



Special Module on Media Processing and Communication

Dayalbagh Educational Institute
(DEI)
Dayalbagh Agra

CSM 011

Indian Institute of Technology Delhi
(IITD)
New Delhi

SIV 864

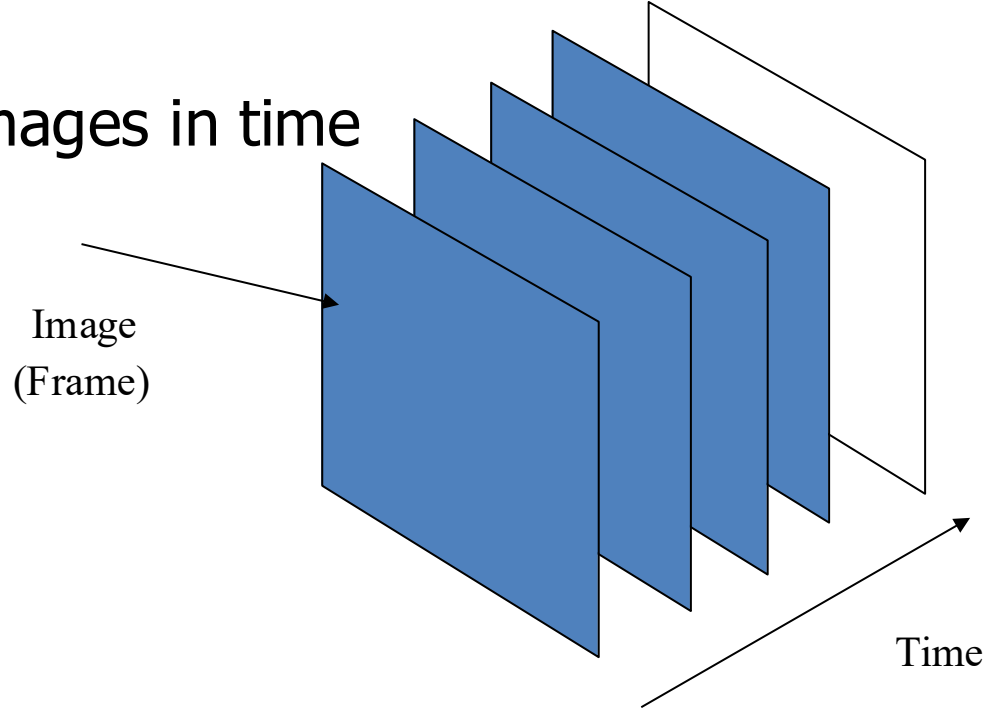


Video Compression

Digital Video

Video is a sequence of images in time

- can be edited
- can be stored on any digital medium
- can be compressed





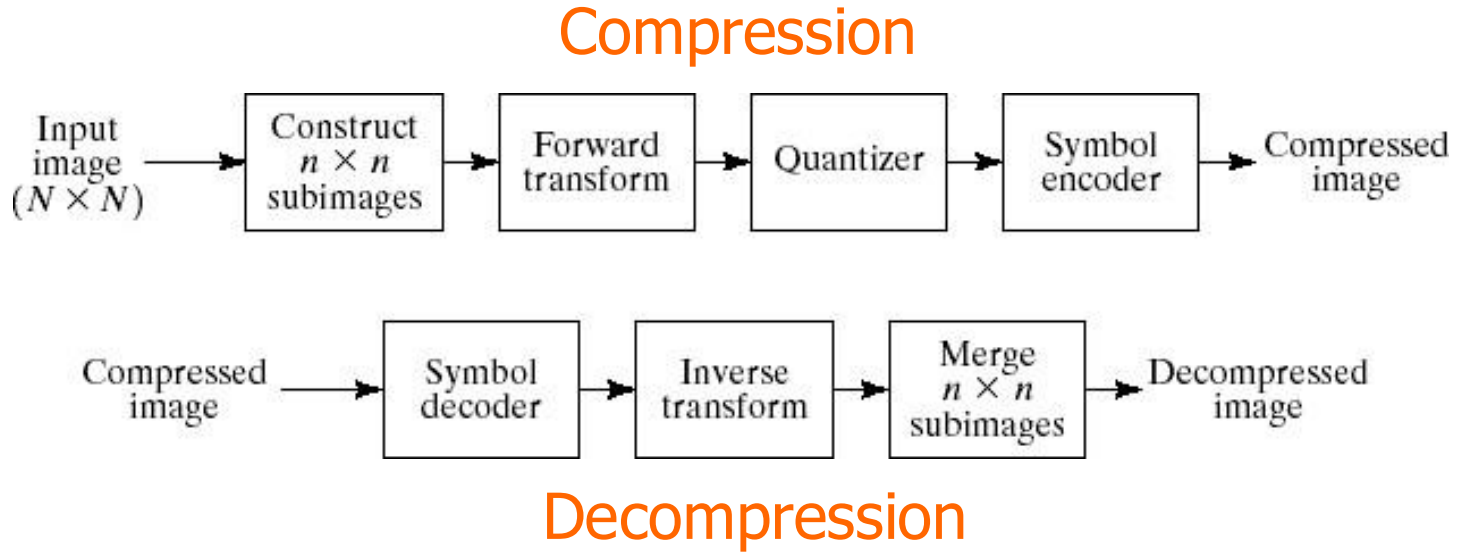
Video Compression

- ▶ The Need for Video Compression
- Huge data
- ▶ Example: High-Definition Television (HDTV)
- 1920x1080
- 30 frames per second (full motion)
- 8 bits for each three primary colors → Total 1.5 Gb/sec!
- Channel bandwidth 19.2 Mb/sec
- Reduced to 18 Mb/sec w/audio + control ...
- Compression rate must be 83:1!



