Graphics in Three Dimension

Graphical Standards

Need for Machine Independent Graphical Languages

A machine Independent language is one that can run on any machine.

Eg:- Java

Machine Independent language can take the compiled code for any given machine and run it on the machine we are attempting to run it on.

A Truly machine-independent language would produce exactly the same output not matter which computer it was run on.

Needing

The needs are:-

1) Machine Independence
2) Cross-Platform compatibility
3) Interoperability
4) Portability
5) User experience Consistency

Graphical Standards: PHIGS, GKS

Software Standards

The primary goal of standardized graphics software is portability.
When packages are designed with standard graphics functions, software can be moved easily from one hardware system to another and used in different implementations and applications.
Without standards, program designed for one hardware system often cannot be transferred to another system without extensive rewriting of the program.

GKS

The General Kernel System (GKS) was the first ISO standard for low-level computer graphics, introduced in 1977
It provides a set of functions for 2D vector graphics.
In GKS pictures are constructed from a number of basic building blocks. There are five types of primitives in GKS.

Poly line - draws sequence of connected lines
Poly marker - marks a sequence of points with same symbol.
FillArea - displays a specified area.
Text - draws a string of characters
CellArray - Displays an image composed of a variety of colors or gray scales.

PHIGS

PHIGS, short for the Programmer's Hierarchical Interactive Graphic System, is basically a library of about 400 functions that allow user to display & interact with 2-D & 3-D graphics

It is an international standard, being created by (ISO).

PHIGS hides hardware-dependent details from the user; so for enample.

It allows an application draw on a plotter the same way it draws on computer screen.

PHIGS provide a set of familiar graphics object called 'primitives'

PHIGS primitives

polyline:-

polymarker:-

fill area:-

fill area set:- which defines the boundaries of a set of areas to be displayed as one.

text:-

annotation text:- which draws a sequence of characters to annotate a drawing.

cellarray:- Display image.

Graphics Software Standards

Graphics software standards define specifications for graphics programming interfaces & file formats.

Example includes OpenGL and DirectX, which provide APIs for rendering 2D & 3D graphics.

Standard like SVG & PDF define file formats for vector graphic & documents, respectively. These standards promote interoperability & compatibility among different software applications & platform.

Language Bindings

Language binding refers to the process of integrating a programming language with a particular software library or API.

For graphics programming, language bindings enable developers to use graphics libraries from different programming languages.

Example include:- Python binding for OpenGL (PyOpenGL) & Java binding for DirectX (Java Direct 3D).

Language binding allow developers to leverage the functionality of graphics libraries while working in their preferred programming environment

Imp

Overview of Gimphics File formats

1. JPEG

Joint Photographic Enpert group.

- lossy compression method used for images
- Typically stored in JFIF (JPEG File Interchange Format) file format with ententions JPG or JPEG.
- Supports 8-bit grayscal & 24-bit color images. 8-Red, 8-blue, 8-green.

2. TIFF

Tagged Image File Format

- Flenible format supporting eight or sixteen bits per color (24-bit or 48-bit). (RGB)
- Extensions: TIFF or TIF
- Not widely supported by web browsers

3. GIF

Graphics Interchange Format.

- Limited to an 8-bit palette (256 colors).
- Suitable for images with few colors like diagrams, logos, & cartoons.
- Uses LZW lossless compression.
- Not suitable for photographic images

4. BMP

Windows Bitmap

Handles graphic files within MSOS. (microsoft windows)

Typically uncompressed resulting in large, lossless files.

Simple structure & widely accepted in Windows

5. PNG (Portable Network Graphics

- Free, open-source alternative to GIF.
- Supports 8-bit palletted img & 24-bit true color or 48-bit true color with or without α channel.
- Support more colors than GIF & offers better compression.
- Suitable for web graphics & images requiring transparency.

Visualization of Data Sets

Data visualization is the graphical represent of information.
Enables quick understanding of complex data
Techniques include charts, graphs, maps & diagrams

The method & categories of Dataset visualization includes:-

Steps :
Area chart
Bar chart
Gantt chart
Circle view
Timeline
Waterfall chart
Maps
Tables
indicators

The visualization can be further categorized into :-

Temporal :-
This type of visualization technique is used when Dataset is linear and one-dimensional.
Eg :- Scatterplot, Timelines, LineGraph.

Hierarchical
The datasets which are in a certain hierarchy or order falls under this Visualization technique.
Eg :- Tree, Ring

Network
Some datasets are connected in a network pattern with each other within a cluster or within an area bound that can be used for visualization falling under the category of Network.
Eg :- Word clouds, Matrix chart.

multidimensional 2D or 3D visualizations
Eg :- Piechart, Venn-Diagram.
Geospatial :- (locations)
Flow map, Density map

Dataset visualization plays a crucial role in data analysis & decision-making process. Understanding its methods, categories & career prospects provides valuable insights into its significance in various industries.