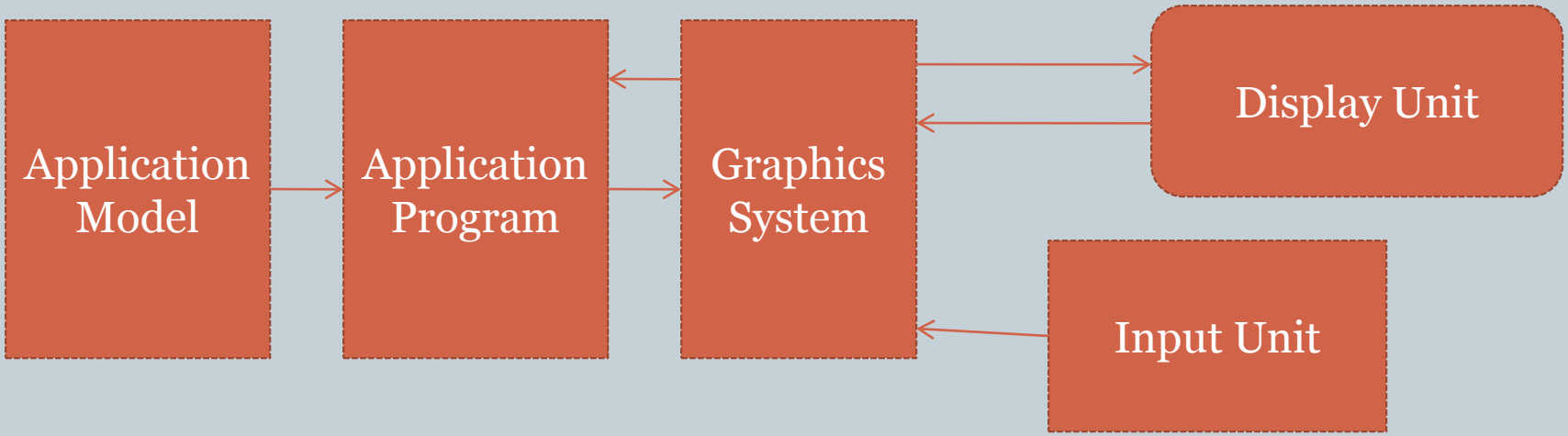
Introduction

- Computer graphics involves display, manipulation data for proper visualization using computer.
- Generate 2D images of a 3D world represented in a computer.
- Main tasks:
  - *Modeling*: creating and representing the geometry of objects in the 3D world
  - *Rendering*: generating 2D images of the objects
  - *Animation*: describing how objects change in time


Computer Graphics
3D geometric data
Compute light interaction
and geometric projection
from 3D to 2D
2D image

- Typical graphical system consists of host computer with support of fast processor , large memory ,frame buffer and
  - Display devices(Monitors)
  - Input devices(keyboards, mouse , joysticks)
  - Output devices(printers, plotters, LCD panel)

Interactive Graphics System



- Designer of computer graphics system or software engineer puts his design in application model.
- He will then writes the program to model the object he is planning to display.
- This application will run on the computer graphics system and output will be displayed on the display devices and the required input can be obtained from the input devices.

Advantages

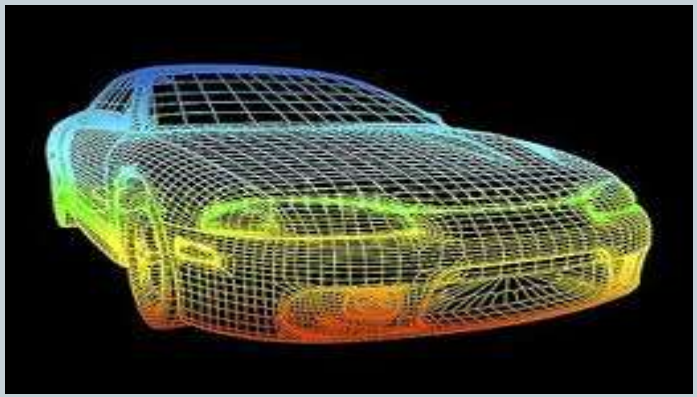
- High quality graphics display provide best way to communicate with computer.
- It is possible to produce animation.
- Can be used to control animation such as speed, total scene in view etc.
- Provides facility of update dynamic which can be used to change shape , color and other properties of object in view.
- With the development in DSP it can provide audio feedback along with the video.

