Chapter 1

Multimedia Introduction

2017.03

Prof. Park Kyusik

Contents

- Multimedia History
- Digital Multimedia
- Multimedia Definition & Classification
- Multimedia Characteristics
- Standards

Multimedia History

- The term “multimedia" was first used in 1965 to describe a performance that combined music, lights, cinema, and performance art (Bob Goldstein)
- Since then, Multimedia = multi + media
  - Text, audio, images, animations, video and interactive content
- Late 1970, desktop computer – CD, DVD storage
- In 1989, Tim Berners Lee WWW, Multimedia PC
- In 1990, Broadband computer network
  - Information compression – MPEG
- Late mobile network and mobile device

Multimedia Technology	
CD-ROM, DVD	600MB, 7.4GB
Peripheral device	Sound card, graphic card
Data compression	JPEG, MPEG, DIVX
Analog-Digital conversion	Make digital multimedia possible
Multimedia Software	Multimedia authoring tool, animation/video editor
Hypermedia technology	WWW
Multimedia standard	JPEG, MPEG, HTML, XML
Multimedia OS	Windows, OS X (Mac), Linux

Digital Multimedia

- The same story and information can be represented in **different media**
  - Text, Image, Sound, Video, Animation
- All the media can be represented **digitally** as a structured collection of bits
  - Manipulated by programs, stored, and transmitted over networks
- Each digital media can be combined into **multimedia**

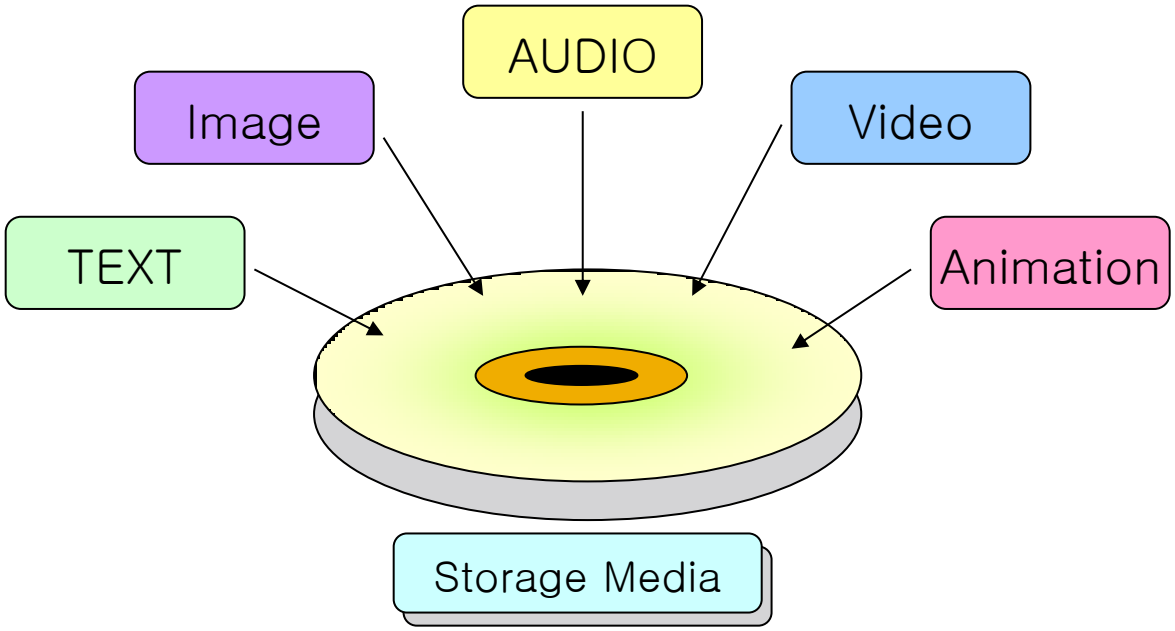
Multimedia Definition

- Narrow definition
  - **Multimedia = Multi + Media**
  - Computer information resulting from **combination of more than two different media types**

- Broader definition
  - Means **all the technologies involved in expression, storage, transmission of information** consisting of different medias such as text, image, video, audio, etc.

