



MULTIMEDIA IN EDUCATION

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Unit I: Introduction to Multimedia (4)

1.1 Definition and scope

The word **multi** and **media** are combined to form the word **multimedia**. The word “**multi**” signifies “**many**.” **Multimedia** is a type of medium that allows information to be easily transferred from one location to another.

Multimedia is the presentation of **text**, **pictures**, **audio**, and **video** with links and tools that allow the user to navigate, engage, create, and communicate using a computer. Multimedia refers to the computer-assisted integration of text, drawings, still and moving images(videos) graphics, audio, animation, and any other media in which any type of information can be expressed, stored, communicated, and processed digitally.

1.2 Categories of Multimedia

1. Linear Multimedia

It is also called non-interactive multimedia. In the case of linear multimedia, the end-user cannot control the content of the application. It has literally no interactivity of any kind. Some multimedia projects like movies in which material is thrown in a linear fashion from beginning to end. A linear multimedia application lacks all the features with the help of which, a user can interact with the application such as the **ability to choose different options, click on icons, control the flow of the media, or change the pace at which the media is displayed**. Linear multimedia works very well for providing information to a large group of people such as at training sessions, seminars, workplace meetings, etc.

2. Non-Linear Multimedia

In Non-Linear multimedia, the end-user is allowed the navigational control to rove through multimedia content at his own desire. The user can control the access of the application. Non-linear offers user interactivity to control the movement of data. For example, computer games, websites, self-paced computer-based training packages, etc.

1.3 Applications of Multimedia

1. Education

In the subject of education, multimedia is becoming increasingly popular. It is often used to produce study materials for pupils and to ensure that they have a thorough comprehension of various disciplines. Edutainment, which combines education and entertainment, has become highly popular in recent years. This system gives learning in the form of enjoyment to the user.

2. Entertainment

The usage of multimedia in films creates a unique auditory and video impression. Today, multimedia has completely transformed the art of filmmaking around the world. Multimedia is the only way to achieve difficult effects and actions. The entertainment sector makes extensive use of multimedia. It's particularly useful for creating special effects in films and video games. The most visible illustration of the emergence of multimedia in entertainment is music and video apps. Interactive games become possible

thanks to the use of multimedia in the gaming business. Video games are more interesting because of the integrated audio and visual effects.

3. Business

Marketing, advertising, product demos, presentation, training, networked communication, etc. are applications of multimedia that are helpful in many businesses. The audience can quickly understand an idea when multimedia presentations are used. It gives a simple and effective technique to attract visitors' attention and effectively conveys information about numerous products. It's also utilized to encourage clients to buy things in business marketing.

4. Technology & Science

In the sphere of science and technology, multimedia has a wide range of applications. It can communicate audio, films, and other multimedia documents in a variety of formats. Only multimedia can make live broadcasting from one location to another possible. It is beneficial to surgeons because they can rehearse intricate procedures such as brain removal and reconstructive surgery using images made from imaging scans of the human body. Plans can be produced more efficiently to cut expenses and problems.

5. Fine Arts

Multimedia artists work in the fine arts, combining approaches employing many media and incorporating viewer involvement in some form. For example, a variety of digital mediums can be used to combine movies and operas. Digital artist is a new word for these types of artists. Digital painters make digital paintings, matte paintings, and vector graphics of many varieties using computer applications.

6. Engineering

Multimedia is frequently used by software engineers in computer simulations for military or industrial training. It's also used for software interfaces created by creative experts and software engineers in partnership. Only multimedia is used to perform all the minute calculations.

1.4 Components of Multimedia

Multimedia consists of the following 5 components:

1. Text

Characters are used to form words, phrases, and paragraphs in the text. Text appears in all multimedia creations of some kind. The text can be in a variety of fonts and sizes to match the multimedia software's professional presentation. Text in multimedia systems can communicate specific information or serve as a supplement to the information provided by the other media.

2. Graphics

Non-text information, such as a sketch, chart, or photograph, is represented digitally. Graphics add to the appeal of the multimedia application. In many circumstances, people dislike reading big amounts of material on computers. As a result, pictures are more frequently used than words to clarify concepts, offer background information, and so on. Graphics are at the heart of any multimedia presentation. The use of visuals in multimedia enhances the effectiveness and

presentation of the concept. Windows Picture, Internet Explorer, and other similar programs are often used to see visuals. Adobe Photoshop is a popular graphics editing program that allows you to effortlessly change graphics and make them more effective and appealing.

3. Animations

A sequence of still photographs is being flipped through. It's a set of visuals that give the impression of movement. Animation is the process of making a still image appear to move. A presentation can also be made lighter and more appealing by using animation. In multimedia applications, the animation is quite popular. The following are some of the most regularly used animation viewing programs: Fax Viewer, Internet Explorer, etc.

4. Video

Photographic images that appear to be in full motion and are played back at speeds of 15 to 30 frames per second. The term video refers to a moving image that is accompanied by sound, such as a television picture. Of course, text can be included in videos, either as captioning for spoken words or as text embedded in an image, as in a slide presentation. The following programs are widely used to view videos: Real Player, Window Media Player, etc.

5. Audio

Any sound, whether it's music, conversation, or something else. Sound is the most serious aspect of multimedia, delivering the joy of music, special effects, and other forms of entertainment. Decibels are a unit of measurement for volume and sound pressure level. Audio files are used as part of the application context as well as to enhance interaction. Audio files must occasionally be distributed using plug-in media players when they appear within online applications and webpages. MP3, WMA, Wave, MIDI, and RealAudio are examples of audio formats. The following programs are widely used to view videos: Real Player, Window Media Player, etc.

1.5 Multimedia authoring tools

Multimedia authoring is a process of assembling different types of media contents like text, audio, image, animations and video as a single stream of information with the help of various software tools available in the market. Multimedia authoring tools give an integrated environment for joining together the different elements of a multimedia production. It gives the framework for organizing and editing the components of a multimedia project. It enables the developer to create interactive presentation by combining text, audio, video, graphics and animation.

Features of Authoring Tools

- Editing and organizing features.
- Programming features.
- Interactivity features.
- Performance tuning and playback features.
- Delivery, cross-platform, and Internet playability features.

Authoring Tools Classification

1. Card or Page based authoring tools

In these authoring systems, elements are organized as pages of a book or a stack of cards. In the book or stack there are thousands of pages or cards available. These tools are best used when the bulk of your content consists of elements that can be viewed individually, for example the pages of a book or file cards in card file. You can jump from page to page because all pages can be interrelated. In the authoring system you can organize pages or cards in the sequences manner. Every page of the book may contain many media elements like sounds, videos and animations.

One page may have a hyperlink to another page that comes at a much later stage and by clicking on the same you might have effectively skipped several pages in between. Some examples of card or page tools are:

- HyperCard (Mac)
- Tool book (Windows)
- PowerPoint (Windows)
- Supercard (Mac)

Advantages

Following are the advantages of card based authoring tools.

- Easy to understand.
- One screen is equal to 1card or 1page.
- Easy to use as these tools provide template.
- Short development time.

Disadvantages

Following are the disadvantages of card based authoring tools.

- Some run only on one platform.
- Tools not as powerful as equivalent stand alone.

2. Icon based or Event driven authoring tools

Icon-based tools give a visual programming approach to organizing and presenting multimedia. First you build a structure or flowchart of events, tasks and decisions by dragging appropriate icons from a library. Each icon does a specific task, for example- plays a sound, open an image etc. The flowchart graphically displays the project's logic. When the structure is built you can add your content text, graphics, animation, video movies and sounds. A nontechnical multimedia author can also build sophisticated applications without scripting using icon based authoring tools. Some examples of icon-based tools are:

- Authorware Professional (Mac/Windows)

- Icon Author (Windows)

Advantages:

Following are the advantages of icon/event based authoring tools.

- Clear Structure.
- Easy editing and updating

Disadvantages:

Following are the disadvantages of icon/event based authoring tools.

- Difficult to learn.
- Expensive.

3. Time based authoring tools

Time based authoring tools allow the designer to arrange various elements and events of the multimedia project along a well-defined time line. By time line, we simply mean the passage of time. As the time advances from starting point of the project, the events begin to occur, one after another. The events may include media files playback as well as transition from one portion of the project to another. The speed at which these transitions occur can also be accurately controlled. These tools are best to use for those projects, wherein the information flow can be directed from beginning to end much like the movies. Some examples of Time-based tools are:

- Macromedia's Director
- Macromedia Flash

Advantages

Following are the advantages of time-based authoring tools.

