



Shri Vile Parle Kelvani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

Approved by AICTE and Affiliated to the University of Mumbai



Department of Electronics & Telecommunication Engineering

Mini Project Report

On

MPEG Audio and Video Compression Technique

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Class/Sem: SE – EXTC -1 (SEM – 4)

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CERTIFICATE

This is to certify that M/S _____ Atulya Kumar _____,
SAP ID _____ 60002160052 _____ of SE EXTC 1 has submitted their
Mini Project for Subject Name for the Academic Year 2017-2018.

Guide

Examiner

Head of Department

EXTC Department



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Introduction:

About MPEG -

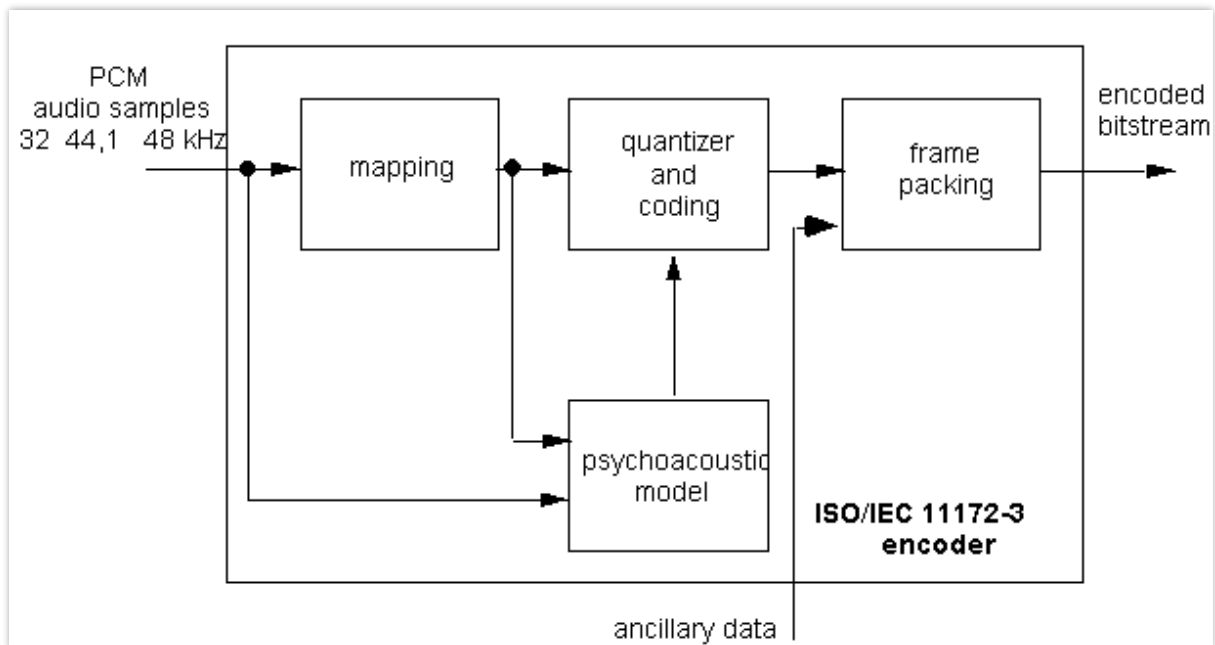
- The Moving Picture Experts Group is a working group of authorities that was formed by ISO and IEC to set standards for audio and video compression and transmission.
- MPEG algorithms compress data to form small bits that can be easily transmitted and then decompressed. MPEG achieves its high compression rate by storing only the changes from one frame to another, instead of each entire frame. The video information is then encoded using a technique called Discrete Cosine Transform (DCT). MPEG uses a type of lossy compression, since some data is removed. But the diminishment of data is generally imperceptible to the human eye.

Need for compression –

- HDTV broadcast has resolution of 1920 x 1080 at 30 fps using 8 bits to represent primary colours. This leads to a total of 1.5 GBPS data rate.
- For an average 5-minute video that is $1.5 \times (5 \times 60) = 450$ GB of video data.
- However, Channel bandwidth is only 6MHz that supports around 19.2 MBPS data rate only.
- Compression ratio = $1.5 \text{ GBPS} / 18 \text{ MBPS} = 83:1$