Multimedia Classification

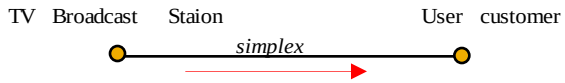
- Classifying multimedia data into five types
  - Text, Image (Graphic), Audio (Speech, Music) Video, Animation



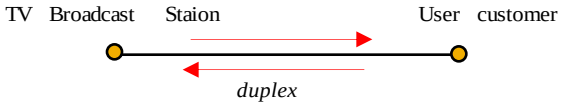
Multimedia Characteristics

- Combined media - **Integrity**
- **Duplex communication** of information
- **Digital** media processing
- Processing ability on **stand-alone computer**
- **Media Interaction**
- **User Interface**
- Massive **storage device**

- Combined media - **Integrity**
  - Computer information consisting of more than two different media types



- **Duplex** communication
  - Simplex communication



(Example, Analog TV : Broadcasting station → User)

  - Duplex communication - Multimedia data can be communicated in both directions based upon user request

Ex) Past simplex TV ⇒ Duplex digital TV with STB, IPTV

CD-ROM Title, WWW, VOD

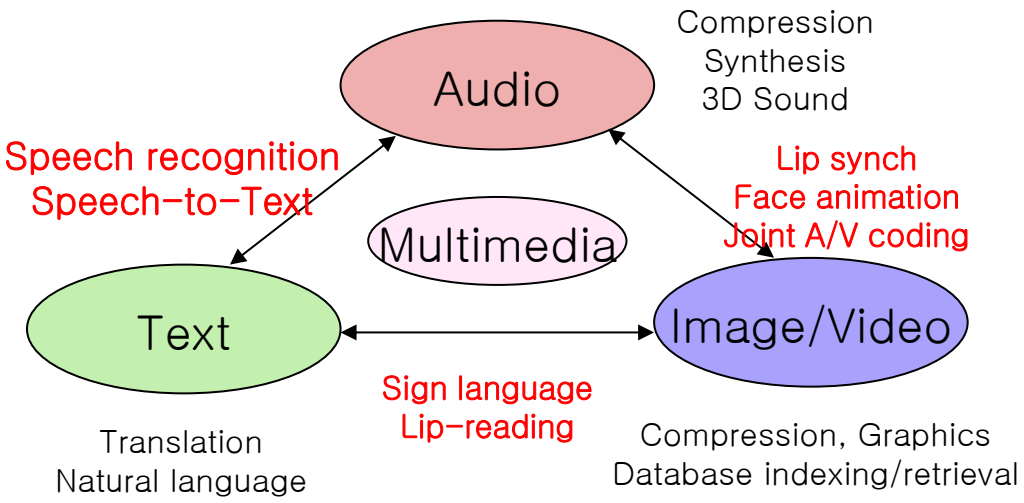
Multimedia is essentially digital processing

- So, each media, such as image, video and audio, must be digitized first before they are combined to form multimedia information
- Because of digital processing, we have some advantages
  - Each media can be expressed in terms of 0, 1 binary

    → So, they can be combined in multimedia form

    with some header information (see later!)
  - Less loss on transmission, storage and easy mobility
  - Can edit and transform to different form without affecting original data

- Processing ability on stand-alone computer
  - Should able to process multimedia information on single computer
- **Media Interaction**
  - Integration and interconnection of different media type to provide useful multimedia applications



- **User Interface**
  - Easy and convenient way of input/output (I/O)
    ↔ Data processing, retrieval, and operation
  - HCI (Human-Computer Interface)

- Massive **storage device**
  - Optical storage device to store massive multimedia data
  - Ex) DVD-ROM, HDD, SSD, USB, ..

Summary

	Characteristics
Combined media – Integrity	Combined information of more than two different medias
Duplex communication	Communication in both directions based upon user request
Digital media processing	Each media must be digitized before Multimedia – Can have some advantages of digital media processing
Stand-alone computer	Must be able to process multimedia information on single computer
Media interaction	Integration and interconnection of different media to provide multimedia applications
User interface	Easy and convenient way of I/O
Massive storage device	Need to store massive multimedia data

Multimedia Data Delivery

- **Online**
  - Uses a network (Internet) to transmit information from one computer to another
    - WWW (World Wide Web) is commonest form of online delivery of multimedia
- **Offline**
  - Removable storage medium to carry the data
    - CD-ROM, DVD, USB

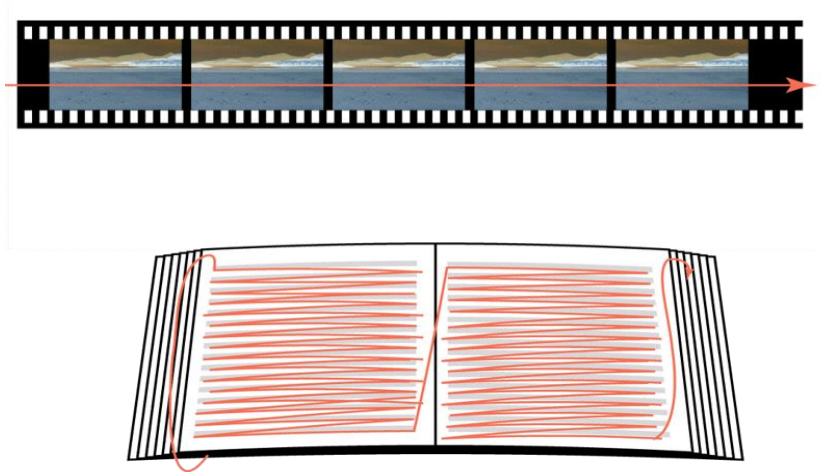
Page & Time-Based Multimedia

- Page-Based Multimedia
  - Text, images **in 2-D arrangement** as in the book or magazine, or JPEG images

