



RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

BCS -504 Computer Graphics &
Multimedia

Lecture-33

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OUTLINE

- **MPEG**
- **I-FRAMES**
- **P-FRAMES**
- **B-FRAMES**



MPEG

The name MPEG is an acronym for Moving Pictures Experts Group. MPEG is a method for video compression, which involves the compression of digital images and sound, as well as synchronization of the two.

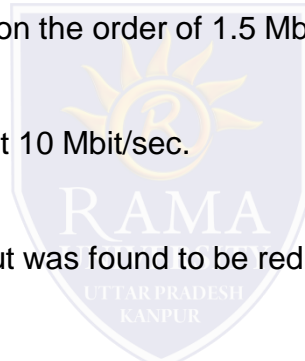
There currently are several MPEG standards.

MPEG-1 is intended for intermediate data rates, on the order of 1.5 Mbit/sec.

MPEG-2 is intended for high data rates of at least 10 Mbit/sec.

MPEG-3 was intended for HDTV compression but was found to be redundant and was merged with MPEG-2.

MPEG-4 is intended for very low data rates of less than 64 Kbit/sec.



MPEG

- i. In principle, a motion picture is a rapid flow of a set of frames, where each frame is an image. In other words, a frame is a spatial combination of pixels, and a video is a temporal combination of frames that are sent one after another.
- ii. Compressing video, then, means spatially compressing each frame and temporally compressing a set of frames.
- iii. **Spatial Compression:** The spatial compression of each frame is done with JPEG (or a modification of it). Each frame is a picture that can be independently compressed.
- iv. **Temporal Compression:** In temporal compression, redundant frames are removed.
- v. To temporally compress data, the MPEG method first divides frames into three categories:
- vi. I-frames, P-frames, and B-frames. Figure 1 shows a sample sequence of names.

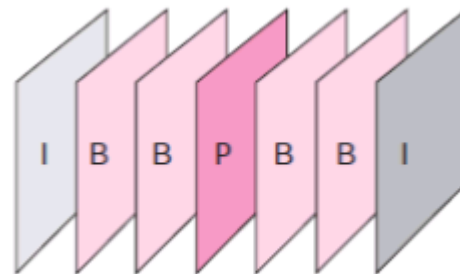
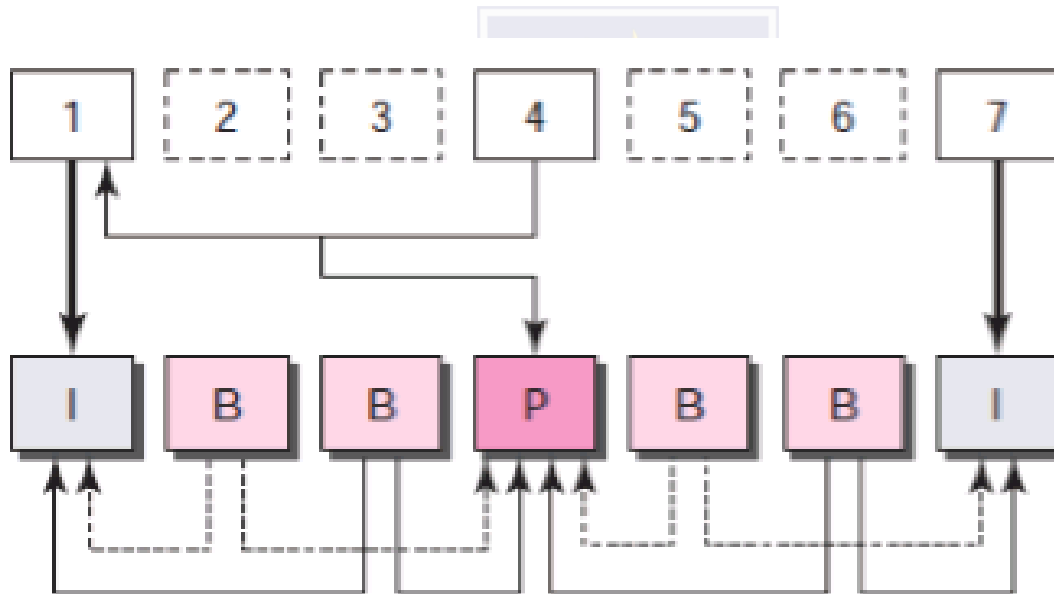


Fig1: MPEG frames

MPEG

vii. Figure2 shows how I-, P-, and B-frames are constructed from a series of seven frames.