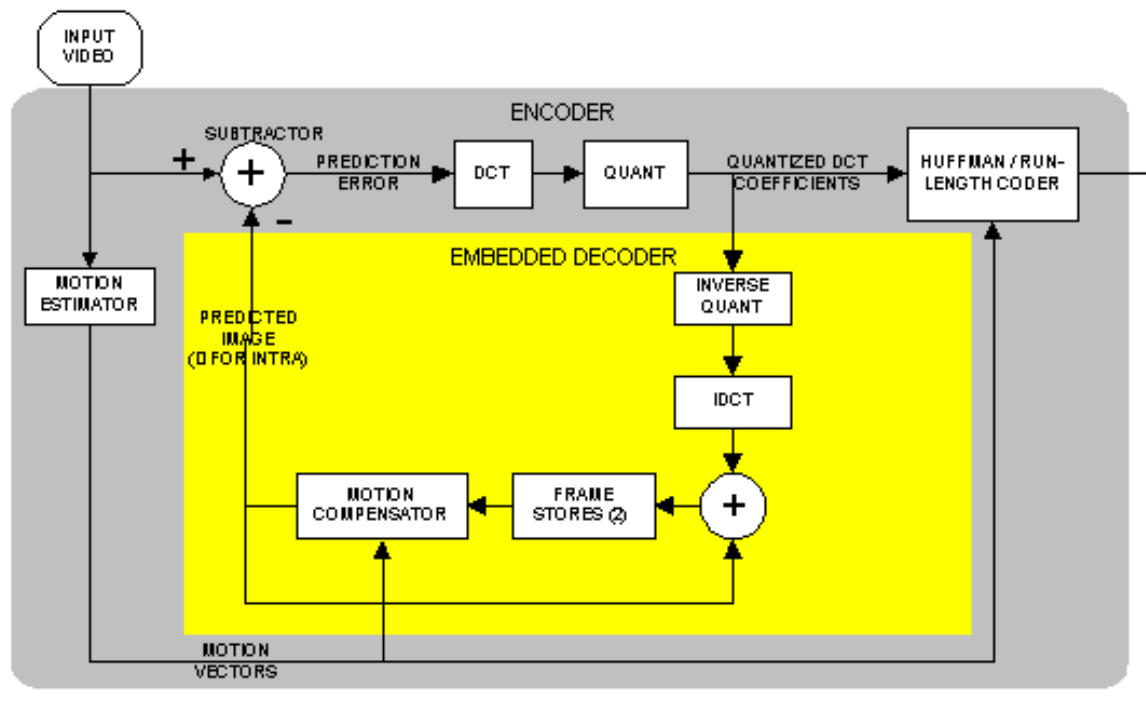
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- Mapping Block – divides audio inputs into 32 equal-width frequency sub bands (samples)
- Psychoacoustic Block – calculates masking threshold for each sub band
- Bit-Allocation Block – allocates bits using outputs of the Mapping and Psychoacoustic blocks
- Quantizer & Coding Block – scales and quantize (reduce) the samples
- Frame Packing Block – formats the samples with headers into an encoded stream



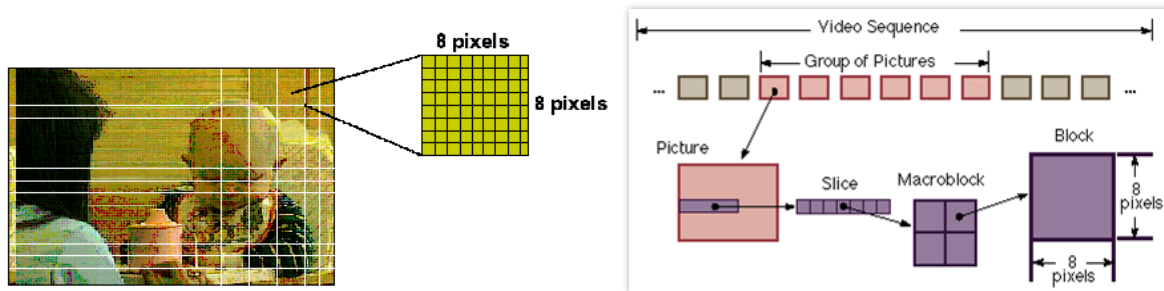
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Four Steps of Video Compression:

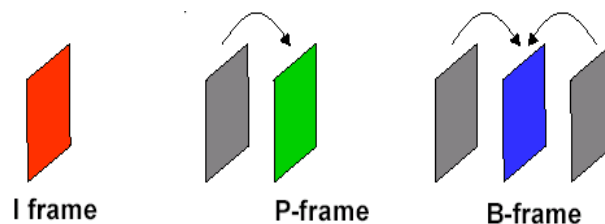
1. Pre-processing
 - a. Filters out unnecessary information
 - i. Information that is difficult to encode
 - ii. Not an important component of human visual perception
2. Temporal Prediction
 - a. Uses the mathematical algorithm Discrete Cosine Transform (DCT) to:
 - i. Divide each frame into 8X8 blocks of pixels
 - ii. Reorganize residual differences between frames
 - iii. Encode each block separately