- Good for creating animation.
- Branching, user control, interactivity facilities.

Disadvantages

Following are the disadvantages of time-based authoring tools.

- Expensive
- Large file size
- Steep learning curve to understand various features.

4. Object-Oriented authoring tools:

Object oriented authoring tools support environment based on object. Each object has the following two characteristics:

1. **State or Attributes** - The state or attributes refers to the built-in characteristics of an object. For example, a color T.V has the following attributes:

- Color receiver
 - Volume control
 - Picture control
 - 128 channels
 - Remote control unit
2. **Behavior or Operations** - The behavior or operations of an object refers to its action. For example, a T.V can behave in any of the following manner at a given point of time:
- Switched on
 - Switched off
 - Displays picture and sound from
 - A TV cable connection
 - A TV transmitter
 - A DVD
 - A VCR

In these systems, multimedia elements events are often treated as objects that live in a hierarchical order of parent and child relationships. These objects use messages passed among them to do things according to the properties assigned to them. For example, a video object will likely have a duration property i.e. how long the video plays and a source property that is the location of the video file. This video object will likely accept commands from the system such as play and stop. Some examples of the object-oriented tools are:

- mTropolis (Mac/Windows)
- Apple Media Tool (Mac/Windows)
- Media Forge (Windows)

5. Web Page Authoring Tools

- Allows users of all skill levels to create Web pages.
- Some application software programs include Web page authoring programs.
- Adobe Dreamweaver allow to create web pages without learning the underlying HTML.
- Software: Adobe Dreamweaver, Front page

1.6 Digital media formats and standards

Introduction

Digital media formats are the building blocks of any digitization project. These formats define how media files are stored, accessed, and preserved, playing a crucial role in maintaining the

quality and accessibility of digital content over time. With numerous formats available, it is essential to understand their purposes and characteristics to select the right one for your needs. This guide will provide an in-depth look at digital media formats and standards, helping you make informed decisions in your digitization projects.

Types of Digital Media Files

Digital media files come in various formats, each designed for specific purposes. The choice of format depends on the intended use, whether it's for high-quality preservation, easy access, or efficient distribution. Understanding the different types of digital media files is essential for ensuring that your digitization project meets its goals.

1. Preservation Files

- **Purpose:** Preservation files are high-quality digital copies of original analog media. They serve as faithful representations of the original content, with minimal or no alterations. These files are intended for long-term storage and are typically not accessed frequently.
- **Key Qualities:**
 - **Detail Retention:** The format must capture and retain all the details during digitization.
 - **Openness:** The format should be open, meaning it doesn't require the purchase of proprietary software to access.
 - **Stability:** The format should be widely supported and unlikely to become obsolete quickly.

2. Primary Access Files

- **Purpose:** These files are high-quality copies of preservation files, intended for use by researchers or other authorized users. They may be edited to improve clarity or to remove sensitive information.
- **Key Qualities:**
 - **Detail Retention:** Enough detail should be retained from the preservation file to allow for the creation of access copies as needed.
 - **Openness:** Ideally, the format should be open, but it could be proprietary if the benefits justify it.
 - **Stability:** The format should be reasonably stable, with regular evaluations to ensure it remains usable over time.

3. Access Copies

- **Purpose:** Access copies are derived from primary access files and are created at varying quality levels to accommodate different distribution methods, such as email, USB drives, or online downloads.
- **Key Qualities:**

- **Good Representation:** The format should maintain a good representation of the primary access file at the desired file size and quality.
- **Openness:** The format should generally be open and not require special software to play.

4. Subclips

- **Purpose:** Subclips are smaller media files containing portions of the content from preservation or access files. They are typically created on request and can be ephemeral or managed within a digital media collection.
- **Key Qualities:** Subclips can be created in any format that serves their intended use.

Properties of Media Files

Media files consist of two main components: metadata and audiovisual streams. The structure of these files is determined by the media “container” or “wrapper,” which is often indicated by the file extension (e.g., WAV, AVI, MOV).

1. Container/Wrapper

- **Definition:** The container, or wrapper, refers to the structure of a digital media file. It holds specific information about the media and the digital data itself.
- **Open vs. Proprietary:** Containers can be open (free and well-documented) or proprietary (owned by private interests). Open containers ensure that you can always play and convert the media files, while proprietary containers may require costly licenses to access.
- **Codec Support:** Containers support specific codecs, which determine how audio and video information is recorded. Codecs can store data in either uncompressed or compressed formats.

2. Codec

- **Uncompressed:** Uncompressed media files retain all the original information, providing the highest quality but requiring significant storage space.
- **Lossless Compression:** Some codecs use lossless compression to reduce file size without sacrificing quality. However, these files often require more processing power to play back and may not be widely supported by common editing programs.
- **Lossy Compression:** Widely used codecs often employ lossy compression, which reduces file size by sacrificing some quality, depending on the needs of the end-user.

Preservation and Primary Access File Formats

Choosing the right file formats for preservation and primary access is crucial for any digitization project. These formats should be selected based on the specific needs of your organization.

1. Audio Preservation File

- **Recommended Format:** Broadcast WAV (BWF) – an uncompressed, high-quality audio format that preserves all the details captured during digitization.
- **Key Features:**
 - **Container:** Broadcast WAV
 - **Codec:** Microsoft uncompressed audio codec
 - **Sampling Rate:** 24-bit, 96 kHz (or 48 kHz minimum)
 - **File Size Limit:** 4 GB (RF64 version for files exceeding 4 GB)

2. Audio Primary Access File

- **Recommended Format:** Broadcast WAV (BWF) – similar to the preservation file but possibly with a lower sampling rate (24-bit, 48 kHz) to reduce file size.

3. Audio Access Copy

- **Recommended Formats:** WAV or MP3 – WAV files maintain high quality, while MP3 files are smaller and more suitable for quick transfer or online distribution.

4. Video Preservation File

- **Recommended Format:** .avi or .mov with an uncompressed V210 codec – these formats are stable, well-documented, and widely adopted, making them suitable for long-term preservation.

5. Video Primary Access File

- **Recommended Format:** .mp4 with an H.264 codec – a widely supported format that balances high quality with manageable file size, ideal for regular access and distribution.

6. Video Access File

- **Recommended Format:** .mp4 with an H.264 codec – similar to the primary access file, suitable for streaming and sharing.

Sustainability and Risk

When selecting digital media formats for preservation, it's essential to consider several factors:

1. **Cost:** Some formats require licenses or expensive software. Consider whether the cost is justifiable for your organization, especially when upgrading or updating computer systems.

2. **Complexity:** Some formats, while suitable for preservation, may not be supported by common editing programs. Ensure that you have the necessary tools to work with your chosen formats efficiently.
3. **Risk:** Proprietary formats carry the risk of becoming inaccessible if the owning company goes out of business or raises licensing fees. Open formats are generally safer for long-term preservation.

Recommended Digital Video Tape Formats

For capturing video from NTSC digital videotapes like MiniDV or Digital8, consider the following formats:

1. **Digital Video Preservation File**
 - **Recommended Format:** .mov or .avi with a DV25 codec – maintains the original quality of the video with well-documented wrappers.
2. **Digital Video Access File**
 - **Recommended Format:** .mp4 with an H.264 codec – widely supported, suitable for streaming and easy sharing.

1.7 Current trends in multimedia

The ever-evolving landscape of multimedia is on the brink of a revolutionary transformation as we approach 2024. With technological advancements and creative innovations at the forefront, the industry is poised to redefine the way we consume and interact with content. In this blog, we will dive into the emerging trends that are set to shape the future of multimedia, offering audiences a glimpse into the exciting possibilities that lie ahead.

1. Spatial Computing: Redefining Interaction

- The future of multimedia is spatial. Spatial computing, which merges physical and digital spaces seamlessly, is gaining momentum. Explore how this trend is transforming user interaction, from virtual try-on experiences in e-commerce to immersive educational simulations.

2. Generative Media: Where AI Meets Creativity

- Artificial intelligence takes center stage in the creation process with generative media. Delve into how AI algorithms are becoming co-creators, generating dynamic and personalized content. Witness the impact of AI in fields like personalized content recommendations, music composition, and even scriptwriting.

