

## **Data elements for Multimedia systems or Multimedia elements**

- Facsimile
- Document Images
- Photographic Images
- Geographic Information System Maps
- Voice Commands and Voice synthesis
- Audio Messages
- Video Messages
- Full motion stored and live video
- Holographic images
- Fractals

**Facsimile:** Facsimile transmission is also known as run-length encoding is a medium level of compression that can be easily achieved in software. It has been estimated that for a reasonably true representation and acceptable legibility a 200 dpi is essential, which is contrasting with laser printers which supports maximum of 400 dpi. This follows CCITT Group 3 compression standards

**Document Images:** for serious storage of document images in electronic form with adequate reproduction quality the requirement starts at 300 dpi. Group 4 compression standards are followed in this format which reduces the size to 75 kbytes which less than an uncompressed A-Size (8 ½ inch X 11 inch) image. The goal of document imaging is to seriously image text book size of data

**Photographic images:** Photographic images are used frequently for imaging systems that are used for identification such as security badges, fingerprint cards, photo identification systems, bank signature cards, patient medical histories, and so on. The requirements of photographic images are much more intense than those for typed documents. Photographic images require proper handling of soft shades and tones. A resolution of 600 dpi is essential for reproducing a photographic image on a laser printer. High resolutions are preferable.

**Geographic information systems Maps:** Known as GIS systems, maps are created in GIS systems are being used widely for natural resource and wild life management as well as urban planning. Two kinds of technologies are used for storage and display of geographic images. Raster storage is used storing data and for displaying raster image is mapped vector for displaying the data

**Voice Commands:** Voice commands are primarily an input voice recognition consideration. Voice commands allow hands free-usage of computer applications by allowing command entry via a short voice commands rather than a keyboard or a pointing device.

**Voice synthesis and audio messages:** voice synthesis is easier to achieve than voice recognition. The initial attempts used fully stored messages or actual voice clips that were strung together. Another approach is to break down the message completely to a canonical form based on phonetics.

**Audio messages are substitute for text messages.** Computers equipped with micro phones can record a audio message and embed it in or attach it to an electronic mail message. Compression techniques attempt to manage the storage more effectively

**Holographic images:** Holography is defined as the means of creating a unique photographic image without the use of lens. The photographic recording of the image is called hologram, which is an unrecognized form of pattern of stripes and whorls but which when illuminated by coherent light as by a laser beam, organizes the laser light into a three dimensional representation of the original objects. Holographic images extend the concept of virtual reality by allowing the user to get “inside” a part such as engine view and its operation from the inside.

**Fractals:** Fractals started as technology in the early 1980s but has received serious attention only recently. This technology is based on synthesizing and storing algorithms that describe the information. Fractals are regular objects with a high degree of irregular shape. Fractals are the decompressed images that result from a compression format that uses arithmetic algorithms to define repeated patterns in the image.

## **Objects for Multimedia systems**

### **Text**

Text is obviously the simplest of data types and requires the least amount of storage.

Text data types can be made fields in a database that can be indexed, searched and sorted.

Text is the basic element of a relational database.

Text is also the basic building block of a document.

Hypertext is an application of indexing text to provide a rapid search of specific text strings in one or more documents.

Hypermedia document is a basic complex objects of which text is a subobject( images, sound, video etc.,).

### **IMAGES**

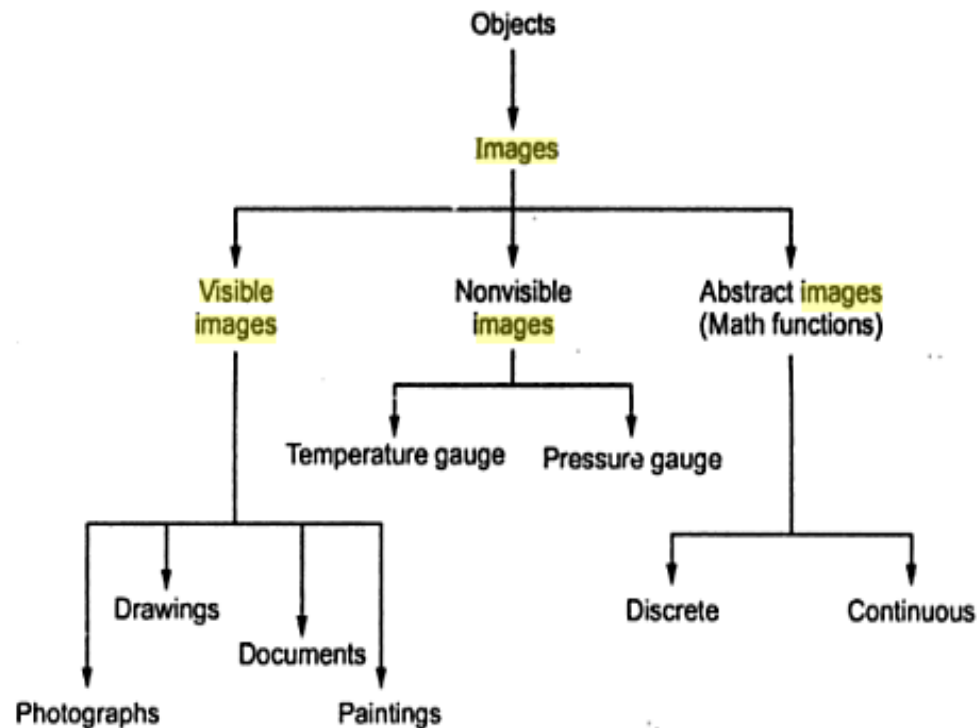
Image object is a subobject of the hypermedia document object

Image object includes all data types that are not coded text and do not have temporal property

All objects are represented in graphics or encoded form

Examples-- document images, facsimile, fractals, bitmaps, still pictures , etc.