Video Compression

Image Compression: Transform Coding-> JPEG Pipeline





Video Compression

MJPEG (Motion JPEG)

- Each frame can be compressed as single image.
- Compression is achieved only due to the **spatial redundancy** in the frame.
- Takes care of intra-frame redundancy



Video Compression

Anything else that can be done?

- What about temporal redundancy or inter frame redundancy?

MPEG (Motion Picture Experts Group)

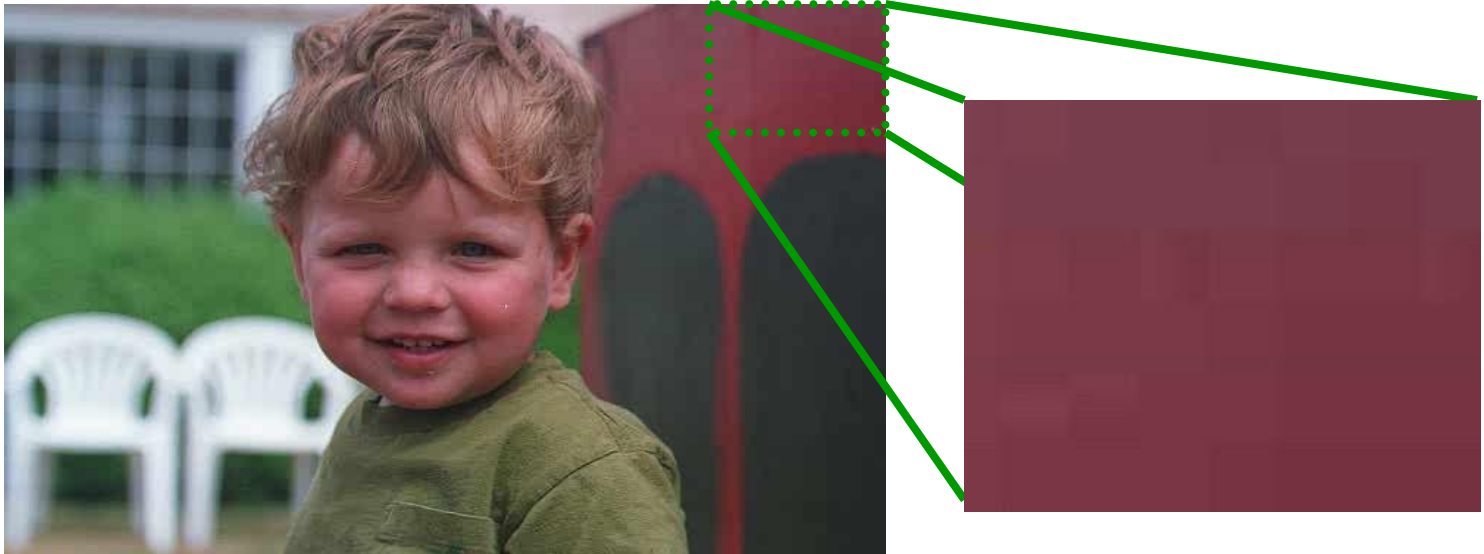
- What about irrelevancy – perceptually unimportant?



Video Compression

Spatial Redundancy

Take advantage of similarity among most neighboring pixels





Video Compression

Temporal Redundancy

Video: Sequence of images in time (that are related!)