- Time-Based Multimedia
  - Means the media that is changing as the time goes by such as sound (2D Info. = sound amplitude + time), video (3D Info. = Image + Time)
  - Can be presented in sequence on a *timeline*

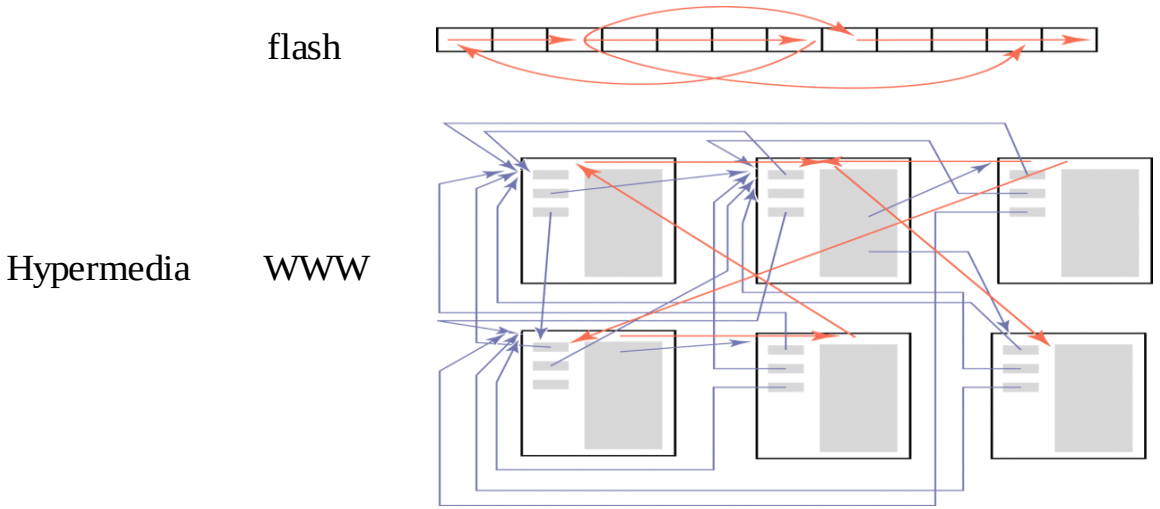
Linearity & Nonlinearity

- Multimedia can be realized into Linear or Nonlinear form
- Linearity
  - Film - Fixed order of frames defines a single playback
  - Book - Physical arrangement of text and pages in linear



Non-Linearity

- Flash: jumps between frames, controlled by interactivity, permit branching and loops
- Hypermedia (WWW) : **links between pages** permit multiple arbitrary reading orders



Multimedia User Interfaces

- Ways of choices and accepting user input

Stylized Interface

Conventional Interface

Standards Definition

- ISO (International Standard Organization)

"**Standards are documented agreements containing technical specifications … to be used consistently** … to ensure that materials, products, processes and services are fit for their purpose"

What Kind of Standard ?

- Need for single integrated way for multimedia data expression, storage and transmission to accommodate each products of different companies in the world wide

  - Standard - Uniform technical specification for Communication, Data expression, System service,.. etc
  - Two types of standard
    - **De jure** (lawful standard)
    - **De facto** (Custom standard)

- De jure
  - Law agreement that every company must follow
- De facto
  - No law agreement, but accepted as a kind of standard

  because it is used by many people (ex: IBM PC)
- Organization for standard regarding multimedia
  - International Organization (ITU, ISO, IEC)
  - National Organization (ANSI)
  - Private Organization (ATM forum, OSF,OMG)
  - Academic Organization (IEEE)
  - W3C regarding WWW and Internet