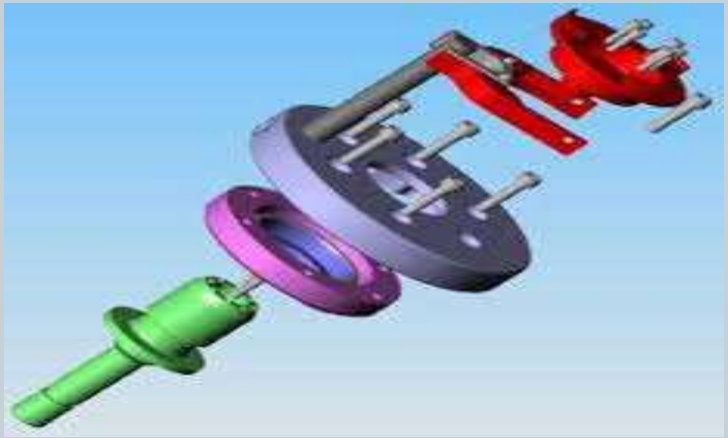
Application Areas

- Computer Aided Design(CAD)
- Presentation Graphics
- Computer Art
- Education and training
- Visualization
- Image processing
- Entertainment
  - Movies Industry
  - Gaming Industry
- Medical field
- Graphical User Interface(GUI)

CAD

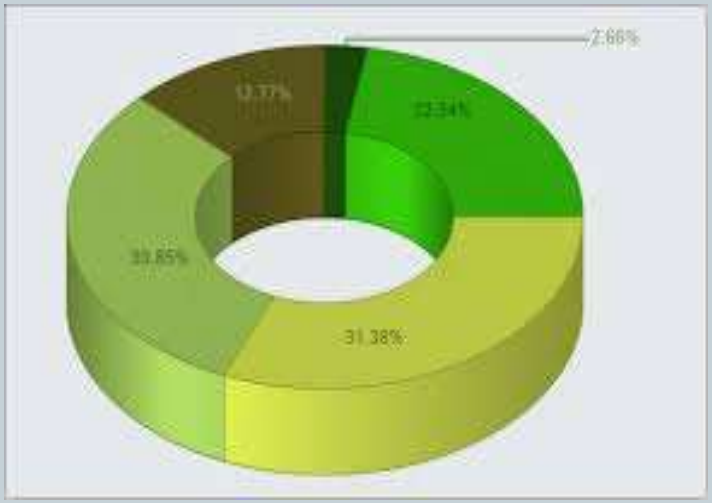
- Major use of computer graphics is in design process, particularly for engineering and architectural systems.
- This include design of buildings, automobiles, aircraft etc.

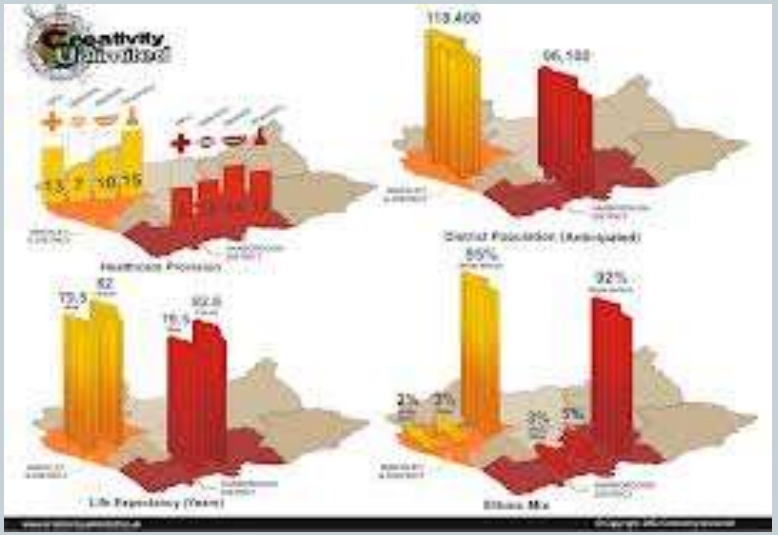




Presentation Graphics

- Used to summarize the financial, mathematical, scientific and economic data.
- Typical examples are bar charts, line graphs, pie charts etc.