Take advantage of similarity between successive frames



950



951



952



Video Compression

Intuitive Methods

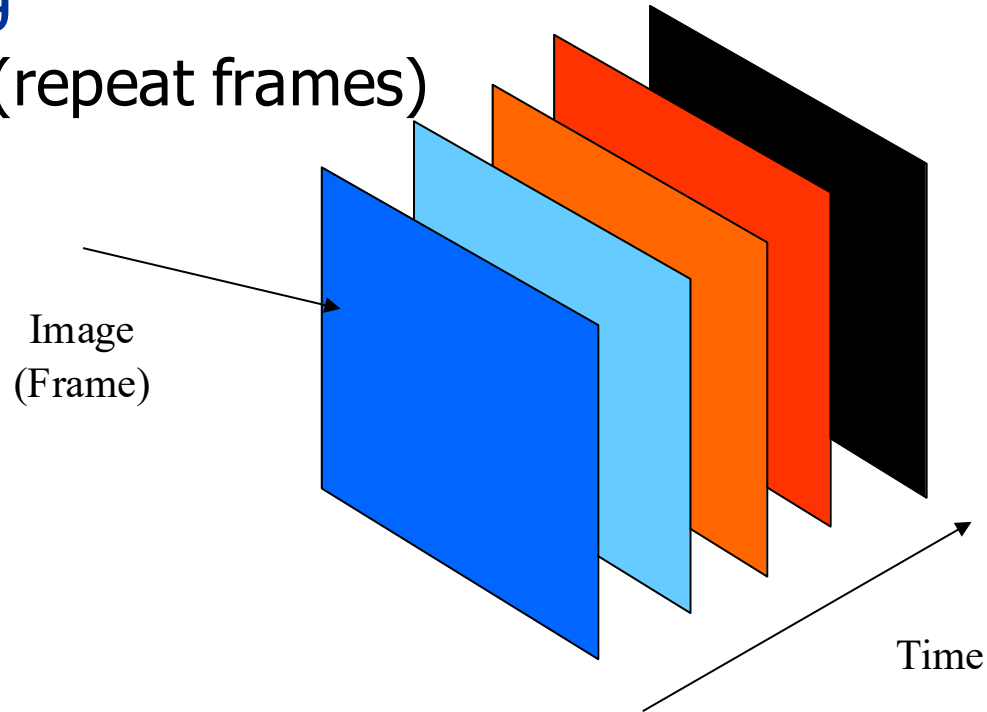
- Subsampling
Drop frames
- Differencing
Differential coding of pixels
- Block Differencing
Differential coding of blocks (big pixels)
- Motion Compensation
Figure out the motion vector and compensate for it



Video Compression

Subsampling

Drop frames (repeat frames)