3. Extended Reality (XR): Bridging the Physical and Virtual Worlds

- Extended Reality, an umbrella term encompassing AR, VR, and MR, is pushing the boundaries of immersive experiences. Explore how XR is reshaping storytelling, gaming, and education by blending digital and physical realities, providing users with captivating and interactive environments.

4. Holographic Experiences: Bringing Fiction to Reality

- The once-fantastical notion of holograms is becoming a reality. Uncover how holographic experiences are entering the mainstream, from virtual concerts that feel lifelike to holographic displays in retail. Witness how this technology is turning fiction into a tangible, awe-inspiring reality.

5. Blockchain in Multimedia: Ensuring Transparency and Security

- Blockchain technology is ushering in a new era of transparency and security in multimedia. Explore its impact on ensuring fair compensation for creators, eliminating issues of copyright infringement, and enhancing the overall integrity of digital content distribution.

6. Emotional AI: Enhancing User Connection

- The future of multimedia is emotionally intelligent. Dive into the realm of Emotional AI, where machines can interpret and respond to human emotions. Discover how this technology is creating more empathetic user experiences, from personalized advertising to emotionally responsive virtual assistants.

7. Biometric Integration: Personalizing User Experiences

- Biometric integration is becoming a staple in multimedia, enhancing personalization and security. Explore how biometrics, from facial recognition to fingerprint scanning, are shaping user interfaces, content recommendations, and even personalized gaming experiences.

8. Sustainable Media Production: Eco-Friendly Creativity

- Sustainability takes center stage in multimedia production. Investigate how the industry is embracing eco-friendly practices, from green filmmaking techniques to carbon-neutral streaming platforms. Witness how creators are aligning their artistic endeavors with environmental responsibility.

9. Immersive Journalism: Beyond the Headlines

- Journalism is embracing immersive technologies to bring news stories to life. Explore how immersive journalism, utilizing VR and AR, transports audiences directly to the heart of news events. Witness the potential impact on audience engagement and empathy in understanding complex global issues.

10. Virtual Production Studios: Redefining Filmmaking

- Traditional filmmaking is undergoing a radical transformation with the advent of virtual production studios. Delve into how filmmakers are using virtual environments, real-time rendering, and digital sets to revolutionize the filmmaking process, offering unprecedented creative freedom and cost-efficiency.

11. Multi-Sensory Experiences: Engaging All Senses

- Multimedia is evolving beyond visual and auditory realms. Uncover the rise of multi-sensory experiences that engage touch, taste, and smell. Explore innovations like haptic

feedback in gaming, virtual dining experiences, and scent-infused storytelling, enriching content consumption in unprecedented ways.

12. Personal AI Assistants for Content Curation: Your Creative Sidekick

- Personal AI assistants are becoming integral to content creation and curation. Explore how AI-driven tools are assisting creators in ideation, suggesting content strategies, and even helping in the editing process. Witness the synergy between human creativity and machine intelligence.

13. 5G Revolution: Unleashing High-Speed Connectivity

- The rollout of 5G technology is set to revolutionize multimedia experiences. Explore how ultra-fast connectivity will impact live streaming, AR/VR applications, and real-time collaborative content creation. Witness the potential for seamless, high-quality multimedia experiences on a global scale.

14. Gamification of Educational Content: Learning Through Play

- Education is embracing gamification as a powerful tool for engagement. Delve into how multimedia is transforming educational content into interactive games, making learning more enjoyable and effective. Witness the fusion of entertainment and education for learners of all ages.

15. Personalized Cinematic Experiences: Tailored for You

- Cinematic experiences are becoming increasingly personalized. Explore how AI algorithms analyze individual preferences to curate unique film and TV show recommendations. Witness the potential for hyper-personalized content, making every viewing experience a tailor-made adventure.

Unit II: Capture and Manipulate Image (6)

2.1 Basics of Digital Photography

Photography is the process of capturing light with a camera in order to create an image.

Photography is the art of capturing light with a camera, usually via a digital sensor or film, to create an image. With the right camera equipment, you can even photograph wavelengths of light invisible to the human eye, including UV, infrared, and radio.

2.1.1 Digital Photography Basics

What is digital photography? Simply put, photography is the process of capturing images focused through a lens to be stored electronically on a computer for further image enhancement. Unlike film photography, which the photographer develops in a dark room, digital photographs develop instantly into a digital computer file (.RAW, .JPG, or both). Before you begin snapping pictures for your image slideshow, it's important to think about how you will compose your shots using the basic principles of photography: exposure triangle, white balance, focal length, and image composition.

Exposure Triangle

The exposure triangle is comprised of three variables: ISO, aperture, and shutter speed. Each plays a significant role in how much, how long, and how intense light passes through the image sensor.

Note: Consult with the DSLR camera instruction manual to learn its capabilities because image sizes vary based on camera type and brand. The general rule for an image sensor is the larger the size, the better the image.

1. ISO

ISO is the light sensitivity to a camera's digital image sensor. ISO can be set to high or low values at 100, 200, 400, 800, and 1600. Newer DSLR camera models with larger image sensors have been able to set ISO values as high as 3200 or 6400, and still produce good quality images. But, Beware! The general rule is the lower the ISO, the sharper the image, and the higher the ISO, the noisier the image.



Unit II: Capture and Manipulate Image (6)

A low ISO value is ideal for outdoor shooting where natural light is present. In outdoor settings, less sensitivity is needed to light the subject. The result is sharp images with no noise. On the contrary, a High ISO is ideal for indoor shooting where artificial light or very little light is available in the area.

Setting the ISO value to a high number makes the image sensor more sensitive to light, but may produce noise in overexposed settings.

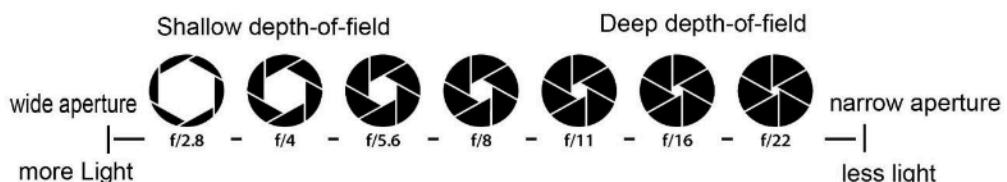
Simplified

LOW ISO = LESS LIGHT SHARPER IMAGE HIGH ISO = MORE LIGHT NOISIER IMAGE

2. APERTURE

Aperture is the size of the opening in a camera lens through which light travels to the image sensor. The opening is characterized as F-stops. As a general rule, the smaller the F-stop number, the larger the opening and the shallower the depth of field.

APERTURE SCALE



Depth of field demonstrates how much the subject is in focus. In images with shallow depth of field, the point of focus is sharp, and the foreground or background is blurred. As illustrated above, low f-stops produce a shallow depth of field and high f-stops, narrow depth of field.



Image Credit: Eve Ellis, SMDC

Unit II: Capture and Manipulate Image (6)

As shown in the image above, the first image used a low f-stop number, which produced a blurred background with a sharp point of focus. The opposite image used a high f-stop, which created an image with a deep depth of field. As you will see in the second image, more of the area around the point of focus is in focus with little to no background blur.

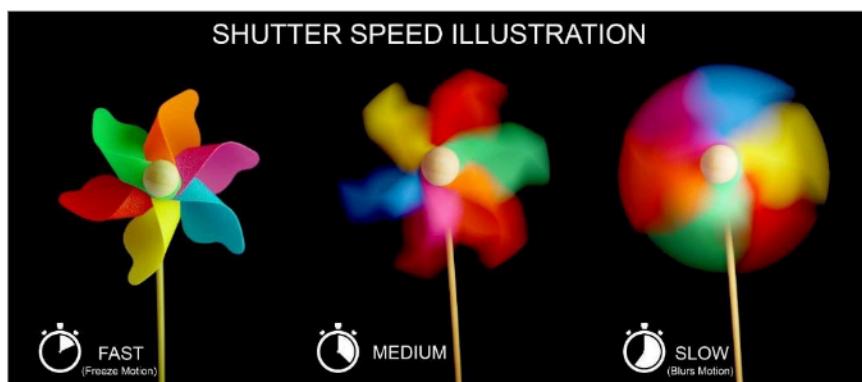
Simplified - How aperture works

LOW F-STOP = More light/shallow depth of field
(little to no background blur)

HIGH F-STOP = Less light/deep depth of field (background blur)

3. SHUTTER SPEED

Shutter speed is measured in seconds as the amount of time your shutter is open. The settings range between 1/1000th(fast) - 1/2(slow) of a second. Photographers use faster shutter speeds to capture fast action like sports and moving objects. Fast shutter speed settings freeze motion, whereas slower shutter speeds capture motion blur.