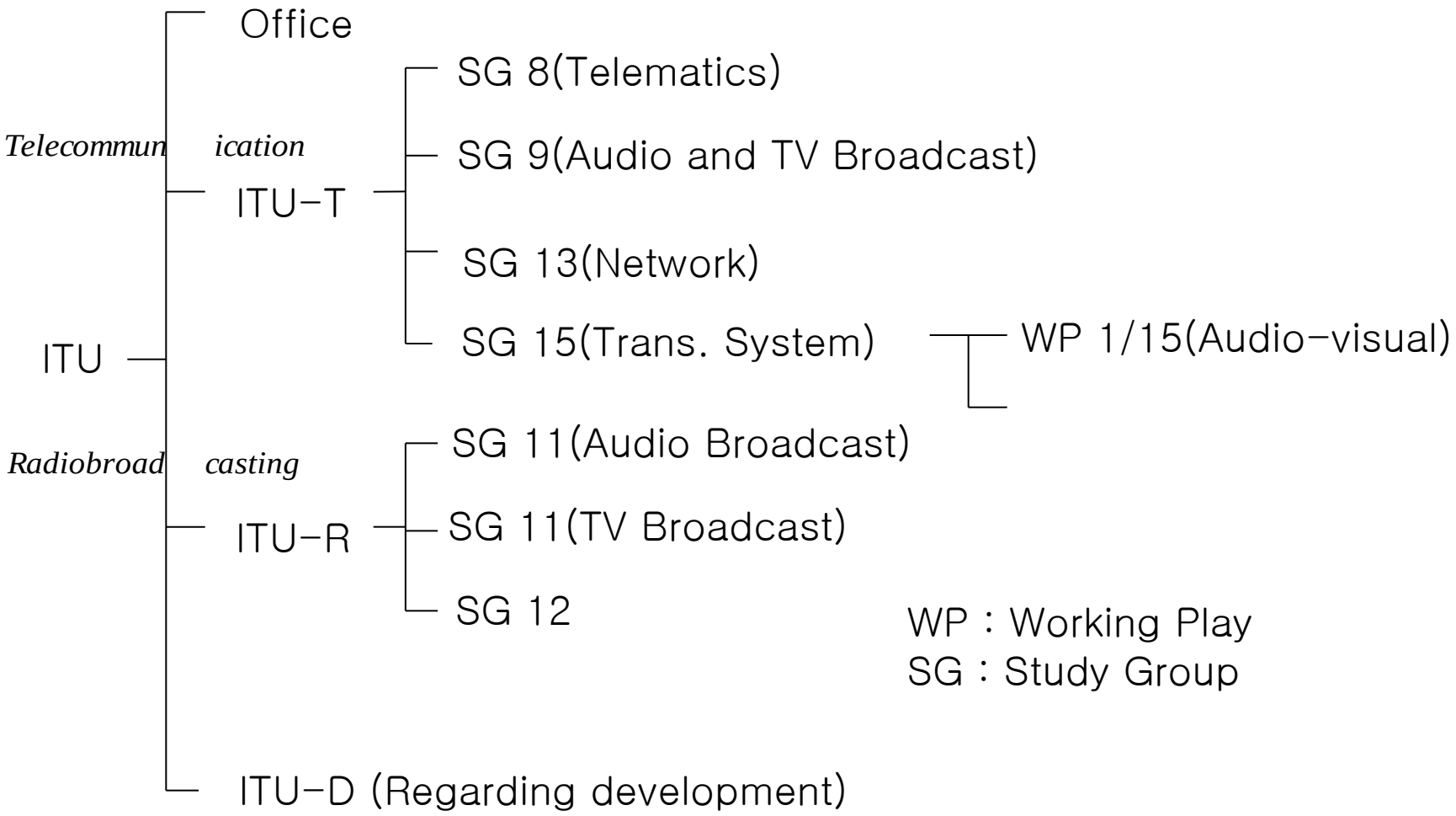
International Standard Organization

- **ITU (International Telecommunication Union)**

  under UN

  - International organization making standard for telecommunication
  - Four sub-divisions and SG
    - Office, ITU-R, ITU-T, ITU-D
    - SG (Study Group) exists under sub-divisions

ITU Organization



ISO (International Standard Organization)

- Non-profit committee in 1946; members are ANSI(USA)

  BSI (England), AFNOR (France), DIN (German)

- ISO → About 200 TC (Technical Committee) →

  SC (Sub Committee) → WG (Working Group)

IEC (International Eletrotechnical Commission)

- Make standard about electric equipment

Useful Standard for multimedia

- **ISO/IEC JTC 1** (Joint Technical Committee)
  - Standard for multimedia coding/decoding
    - SC29 – WG1 : JPEG and JBIG (image)
    - SC29 – WG11 : MPEG (Audio and Video)
    - SC29 – WG12 : MHEG
- **IAB (Internet Architecture Board)**
  - Standard regarding internet technology
  - Standard document is called RFC (Request For Comments)
  - Subcommittee - IRTF, IETF

W3C

- World Wide Web Consortium
- Maintaining and developing WWW technology
- Three main goals of W3C are to provide
  - Universal access of web resources (by everyone every-where)
  - Effectiveness of navigating available information
  - Responsible use of posted material
- IETF (Internet Engineering Task Force)
  - Standardizes the WWW technologies

Homework #1

- Read textbook Chap 1.
- Summarize international standard for
  - MPEG audio and video standard (MPEG1,2,4, ...)
  - The purpose of each standard and applications

- Book
  - Follow DSP book format