Computer Art

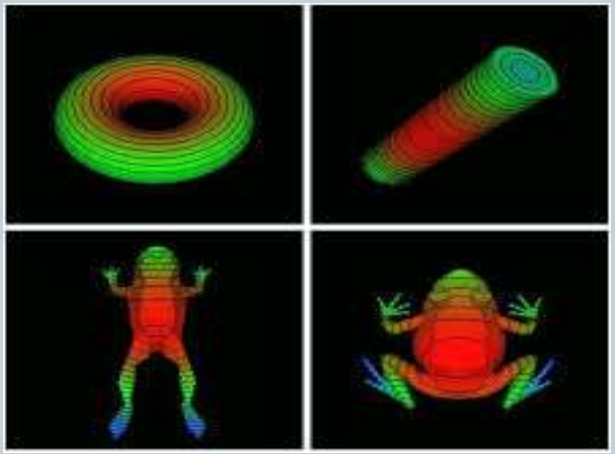
- Artist uses special purpose hardware and programs that provides facilities for designing object shapes and specifying object motion.
- Examples pixel paint, super paint etc.

Education and training

- Computer generated models of physical, financial and economic system are often used as educational aids.
- Various kinds of simulators program can be used to provide the trainings. E.g. automobile driving simulator.

Visualization

- Various techniques can be used to represent the large amount of data obtained from scientific , medical or business analysis.
- These includes color coding, contour plots, graphs , charts etc.



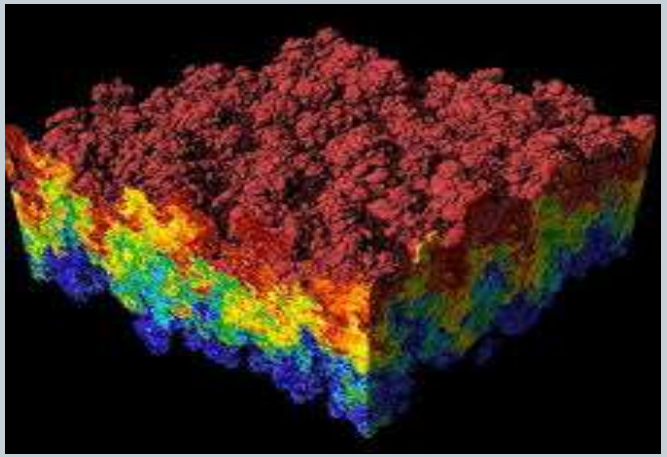
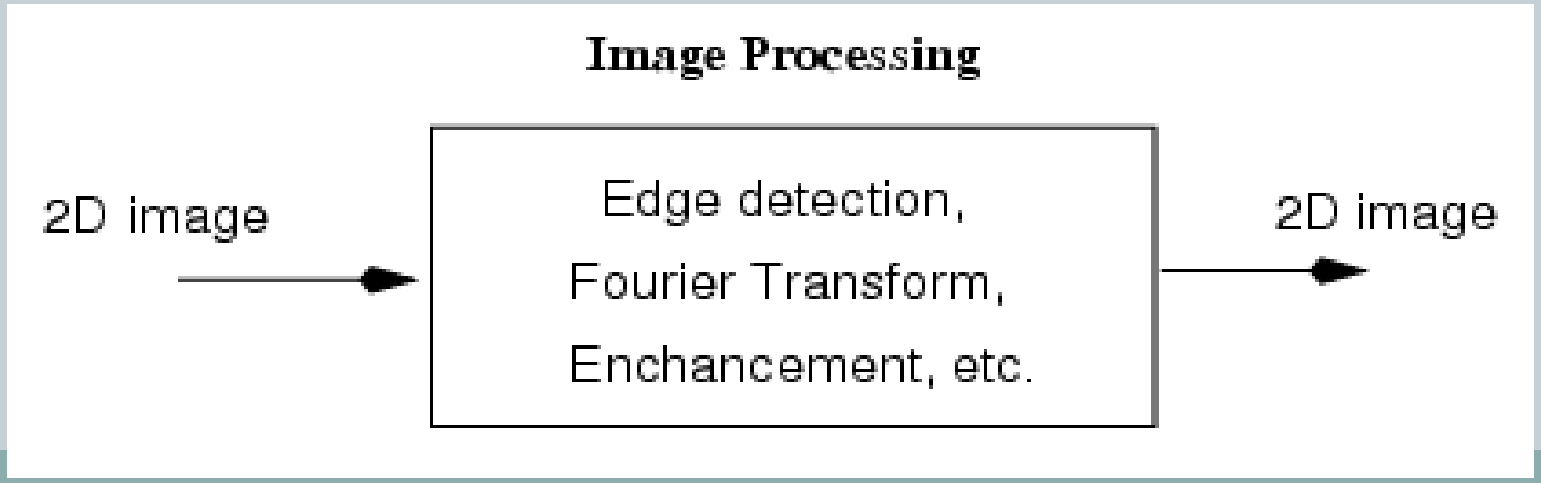