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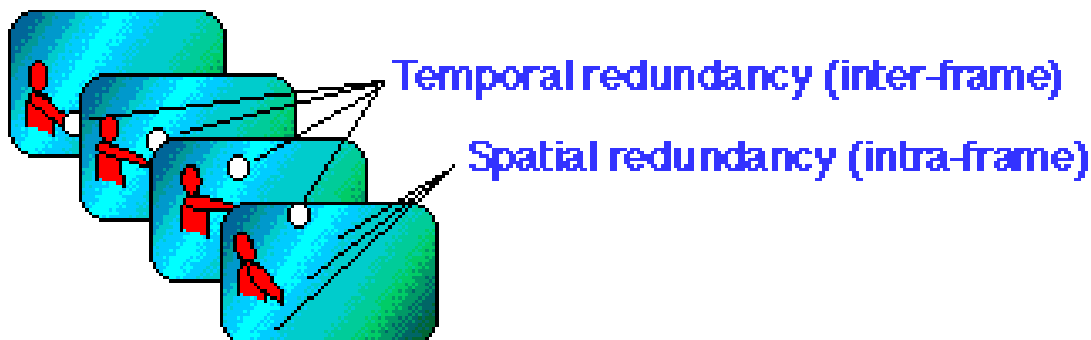
b. Group of Pictures (GOP)

- i. I-frames: can be reconstructed without any reference to other frames
- ii. P-frames: forward predicted from last I-frame and P-frames
- iii. B-frames: forward and backward predicted



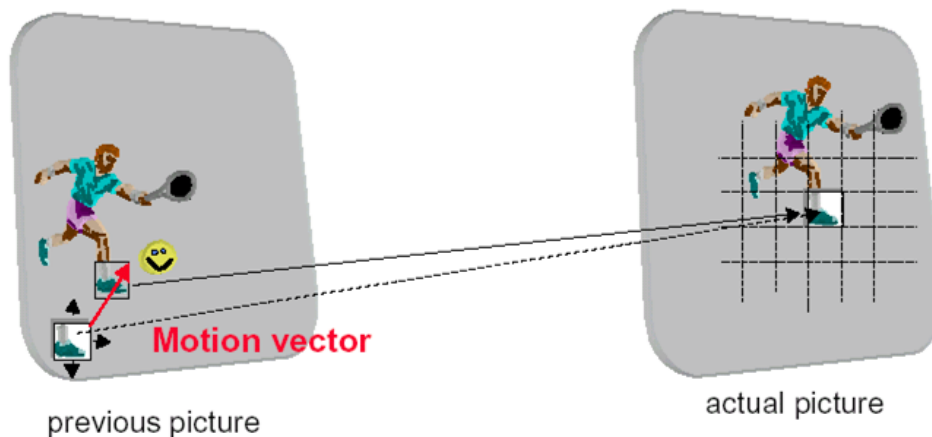
c. Compression: Eliminating Redundancies

- i. Spatial Redundancy - Pixels are replicated within a single frame of video
- ii. Temporal Redundancy - Consecutive frames of video display images of the same scene



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- Try to match each block in the actual picture to content in the previous picture. Matching is made by shifting each of the 8 x 8 blocks of the two successive pictures pixel by pixel each direction -> Motion vector
- Subtract the two blocks -> Difference block
- Transmit the motion vector and the difference block

**4. Quantization**

- a. Refers to DCT coefficients
- b. Removes subjective redundancy
- c. Controls compression factor
- d. Converts coefficients into even smaller numbers



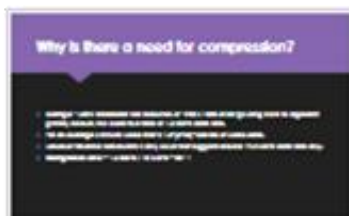
Conclusion: We have successfully understood and presented the topic 'MPEG Audio and Video Compression Technique'.

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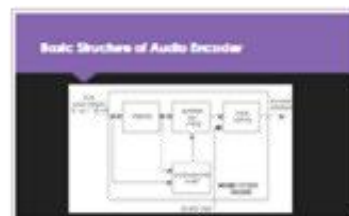
Presentation Slides:



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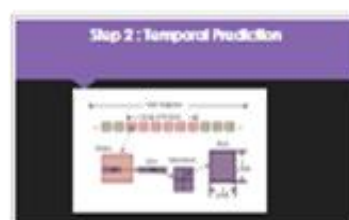
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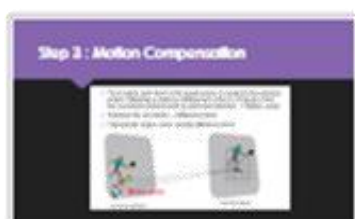
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