The focal length of the camera lens affects shutter speed settings. As a rule of thumb, for sharper images, the focal length that one uses should either match or exceed the shutter speed. For example, if you are using a 50mm lens, the shutter speed should be no less than 1/50th of a second. Consider this rule as a starting point for shutter speed settings. Depending on how fast the subject is moving, the shutter speed may need to be set at a faster rate.

Simplified

FAST SHUTTER SPEED = LESS MOTION BLUR (Sharp Images)

SLOW SHUTTER SPEED = MORE MOTION BLUR

EXPOSURE TRIANGLE - APPLICATION

Changing the settings for the ISO, Aperture, and Shutter speed is accomplished in the camera mode. Professional DSLR cameras use several manual modes, the advanced modes that are offered depends significantly on the camera. However, most DSLR cameras share common camera modes.



(P) Program Mode: Automatically set your exposure by choosing the Aperture and shutter speed based on the lighting conditions.

(S) or (TV) Shutter Priority: Photographer can control the shutter speed settings to achieve maximum exposure.

(A) or (AV) Aperture Priority: The photographer controls the aperture settings to achieve maximum exposure.

(M) Manual Mode: Photographer has full control of making adjustments to the ISO, aperture, and shutter speed.

DSLR cameras also come with automatic modes with presets for image exposure: Auto, Action, Portrait, Night portrait, landscape, and macro.

Rule of Thumb (Manual Mode)

- If the image is too dark adjust exposure triangle in the following order: Slow shutter speed, lower aperture, raise ISO
- If the image is too bright, adjust in the following order: lower ISO, raise shutter speed, increase the aperture.

White Balance

In addition to making decisions about the exposure triangle, photographers need to consider white balance. White balance measures the color temperature of the light source via the camera's settings. Auto white balance (a feature present in most DSLR camera configurations) looks at the colors in a frame of view and tries to determine the overall temperature of what the scene is and tell the camera to match those colors to give the image a natural look.

Color temperature is measured in Kelvins (K). Most cameras have the following white balance presets:

Common White Balance Presets

AWB Automatic White Balance

-  Daylight (5600K) - Camera adds warm tones
-  Shade (7000K) - Camera adds warm tones
-  Cloudy (6000K) - Camera adds warm tones
-  Tungsten (3200K) - Camera adds cool tones to indoor lighting
-  Fluorescent (4000K) - Camera adds red/orange tones to offset green tones.
-  Flash (5500K) - Camera adds warm tones
-  Custom White Balance - user set white balance using white card
-  Kelvin - User defines white balance using Kelvin scale

If the colors from the presets do not measure up, you can add a custom white balance by taking a picture of a sheet of white paper or card in the subject area that you plan to shoot in. Photographers can also use the Kelvin scale to create white balance.

Focal Length

The focal length is the optical distance (measured in millimeters) from which light rays converge between the lens to the camera image sensor. The focal length is measured in millimeters (ex., 35mm, 50mm, or 100mm). Zoom lenses state the range (minimum and maximum) of focal length. (ex. 18 – 55mm or 75-300mm).

The focal length of a lens tells the photographer two things:

1. The angle of view is how much of the scene will be captured.
2. Magnification is how large the subject will be within the angle of view.

As described in the previous section (shutter speed), the focal length is also used as a guide for appropriate settings for snapping sharp or creative images with blurred motion.

The field of view depends on the sensor size, which is not one size fits all. Several sensor sizes range from a 35mm full-frame (high-end DSLRs) to 28mm low or midrange sensors. The sensor size matters in photography because it determines how much light is used to create an image and how much area will be covered in the field of view.

Simplified

LONGER FOCAL LENGTH = Narrow angle of view/high magnification)	SHORTER FOCAL LENGTH = Wide angle of view/low magnification.
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Interchangeable cameras lenses offered at the Student Multimedia Design Center for a short-term loan.

	Canon EF-S 60mm F/2.8 Macro USM Lens
	Canon EF 100mm F/2.8 Macro Lens
	Canon EF 75 -300mm F/4.0 - 5.6 Zoom Lens

2.2 Image format and compression

Image Format describes how data related to the image will be stored. Data can be stored in compressed, Uncompressed, or vector format. Each format of the image has a different advantage and disadvantage. Image types such as TIFF are good for printing while JPG or PNG, are best for the web.

- **TIFF (.tif, .tiff):** Tagged Image File Format this format store image data without losing any data. It does not perform any compression on images, and a high-quality image is obtained but the size of the image is also large, which is good for printing, and professional printing.
- **JPEG (.jpg, .jpeg):** Joint Photographic Experts Group is a loss-prone (lossy) format in which data is lost to reduce the size of the image. Due to compression, some data is lost but that loss is very less. It is a very common format and is good for digital cameras, nonprofessional prints, E-Mail, PowerPoint, etc., making it ideal for web use.
- **GIF (.gif):** GIF or Graphics Interchange Format files are used for web graphics. They can be animated and are limited to only 256 colors, which can allow for transparency. GIF files are typically small in size and are portable.
- **PNG (.png):** PNG or Portable Network Graphics files are a lossless image format. It was designed to replace gif format as gif supported 256 colors unlike PNG which support 16 million colors.
- **WebP:** Basically, Google created WebP to replace JPEG as the standard format for images on the web by shrinking image files to expedite the loading of online pages.

Also, WebP employs a RIFF-based container which is based on the intra-frame coding of VP8.

- **HEIF (High Efficiency Image File Format):** A High Efficiency Image File Format or HEIF is an image container format which was standardized by MPEG on the basis of the ISO base media file format to solve some problems. The HEIF standard specifies the storage of HEVC intra-coded images and HEVC-coded image sequences that make use of inter-picture prediction, even though HEIF can be used with any image compression method as per requirement.
- **AVIF (AV1 Image File Format):** In order to benefit from contemporary compression algorithms and an entirely royalty-free image format, the video consortium Alliance for Open Media (AO Media), which created the video format Av1, standardized the AV1 Image File Format (AVIF) to process the needful technology. It employs the AVIF-coded picture format and also suggests utilizing the HEIF container.
- **Bitmap (.bmp)** Bit Map Image file is developed by Microsoft for windows. It is same as TIFF due to lossless, no compression property. Due to BMP being a proprietary format, it is generally recommended to use TIFF files.
- **EPS (.eps)** Encapsulated PostScript file is a common vector file type. EPS files can be opened in applications such as Adobe Illustrator or CorelDRAW.
- **RAW Image Files (.raw, .cr2, .nef, .orf, .sr2)** These Files are unprocessed and created by a camera or scanner. Many digital SLR cameras can shoot in RAW, whether it be a .raw, .cr2, or .nef. These images are the equivalent of a digital negative, meaning that they hold a lot of image information. These images need to be processed in an editor such as Adobe Photoshop or Lightroom. It saves metadata and is used for photography.

What is image compression?

Image compression is a process applied to a graphics file to minimize its size in bytes without degrading image quality below an acceptable threshold. By reducing the file size, more images can be stored in a given amount of disk or memory space. The image also requires less bandwidth when being transmitted over the internet or downloaded from a webpage, reducing network congestion and speeding up content delivery.

What are the two types of image compression?

1. Lossy Compression

Lossy compression reduces an image's file size by permanently eliminating some of the less critical information, particularly redundant data. The key advantage of lossy compression is that it can significantly reduce file size, making it ideal for applications like web usage where smaller file sizes are necessary for faster loading times.

However, this reduction in file size comes at the cost of image quality. The more aggressively an image is compressed using a lossy method, the more data is discarded, potentially leading

to visible artifacts or distortions. Once lossy compression is applied, the original quality cannot be restored, as the discarded data is permanently removed.