Image Processing

- Computer graphics is used to create pictures.
- Image processing applies techniques to modify or interpret the existing pictures.
- It is used to:
  - Improve picture quality
  - Machine perception of visual information

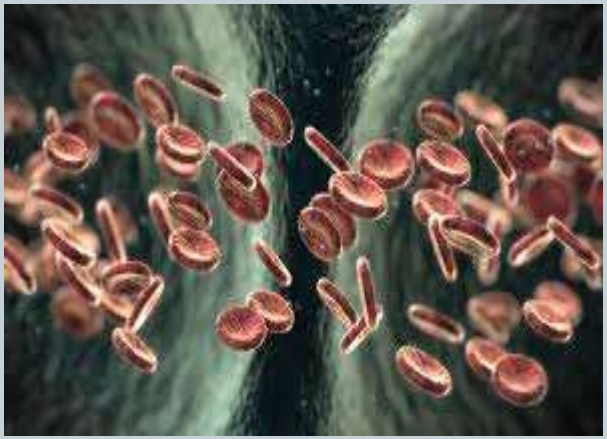


Entertainment

- Computer graphics methods are now commonly used in making motion pictures, music videos , games and televisions shows.
- Sometime graphics pictures are displayed by themselves and sometime combined with the actors and live scenes.

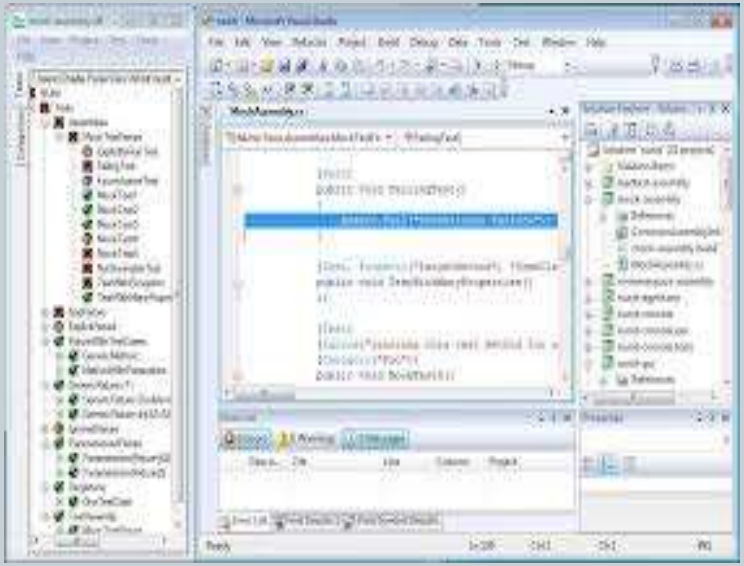
Medical Field

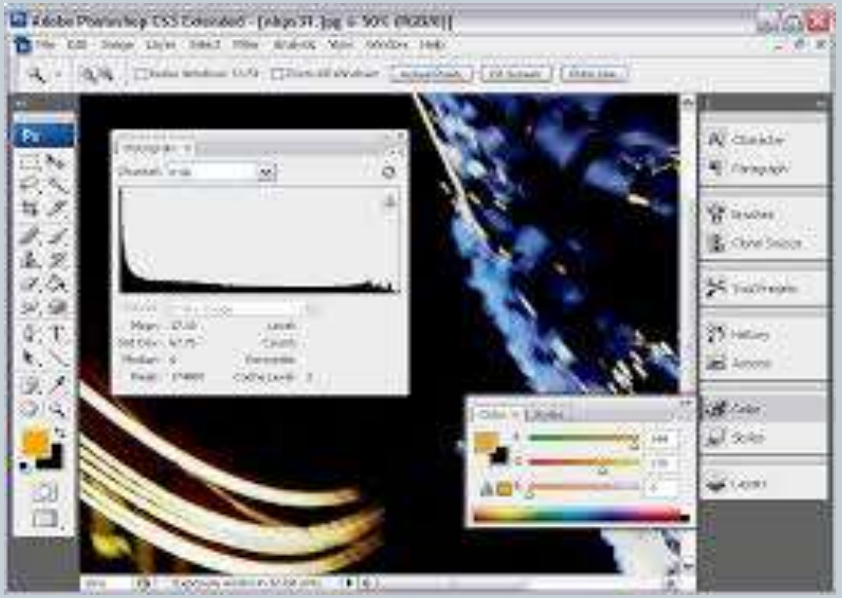
- Computer graphics can also be used to represent the various internal parts and process of the human body.