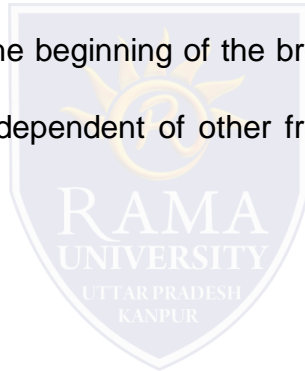
Fig2: MPEG frame construction



I-frames

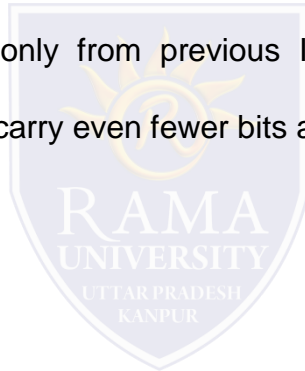
I-frames: An intracoded frame (I-frame) is an independent frame that is not related to any other frame.

They are present at regular intervals. An I-frame must appear periodically to handle some sudden change in the frame that the previous and following frames cannot show. Also, when a video is broadcast, a viewer may tune at any time. If there is only one I-frame at the beginning of the broadcast, the viewer who tunes in late will not receive a complete picture. I-frames are independent of other frames and cannot be constructed from other frames.



P-frames

P-frames: A predicted frame (P-frame) is related to the preceding I-frame or P-frame. In other words, each P-frame contains only the changes from the preceding frame. The changes, however, cannot cover a big segment. For example, for a fast-moving object, the new changes may not be recorded in a P-frame. P-frames can be constructed only from previous I- or P-frames. P-frames carry much less information than other frame types and carry even fewer bits after compression.



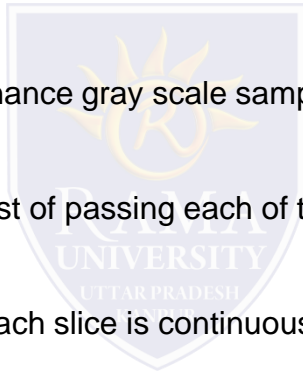
B-frames

B-frames: A bidirectional frame (B-frame) is related to the preceding and following I-frame or P-frame. In other words, each B-frame is relative to the past and the future. Note that a B-frame is never related to another B-frame.

1. According to the MPEG standard the entire movie is considered as a video sequence which consist of pictures each having three components, one luminance component and two chrominance components (y, u & v).
2. The luminance component contains the gray scale picture & the chrominance components provide the color, hue & saturation.
3. Each component is a rectangular array of samples & each row of the array is called the raster line.
4. The eye is more sensitive to spatial variations of luminance but less sensitive to similar variations in chrominance. Hence MPEG – 1 standard samples the chrominance components at half the resolution of luminance components.

B-frames

1. The input to MPEG encoder is called the resource data and the output of the MPEG decoder is called the reconstructed data.
2. The MPEG decoder has three parts, audio layer, video layer, system layer.
3. The system layer reads and interprets the various headers in the source data and transmits this data to either audio or video layer.
4. The macro block consist of 16×16 block of luminance gray scale samples divided into four 8×8 blocks of chrominance samples.
5. The MPEG compression of a macro block consist of passing each of the $^{\circ}6$ blocks their DCT quantization and entropy encoding similar to JPEG.
6. A picture in MPEG is made up of slices where each slice is continuous set of macro blocks having a similar gray scale component.
7. The concept of slice is important when a picture contains uniform areas.



Multiple Choice Question

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	In a transformation, the final figure is called the.....	scene	Pre image	image	none of these
2	A translation is an example of a that moves each point of a shape the same distance and in the same direction.	clipping	transformati on	viewport	Reflectio n
3	A rotation is a transformation that..... (turns) an image a certain amount about a certain point.	rotates	circulate	shaped	alter
4	A reflection is an example of a transformation that flips each point of a shape over the	same line	Different line	both a & b	none of these
5	A <i>composite transformation</i> is when two or more are combined to form a new image from the preimage	clipping	transformati ons	viewport	graphics

REFERENCES

- <http://www.engppt.com/search/label/Computer%20Graphics>