JPEG (Joint Photographic Experts Group) is the most common example of a lossy compression format. Widely used in digital photography and online, JPEG allows for adjustable compression levels, letting users balance between file size and image quality. A moderately compressed JPEG image may show minimal quality loss, but if compression is too high, noticeable degradation can occur.

Use Cases for Lossy Compression:

- **Web images:** Faster load times are crucial, and moderate quality loss is often acceptable.
- **Digital photography:** Where storage space is limited, and small quality loss is tolerable.

2. Lossless Compression

Lossless compression retains all the original data from the image, ensuring that no quality is lost during compression. This means that the image can be restored to its exact original state if needed. While this method is beneficial for preserving image quality, it typically does not reduce file size as much as lossy compression.

Lossless compression is used when image quality is paramount, such as in archival situations or professional settings where even a slight loss of detail is unacceptable.

PNG (Portable Network Graphics) is a widely used lossless format. PNG files are larger than JPEGs but are preferred for images requiring transparency or higher levels of detail, such as logos, icons, or screenshots. **BMP (Bitmap)** and **GIF (Graphics Interchange Format)** are other examples of lossless formats, although GIF is often confused with lossy compression due to its color limitations (restricted to 256 colors).

Use Cases for Lossless Compression:

- **Archival storage:** When preserving the original image quality is crucial.
- **Professional graphics and logos:** Where transparency and high detail are necessary.

3. WebP: A Hybrid Approach

Google's **WebP** format is an example of an innovative image format that supports both lossy and lossless compression. This versatility allows WebP to offer high-quality images with reduced file sizes, making it an increasingly popular choice for web use. WebP's ability to compress images more efficiently than traditional formats like JPEG and PNG while maintaining comparable quality has led to its adoption across major browsers and platforms.

2.3 Removing Unwanted Objects

2.4 Fixing Lighting Issues with Adjustments

2.5 Working with Layers

2.6 Exploring Filters

2.7 Adding Text to an Image

Practical Tasks:

- Remove unwanted objects from an image.
- Improve image quality by adjusting lighting issues
- Work with multiple layers to create a composite image
- Apply and explore various filters to enhance an image
- Add and style text within an image

Unit III: Audio Recording and Editing (12)

3.1 Concept of audio

Audio is sound that is within the acoustic range of human hearing. It is the audible portion on the spectrum of sound frequencies, distinct from inaudible sounds heard by certain animals or used in science and medicine. An elephant, for example, can hear sounds at lower frequencies than humans, and porpoises can hear sounds at higher frequencies. In both cases, they hear sounds that fall outside the range of human hearing.

Sound is a form of mechanical energy that travels in waves through air and other substances. It is measured in hertz (Hz), with one Hz equal to one full wave cycle per second. Humans can hear only a portion of the full spectrum of sound frequencies. The audio portion is typically between 20 to 20,000 Hz, but aging and hearing damage can shorten this range.

How is an audio file created?

To record a voice or music played outside a computer, an audio file is created using a microphone to record the sound it detects. The sound is converted to a digital signal the computer uses to create the audio file. Audio files can also be created using software running on a computer. For example, a person could use an audio program, like Audacity, to record the sound played in a video file.

3.2 Audio file format

Audio format defines the quality and loss of audio data. Based on application different type of audio format is used. Audio formats are broadly divided into three parts:

1. Uncompressed Format
2. Lossy Compressed format
3. Lossless Compressed Format

1. Uncompressed Audio Format:

- **PCM** – It stands for Pulse-Code Modulation. It represents raw analog audio signals in digital form. To convert analog signal into digital signal it has to be recorded at a particular interval. Hence it has sampling rate and bit rate (bits used to represent each sample). It is an exact representation of the analog sound and do not involve compression. It is the most common audio format used in CDs and DVDs
- **WAV** – It stands for Waveform Audio File Format; it was developed by Microsoft and IBM in 1991. It is just a Windows container for audio formats. That means that a WAV file can

contain compressed audio. Most WAV files contain uncompressed audio in PCM format. It is just a wrapper. It is compatible with both Windows and Mac.

- **AIFF**

It stands for Audio Interchange File Format. It was developed by Apple for Mac systems in 1988. Like WAV files, AIFF files can contain multiple kinds of audio. It contains uncompressed audio in PCM format. It is just a wrapper for the PCM encoding. It is compatible with both Windows and Mac.

3. Lossy Compressed Format:

It is a form of compression that loses data during the compression process. But difference in quality no noticeable to hear.

- **MP3**

It stands for MPEG-1 Audio Layer 3. It was released in 1993 and became popular. It is most popular audio format for music files. Main aim of MP3 is to remove all those sounds which not hearable or less noticeable by humans' ears. Hence making size of music file small. MP3 is like universal format which is compatible almost every device.

- **AAC**

It stands for Advanced Audio Coding. It was developed in 1997 after MP3. The compression algorithm used by AAC is much more complex and advanced than MP3, so when compared a particular audio file in MP3 and AAC formats at the same bitrate, the AAC one will generally have better sound quality. It is the standard audio compression method used by YouTube, Android, iOS, iTunes, and PlayStations.

- **WMA**

It stands for Windows Media Audio. It was released in 1999. It was designed to remove some of the flaws of MP3 compression method. In terms of quality, it is better than MP3. But is not widely used.

4. Lossless compression:

This method reduces file size without any loss in quality. But is not as good as lossy compression as the size of file compressed to lossy compression is 2 and 3 times more.

- **FLAC**

It stands for Free Lossless Audio Codec. It can compress a source file by up to 50% without losing data. It is most popular in its category and is open-source.

- **ALAC**

It stands for Apple Lossless Audio Codec. It was launched in 2004 and became free after 2011. It was developed by Apple.

3.3 Recording and Editing Audio

3.4 Track Management: Labeling Tracks, Adding Tracks

3.5 Audio Enhancement: Noise Reduction and Normalization, Adjusting Audio Speed

3.6 Metadata and Exporting: Adding Metadata, Exporting Audio

3.7 Live Recording on social media Practical Tasks:

- Record a short audio clip, perform simple edits, and split the track.
- Manage multiple tracks within a project
- Enhance audio quality using noise reduction, normalization, and speed adjustment.
- Add metadata to a project and export the final audio file
- Record a live session and prepare it for social media sharing

Unit IV: Video Capturing and Editing (4)

4.1 Common Video Format

Whenever a video file is saved it contains two files in it. One is the container and other is codecs. Container defines the structure of the video file and which codecs will be used. Codecs is used to compress and decompress video file. Some of common container format are:

- **Flash Video Format (.flv)** This video format is very popular due to the availability of flash player for cross platform. These video files are supported by almost every browser making suitable for web. This format is compact and support progressive and streaming download. Some users of this format are YouTube, Yahoo! Video, VEVO etc.
- **AVI format (.avi)** Audio Video Interleave which can contain both audio and video data. It was developed by Microsoft. It uses less compression can contain almost any codecs. It is popular among internet user due to multiple codecs support. This means that even if AVI files may look similar on the outside are different from one another on the inside. All windows OS support this format including another player for other platform exist.
- **MP4 (.mp4)** This format is used to store to store audio and video stream online. MP4 file format was created by Moving Picture Experts Group (MPEG) as a multimedia container format store audiovisual data. It used different compression technique for video and audio.
- **3GP (.3gp)** This is both audio and video file format which was designed to transmit data between 3G phones and the internet. It is most commonly used to capture video from the phone and upload it online. Both Windows and Mac support the format.
- **WMV (Windows Media Video)** This format was developed by Microsoft. It was designed for web streaming applications. WMV files are the very small in size over the Web, as their file size decreases after compression, due to which results in poor video quality. But this make it only file format which can be send through e-mail.
- **QuickTime Format (.mov)** This format was developed by Apple. It can store multiple tracks (for different language), text file(subtitle) and effects. MOV files are of high quality and are usually big in file size. It is supported both by Windows and Apple.

Video file format compression

Video compression reduces the amount of data per second in a video file, which can affect the video's quality, file size, compatibility, and functionalities. Here are some video file formats and how they compress video:

1. WebM

A common compressed video format that's often used to deliver videos online. Its compressed technology allows high quality audio and video to play on a webpage without slowing down the server or page load.