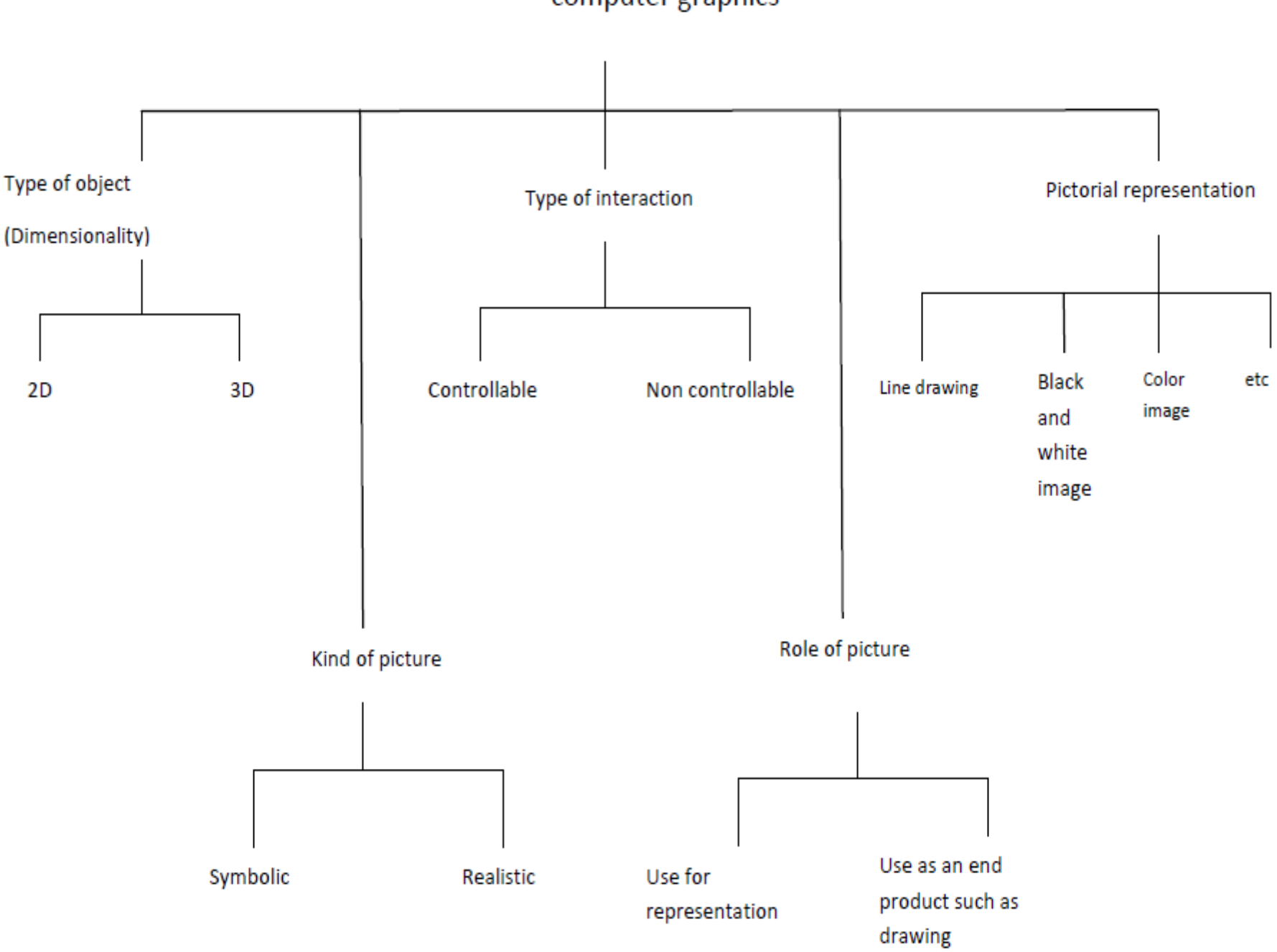


GUI

- It is the interface of the software that communicates with the user with help of some input devices.
- It contains number of windows , menus and icons for fast selection of processing options.






computer graphics
Type of object
(Dimensionality)
2D
3D
Type of interaction
Controllable
Non controllable
Pictorial representation
Line drawing
Black and white image
Color image
etc
Kind of picture
Symbolic
Realistic
Role of picture
Use for representation
Use as an end product such as drawing