### Image Hierarchy



#### Visible

This Group of images includes

Drawing ( blueprints, engg drawings, space maps for offices, town layouts etc.,)

Documents

Paintings

Photographs

Still frames captured from a video camera.

Multimedia systems – compression algorithm depend upon type and source of image , so information about compression method should be part of the image.

#### Non-Visible

Images that are not stored as images but displayed as a images – example pressure gauges, metering display etc.

### **Abstract Images**

It is a computer generated images based on some arithmetic calculations -- ex.. Fractals.

The **discrete functions** result in still images

**Continuous functions** used for animated images– image fading , dissolving into another image

### **Audio and voice**

Information are stored in compressed form in audio and voice objects

Type-- music, speech, voice commands, telephone conversation etc.

Audio object needs to store following information.

- The length of the sound clip
- Its compression algorithm
- Play back characteristics
- Any sound annotations associated with the original clip.

### **Full-motion and live video**

Most processing and storage intensive components .

It is a pre-stored video clip and live video by its definition is live and must be processed while being captured by the camera.

Storage and processing perspective

Video server needs use of different technologies

- Database storage
- Network media and protocols
- Decompression engines
- Display engines.

## **Evolving Technologies For multimedia Systems:**

### **Hypermedia Documents:**

Technical and business documents are increasingly being compiled, written, and distributed in electronic form. The availability of fast-networks has allowed this transformation to computer-based electronic hypermedia documents. Hypermedia documents by definition contain, in addition to text, embedded or linked multimedia objects such as image, audio, hologram, or full-motion video. The network speed and computing efficiency with which these hypermedia documents can be manipulated has special implications for multimedia applications such as messaging. Hypermedia has its roots in hypertext.

### **Hypertext:**

Hypertext implements the organization of non sequential data by natural associations of information. Hypertext systems allow authors to link information together, create information paths through a large volume of related text in documents, annotate existing text, and append notes that direct readers to bibliographic information or to other reference material. Hypertext allows fast and easy searching and reading of selected excerpts through text spanning up to hundreds of thousands of pages.

### **Hyperspeech:**

Accelerating trends such as multimedia and cellular-phone networks stimulated the development of general purpose speech interfaces. Speech synthesis has been used in a limited form only. However, expectations make speech synthesis and indexing of speech an important component of multimedia systems. For example, a mail message can be used to generate a hyperspeech file that a user can begin to navigate on a selective basis. Instead of having to listen to a synthesized recording of the entire message, a user can jump from concept to concept, following a variety of threads of thought. By using this approach, a user can get a synopsis of a report in a very short time and effectively respond to the issues quickly.

### **HDTV and UDTV:**

Among the better-known television broadcasting standards are NTSC, PAL, SECAM, NHK and others. These standards range resolutions from 525 lines for NTSC to 819 l lines for the French standards. An 1125-line digital HDTV (High-Definition TV) has been developed and is being commercialized while UDTV (Ultra-Definition TV) is developed by NHK of Japan featuring approximately 3000 lines.

### **3-D Technologies and Holography:**

Three-dimensional technologies are concerned with two areas : pointing devices and displays. 3-D pointing devices are essential to manipulate objects in a 3-D displays system. 3-D displays are achieved using holography techniques. The development of 3-D pointing devices and system is an important component in the progress towards multimedia systems.

### **Digital Signal Processing (DSP):**

The use of digital signal processor (DSP) chips continues to grow rapidly, outpacing the overall use of ICs. DSP chips are also used in applications such as the European digital cellular telephone system, digital servos in hard disk drives, and fax/data modems. A typical DSP operating system architecture would contain the following subsystems:

- Memory management: DSP architectures provide dynamic allocation of arrays from multiple segments, including RAM, SRAM and DRAM.
- Hardware-interrupt handling: A DSP operating system must be designed to minimize hardware interrupt latency to ensure fast response to real-time events for applications, such as servo systems.
- Multitasking: DSPs need real-time kernels that provide preemptive multitasking and user-defined and dynamic task prioritization.
- Inter-task synchronization and communication: Mechanisms for inter-task communication include message queues, semaphores, shared memory, and quick response event flags.
- Multiple timer services: The ability for the developer to set system clock interrupt managed timers to control and synchronize tasks, needed for most real-time applications.
- Device-independent I/O: DSP operating systems should support two fundamentally different forms of program interaction with underlying devices, an asynchronous data stream for passing data between program and device, and synchronous message passing for passing control messages between the device and the program.