2. MP4

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Also known as MPEG-4 Part 14, this is a versatile format that's compatible with many devices and players. It's efficient at compressing video files while maintaining high quality.

3. AVI

This format uses less compression than other formats, which can result in large file sizes of about 2-3 GB per minute of video. It's also possible to create AVI video files without compression, which makes them lossless.

4. WMV

Developed by Microsoft, this format has a high compression ratio and can store large amounts of video and audio data without taking up too much space. It's compatible with Windows Media Player and other Windows-based programs.

5. MOV

Also known as QuickTime Film, this format stores high-quality video, audio, and effects, but the files can be large. It uses MPEG-4 encoding and is supported by Facebook and YouTube.

6. AVCHD

This format uses MPEG-4 AVC/H.264 standards for compression and works with many high definition, stereoscopic video, and formatting settings. It's a good choice for professional video editors and content creators.

7. FLV

Created by Adobe Flash, this format can compress video files without significantly reducing video quality.

4.2 Video recording methods and skills

Videography skills are the combination of photography, editing proficiency, creativity and physical skills that videographers use in their trade. While it can appear as simple as shooting a video on your smartphone, videography involves a complex set of skills in every step of the process, from creative planning, setup, filming, editing and promotion. It's important to develop a foundational videography skill set that you can build upon throughout your career.

Examples of videography skills

Videographers use many skills that mostly fall into five categories. Each category represents a different aspect of videography. Here are some examples of videography skills:

1. Photography skills

The central component of videography is the ability to take a camera and use it to create footage. These photography skills are important for creating raw footage that you can use to develop the final product:

- Framing and shot composition
- Lighting and sound

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- Focus, exposure and angles
- Knowing which equipment to use for various kinds of filming
- Shooting primary footage, background footage and live feed

2. Editing skills

Filming generates the footage, and editing refines it. Videographers, especially those working in small groups or by themselves, take their footage and edit it so it becomes a cohesive story. Editing skills such as these are essential to videographers:

- Understanding post-production techniques
- Proficiency with various editing software
- Editing raw footage
- Adding effects like music, captions, graphics, alt text

3. Creative skills

Videographers take an idea and make it tangible. Often, the creative process involves working with others, whether under someone else's creative direction or with a team to achieve the best result. Videography requires a certain level of creative ability in every setting. Here are some creative abilities that videographers often have:

- Collaborating with others to create the film or video product
- Being able to interpret creative directives
- Knowing what footage to keep and discard
- Telling a cohesive story through film clips

4. Physical skills

Videography can often be a physically demanding profession. Handling equipment, working in filming locations or the studio and working long days are common requirements for videographers. These physical and technical skills are key aspects of videography:

- Dexterity for handling cameras and equipment
- Setting up and taking down equipment
- Maintaining, repairing, calibrating and troubleshooting equipment and gear
- Stamina to withstand long working days
- Being able to move around to achieve the perfect shot
- Ability to work in the studio or on location

5. Soft skills

As much as videographers work with cameras and computers, they also work with people. Whether it's promoting your services or working with others on set, these soft skills are often just as important as the technical ones:

- Marketing, networking and self-promotion
- Multitasking
- Time management
- The ability to work with teams or individually
- Communication
- Sales

Video recording methods

Video recording methods refer to the techniques and technologies used to capture moving images and sound. These methods vary based on the equipment, the recording medium, and the purpose of the recording. Here's an overview of some of the most common video recording methods:

1. Analog Video Recording

Analog video recording was the standard before digital technology became prevalent. In this method, video signals are recorded as continuous electrical signals representing changes in light intensity and color.

- **VHS (Video Home System):** A widely used analog video recording format in the 1980s and 1990s. VHS tapes store video and audio on magnetic tape, with a relatively low resolution compared to modern standards.
- **Betamax:** An analog video format developed by Sony, Betamax offered better quality than VHS but was less popular due to shorter recording times and higher costs.
- **Camcorder (Analog):** Early camcorders used analog tape formats like VHS-C and Video8 to record home videos.

2. Digital Video Recording

Digital video recording converts video and audio signals into digital data, which offers better quality, easier editing, and more efficient storage.

- **DV (Digital Video):** A format that records video digitally onto tape. DV camcorders were popular in the late 1990s and early 2000s, offering improved video quality and easier editing compared to analog formats.
- **HDV (High-Definition Video):** An extension of the DV format that records high-definition video onto digital tape. HDV camcorders provided an entry point to HD recording for consumers and professionals.
- **Digital Camcorders:** Modern camcorders record video digitally onto solid-state media (e.g., SD cards), hard drives, or optical discs. These devices offer high-definition and even 4K resolution recording, along with features like image stabilization and automatic focus.

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4.3 Trimming and Cutting Clips

4.4 Merging Clips

4.5 Adding Text

4.6 Adjusting Brightness and Saturation

4.7 Keyframe Animation

Practical Tasks

- Remove unwanted sections or create shorter segments from video clips
- Combine multiple video clips into a single video
- Overlay text for titles, captions, or subtitles
- Enhance the visual quality of a video by adjusting brightness and saturation.
- Create smooth animations using keyframes
- Enhance the video with background music
- Apply filters and effects to enhance the video's visual appeal.

Unit V: Online Broadcasting (12)

5.1 Concept of live streaming

What is live streaming?

Live streaming is the act of presenting to your audience on video in real-time. In the past, this was limited to media outlets that had the technology to broadcast live to their viewers. But in the past few years, live streaming technology has lit up the internet, and more and more people are creating and consuming that live experience from their homes--no need for an expensive TV studio.

Unlike traditional broadcasting, live streaming also allows for viewers to engage: to comment, like, share, and even get invited into the broadcast. This makes it powerful and personal, and people love the intimate feel of real-time, mistakes and all. In fact, the little mistakes and pauses are part of what makes it special. Unlike a polished, pre-recorded video, live streaming makes it feel like you're that much closer to the host or the audience.

Live streaming benefits

Here are five key benefits of live streaming:

1. **Real-Time Engagement:** Live streaming allows for immediate interaction between the streamer and the audience, enabling real-time feedback, questions, and comments. This enhances viewer engagement and creates a more personal and dynamic experience.
2. **Wider Reach:** Live streaming can reach a global audience instantly, breaking geographical barriers. It allows content creators, businesses, and organizations to connect with viewers worldwide, often with minimal costs compared to traditional broadcasting methods.
3. **Cost-Effective:** Compared to producing pre-recorded video content, live streaming is often more affordable. It requires less post-production work and can be done with basic equipment, making it accessible to individuals and small businesses.
4. **Authenticity and Transparency:** Live streaming provides a more authentic and unfiltered view of the content, which can build trust with the audience. Viewers appreciate the raw, unscripted nature of live content, which can humanize brands and creators.
5. **Instant Monetization Opportunities:** Many live streaming platforms offer monetization options such as ads, viewer donations, and subscriptions. Content creators can generate revenue in real time, making live streaming a viable income source.

Q. How does live streaming work on a technical level?

These are the main steps that take place behind the scenes in a live stream:

- Compression
- Encoding
- Segmentation
- Content delivery network (CDN) distribution
- CDN caching
- Decoding
- Video playback

1. Video capture

Live streaming starts with raw video data: the visual information captured by a camera. Within the computing device to which the camera is attached, this visual information is represented as digital data – in other words, 1s and 0s at the deepest level.

2. Compression and encoding

Next, the segmented video data is compressed and encoded. The data is compressed by removing redundant visual information. For example, if the first frame of the video displays a person talking against a grey background, the grey background does not need to render for any subsequent frames that have the same background.

Think of video compression as being like adding a piece of new furniture to a living room. It is not necessary to buy entirely new furniture each time a new chair or side table is added. Instead, it is possible to keep the room layout roughly the same and change out just one piece at a time, occasionally making larger rearrangements as necessary. Similarly, not every frame of a video stream needs to be rendered in total – just the parts that change from frame to frame, such as the movement of a person's mouth.

"Encoding" refers to the process of converting data into a new format. Live streaming video data is encoded into an interpretable digital format that a wide variety of devices recognize. Common video encoding standards include:

- H.264
- H.265
- VP9
- AV1

3. Segmentation

Video includes a lot of digital information, which is why it takes longer to download a video file than to download a short PDF or an image. Because it would not be practical to send all

the video data out over the Internet at once, streaming video is divided into smaller segments a few seconds in length.

4. CDN distribution and caching

Once the live stream has been segmented, compressed, and encoded (all of which only takes a few seconds), it needs to be made available to the dozens or millions of viewers who want to watch it. In order to maintain high quality with minimal latency while serving the stream to multiple viewers in different locations, a CDN should distribute it.

A CDN is a distributed network of servers that cache and serve content on behalf of an origin server. Using a CDN results in faster performance, because user requests no longer have to travel all the way to the origin server but can instead be handled by a nearby CDN server. Handling requests and delivering content in this manner also reduces the origin server's workload. Finally, CDNs make it possible to efficiently serve content to users around the world because their servers are located all over the world instead of clustered in a single geographic area.

A CDN will also cache – temporarily save – each segment of the live stream, so most viewers will get the live stream from the CDN cache instead of from the origin server. This actually makes the live stream closer to real-time even though the cached data is a few seconds behind, because it cuts down on round-trip time (RTT) to and from the origin server.

5. Decoding and video playback

The CDN sends the live stream out to all the users who are watching the stream. Each user's device receives, decodes, and decompresses the segmented video data. Finally, a media player on the user's device – either a dedicated app or a video player within the browser – interprets the data as visual information, and the video plays.

Live streaming examples

- A Mighty Network host announces a weekly challenge on a live stream every Monday.
- A musician goes live on IGTV or TikTok and hosts a mini-conference for viewers.
- A thought leader interviews someone on LinkedIn live about an upcoming book release.

An example

Suppose Alice starts a live stream on her smartphone and Bob, who lives on the other side of the country, tunes into the live stream on his smartphone, along with a few dozen more of Alice's friends. Alice starts out the live stream by turning the smartphone camera on herself and saying, "Hello, world!" What needs to happen for that "Hello, world" section of video to reach Bob on the other side of the country, along with all the other people watching the stream?

First, Alice's smartphone will encode and compress that little segment of video. If Alice is filming the live stream in her kitchen, her kitchen wall is recorded as the first frame of the video, and subsequent frames will leave it out since the background doesn't change.

Now the app Alice is using will send the encoded, compressed version of her saying "Hello, world" out to the app's CDN. Fortunately for Bob, one of the CDN servers is just a few miles away from his home, so his smartphone's request for the first segment of the live stream is answered almost immediately. Other live stream viewers may experience more or less latency than Bob depending on their geographic location.

Bob's phone decodes the video segment and reconstructs the compressed data, so that Alice's kitchen wall appears in every frame. And finally, only a few seconds after Alice said "Hello, world" in her kitchen on the other side of the country, her face appears on Bob's smartphone and Bob sees and hears her greeting.

5.2 Mobile application and live streaming

1. YouTube

- **Description:** YouTube is one of the largest video-sharing platforms that allows users to live stream content directly from their mobile devices.
- **Benefits:**
 - **Widespread Reach:** With billions of active users, streamers can reach a massive audience.
 - **Monetization Options:** Creators can monetize their streams through ads, Super Chats, and channel memberships.
 - **Built-in Tools:** YouTube provides tools for scheduling, analytics, and audience interaction, such as live chat.
 - **Variety of Content:** Supports various content types, from gaming to tutorials, making it versatile for different audiences.
 - **Community Engagement:** Features like comments and live chats enhance interaction with viewers.

2. Twitch

- **Description:** Twitch is primarily focused on gaming but has expanded to include various categories such as music, art, and talk shows. Users can live stream their gameplay or creative processes.
- **Benefits:**
 - **Interactive Features:** Real-time interaction with viewers through chat and polls enhances community engagement.
 - **Subscription Model:** Streamers can earn money through subscriptions, bits, and ad revenue.
 - **Gaming Community:** A strong, dedicated gaming community encourages interaction and loyalty among viewers.

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- **Customizability:** Streamers can customize their channels with overlays, alerts, and widgets to enhance viewer experience.
- **Networking Opportunities:** Collaborating with other streamers helps grow audiences and communities.

3. Facebook Live

- **Description:** Facebook Live allows users to broadcast live video to their friends, followers, or a specific group on Facebook.
- **Benefits:**
 - **Built-In Audience:** Leveraging existing social networks, users can easily reach their friends and followers.
 - **Engagement Tools:** Live reactions, comments, and shares increase viewer interaction and engagement.
 - **Event Promotion:** Businesses and creators can use live streaming to promote events and drive attendance.
 - **Content Variety:** Supports various types of content, including Q&As, product launches, and behind-the-scenes looks.
 - **Cross-Promotion:** Users can share their live videos on their profiles, pages, or groups to increase visibility.

4. Instagram Live

- **Description:** Instagram Live is a feature within the Instagram app that allows users to broadcast live video to their followers.
- **Benefits:**
 - **Real-Time Interaction:** Viewers can comment and send hearts during the stream, fostering a sense of community.
 - **Stories Integration:** Live streams can be shared on Instagram Stories after the broadcast, extending their reach.
 - **Influencer Engagement:** Ideal for influencers to connect with their audience and showcase products or content in a personal way.
 - **Simplicity:** Easy to use with no additional software required, making it accessible for casual users and businesses alike.
 - **Collaborative Features:** Users can invite other accounts to join their live streams, creating dynamic content and collaborations.

5. Zoom

- **Description:** While primarily known for video conferencing, Zoom also allows for live streaming to platforms like Facebook Live and YouTube.
- **Benefits:**

- **Professional Use:** Great for webinars, online classes, and virtual events, allowing for professional-grade live streaming.
- **Screen Sharing:** Streamers can share their screens for presentations, making it ideal for educational content and meetings.
- **Participant Interaction:** Attendees can interact through chat, Q&A sessions, and polls during the live stream.
- **Recording Features:** Users can record their live sessions for later viewing or sharing, increasing content longevity.
- **Security Options:** Offers various security settings to protect the live streaming environment, ensuring a safe experience for users.

5.3 Audio Live podcasting

Audio live podcasting has become increasingly popular, enabling creators to engage with their audiences in real-time. Here are five applications that support live audio podcasting, along with their benefits:

1. Clubhouse

- **Description:** Clubhouse is a social audio app that allows users to create and join live audio rooms where they can discuss various topics.
- **Benefits:**
 - **Real-Time Interaction:** Users can participate in live discussions, ask questions, and engage with speakers directly.
 - **Community Building:** Facilitates networking and community growth by connecting like-minded individuals through shared interests.
 - **Discoverability:** Users can explore rooms based on their interests, making it easier to find and engage with relevant content.
 - **Exclusive Content:** Offers opportunities for exclusive, invite-only discussions, making the content feel more personal and engaging.
 - **Spontaneity:** Encourages spontaneous conversations, allowing creators to engage with their audience in real-time without much preparation.

2. Spotify Greenroom

- **Description:** Spotify Greenroom (now rebranded as Spotify Live) is a live audio app where users can host or join live audio rooms, with a focus on music, sports, and culture.
- **Benefits:**
 - **Integration with Spotify:** Allows users to integrate their live audio sessions with their Spotify accounts, making it easier to reach their existing audience.

- **Monetization Options:** Creators can earn through features like ticketed events and fan subscriptions.
- **Audience Engagement:** Listeners can interact with hosts and guests in real-time, enhancing the sense of community.
- **Wide Reach:** Tapping into Spotify's vast user base increases the potential audience for live audio sessions.
- **Cross-Promotion:** Live sessions can be promoted across Spotify's ecosystem, driving more listeners to live events.

3. Twitter Spaces

- **Description:** Twitter Spaces is a live audio feature within the Twitter app that allows users to host and participate in live audio discussions.
- **Benefits:**
 - **Seamless Integration:** Twitter Spaces is integrated into the Twitter platform, allowing easy sharing and promotion of live sessions to followers.
 - **Real-Time Interaction:** Listeners can participate in conversations, ask questions, and engage with hosts directly.
 - **Inclusivity:** Spaces are open to all Twitter users, making it accessible for a wide audience.
 - **Discoverability:** Spaces are visible on followers' timelines, increasing the chances of attracting new listeners.
 - **Accessibility Features:** Twitter offers live captions, making Spaces more accessible to a wider audience.

4. Anchor

- **Description:** Anchor by Spotify is a podcast creation platform that now supports live audio recording, allowing creators to interact with their audience in real-time.
- **Benefits:**
 - **Podcast Integration:** Live sessions can be recorded and published as podcast episodes, maximizing content use.
 - **User-Friendly Interface:** Anchor's simple interface makes it easy for creators to start live audio sessions with minimal setup.
 - **Audience Engagement:** Real-time interaction with listeners enhances the connection between the host and the audience.
 - **Monetization:** Creators can monetize their live sessions through sponsorships and listener support.
 - **Cross-Platform Distribution:** Live recordings can be distributed across multiple podcast platforms, reaching a broader audience.

5. Discord

- **Description:** Originally designed for gamers, Discord now supports live audio chat through its "Stage Channels," making it a great tool for live podcasting.
- **Benefits:**
 - **Community Focused:** Discord allows creators to build and manage communities where members can interact and participate in live audio sessions.
 - **Real-Time Feedback:** Audience members can join the conversation or ask questions in real-time, creating a dynamic interaction.
 - **Customization:** Creators can customize their servers and roles, allowing for controlled access and better management of live events.
 - **Recording and Archiving:** Sessions can be recorded for later use, turning live audio content into podcast episodes.
 - **Integration with Other Platforms:** Discord can be integrated with other platforms, making it easier to manage content and audience interaction.

5.4 Video and live streaming

When it comes to video creation and live streaming on a PC, several applications offer robust features tailored for different needs. Here are five popular applications along with their benefits:

1. OBS Studio (Open Broadcaster Software)

- **Description:** OBS Studio is a free, open-source software for video recording and live streaming. It is widely used by gamers, content creators, and professionals.
- **Benefits:**
 - **Customizable:** Highly customizable with support for various plugins, allowing users to add features such as overlays, alerts, and transitions.
 - **High-Quality Streaming:** Supports streaming to platforms like Twitch, YouTube, and Facebook Live in high definition with minimal performance impact on the PC.
 - **Multi-Source Mixing:** Allows users to mix multiple video and audio sources, including screen captures, webcams, and media files, providing a professional broadcasting experience.
 - **Scene Management:** Users can create multiple scenes with different layouts and switch between them seamlessly during live broadcasts.
 - **Free and Open Source:** No cost involved, and the community constantly develops and updates new features.

2. Streamlabs

- **Description:** Streamlabs is built on top of OBS Studio and adds user-friendly features that cater to streamers, particularly those on platforms like Twitch and YouTube.
- **Benefits:**
 - **Integrated Alerts:** Comes with built-in alerts for new followers, donations, subscriptions, and more, enhancing viewer engagement.
 - **Widgets and Themes:** Offers a wide variety of widgets and themes that can be easily added to streams, giving them a professional look.
 - **Monetization Tools:** Includes tools for accepting donations, subscriptions, and other forms of viewer support directly through the stream.
 - **Cloud-Based:** Settings and configurations can be saved in the cloud, allowing users to access their setups from different devices.
 - **User-Friendly Interface:** Simplifies the setup process for new streamers while still offering advanced features for experienced users.

3. XSplit Broadcaster

- **Description:** XSplit Broadcaster is a professional-grade video mixing software for streaming and recording.
- **Benefits:**
 - **User-Friendly:** Easy to set up and use, with a straightforward interface that allows users to start streaming quickly.
 - **Advanced Features:** Supports features like multi-streaming, scene transitions, and source management, providing flexibility for complex broadcasts.
 - **Plugin Support:** Users can enhance functionality with various plugins, including social media integrations, video effects, and more.
 - **Professional Quality:** Designed for high-quality streaming and recording, with support for 4K resolution and high bitrates.
 - **Integrated Editing Tools:** Includes tools for video editing and trimming, making it easier to produce content for later use.

4. vMix

- **Description:** vMix is a live production software that allows for the mixing of video and audio for live streaming.
- **Benefits:**
 - **Professional-Grade Production:** Suitable for professional-grade live streaming and video production, with support for HD, 4K, and even 8K streaming.

- **Multi-Camera Support:** Allows users to switch between multiple camera feeds, making it ideal for live events, concerts, and broadcasts.
- **Built-In Effects:** Comes with a wide range of built-in transitions, effects, and overlays, allowing for polished, professional broadcasts.
- **Instant Replay:** Includes features like instant replay, making it suitable for sports and other events where this functionality is needed.
- **Remote Guests:** Supports remote guest integration, allowing users to include remote participants in live broadcasts easily.

5. Wirecast

- **Description:** Wirecast is a professional live video streaming production software that is used for streaming live events, webinars, and online shows.
- **Benefits:**
 - **Professional Broadcasts:** Ideal for high-quality, professional broadcasts with support for multiple cameras, live guests, and real-time production.
 - **Multi-Platform Streaming:** Allows simultaneous streaming to multiple platforms such as Facebook, YouTube, and custom RTMP servers.
 - **Live Production Features:** Offers features like live titling, transitions, and social media integration, making it versatile for various live production needs.
 - **Virtual Sets:** Includes virtual sets and backgrounds, giving users the ability to create visually engaging live streams.
 - **Recording and Archiving:** Streams can be recorded and archived for later use, providing flexibility for content creation.

Q. Evaluate and reflect on student learning through live streaming sessions.

Evaluating and reflecting on student learning through live streaming sessions can be highly effective, given the right strategies. Here are key aspects to consider:

1. Real-Time Feedback and Engagement

- **Evaluation:** During live streaming sessions, educators can gauge student understanding by monitoring questions, comments, and participation in real-time. Tools like chat boxes, polls, and Q&A sessions allow teachers to see how well students are grasping the material.
- **Reflection:** Reflecting on these interactions can help educators identify areas where students struggle or excel, allowing them to adjust their teaching methods accordingly.

2. Interactive Assessments

- **Evaluation:** Live streaming platforms often include features such as quizzes and polls that can be used to assess student comprehension on the spot. These assessments provide immediate data on student learning.
- **Reflection:** By analyzing the results of these assessments, educators can reflect on the effectiveness of their instruction and the learning progress of their students. This reflection can guide future lesson planning and instructional strategies.

3. Recording and Playback

- **Evaluation:** Sessions can be recorded, allowing both students and educators to review the material. Students can revisit challenging topics, and teachers can assess their delivery and the overall flow of the lesson.
- **Reflection:** Reviewing recorded sessions allows educators to reflect on their teaching style, pacing, and how well the content was received. This can lead to improvements in future sessions.

4. Post-Session Feedback

- **Evaluation:** After a live streaming session, educators can collect feedback from students through surveys or follow-up discussions. This feedback can provide insights into how students perceived the lesson and whether they feel they met the learning objectives.
- **Reflection:** Reflecting on student feedback helps educators understand the effectiveness of their teaching methods and identify areas for improvement. It also fosters a student-centered approach to learning, where students' voices influence the educational process.

5. Tracking Participation and Attendance

- **Evaluation:** Attendance and participation can be tracked during live streams, providing data on student engagement. Low participation may indicate a lack of understanding or interest, signaling a need for different approaches.

- **Reflection:** Reflecting on participation trends can help educators identify patterns, such as which students are regularly engaged and which are not, leading to more targeted support for those who may need it.

6. Student Reflection

- **Evaluation:** Encourage students to reflect on their own learning after each session. This can be done through journals, discussion boards, or video reflections.
- **Reflection:** Educators can review these reflections to understand students' self-assessment of their learning, which can provide deeper insights into their needs and progress.

7. Longitudinal Assessment

- **Evaluation:** Over multiple live sessions, educators can assess student progress by comparing performance and engagement over time. This long-term view helps in identifying trends and areas for consistent improvement.
- **Reflection:** Reflecting on longitudinal data helps educators adjust their curriculum and teaching strategies to better meet students' evolving needs and ensure continuous progress.

Conclusion

Evaluating and reflecting on student learning through live streaming sessions requires a multi-faceted approach, leveraging real-time tools and post-session analysis. By continuously assessing both student performance and instructional effectiveness, educators can create more engaging and effective online learning environments.

Practical Tasks

- Demo live streaming using mobile application such as Facebook live, Instagram live, ticktack or student learning reflection.
- Demo Audio Live Podcasting include arranging essential equipment such as microphones, headphones, and audio interfaces in a dedicated space.
- Demo Live Streaming Using OBS or YouTube