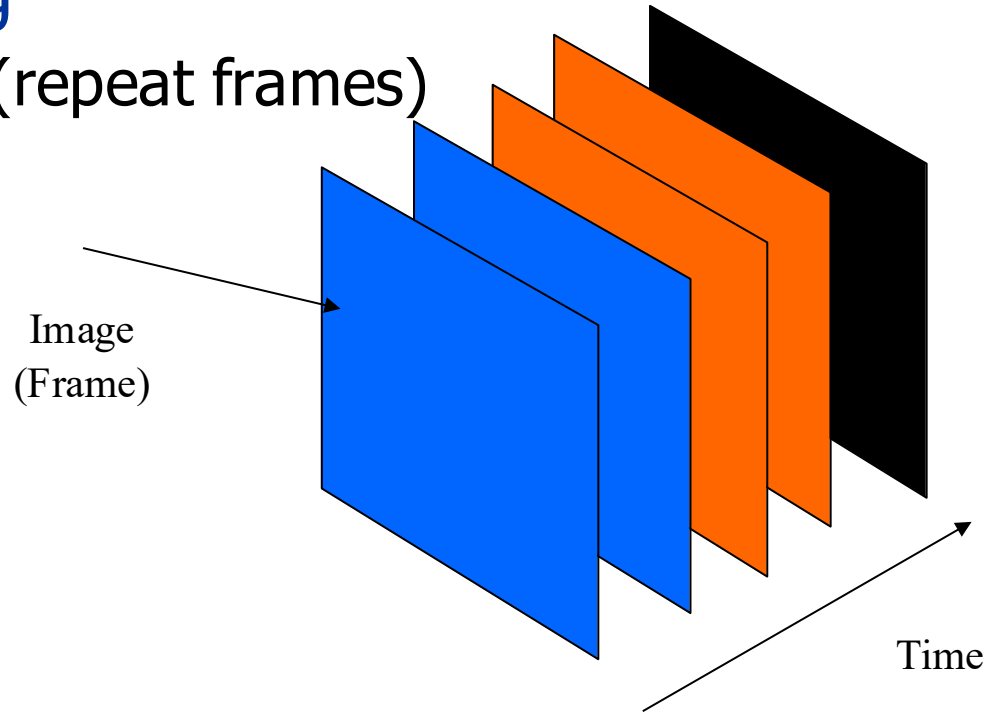




Video Compression

Subsampling

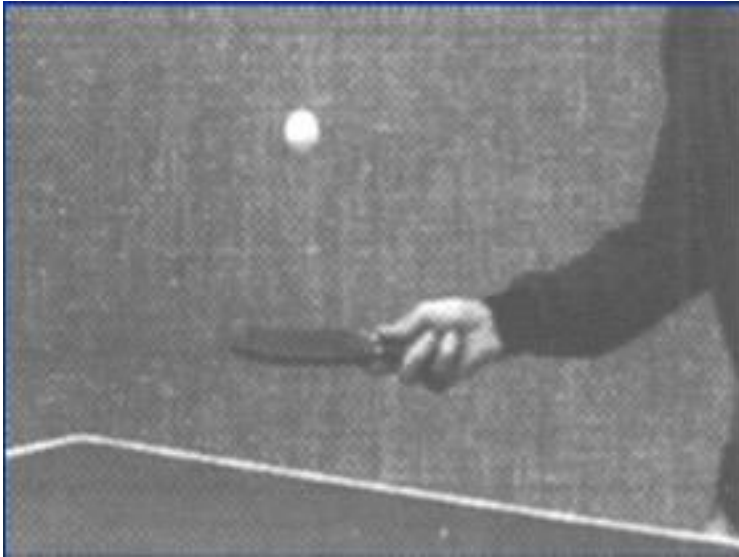
Drop frames (repeat frames)



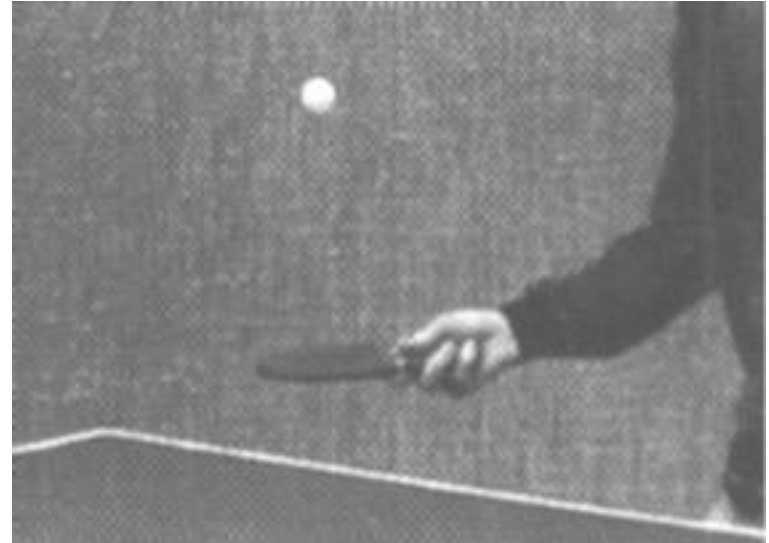


Video Compression

Differencing



Frame N

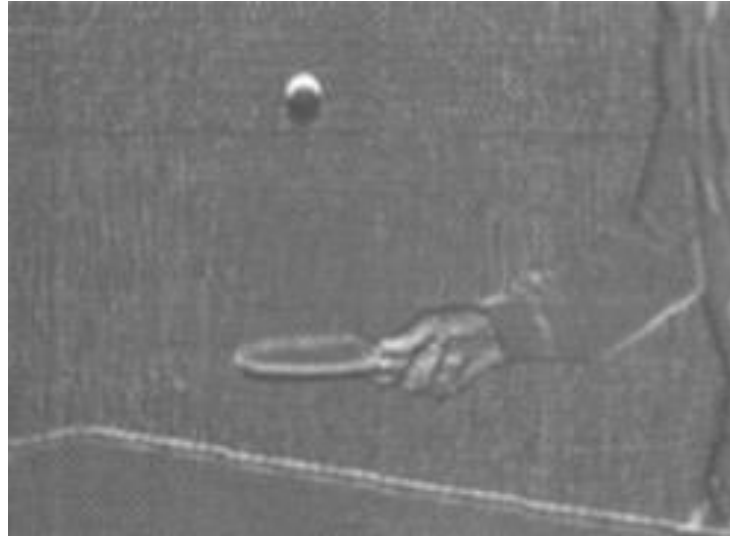


Frame N+1



Video Compression

Differencing



Difference frame



Video Compression

Block Differencing

- Frame is divided into non-overlapping blocks
- Block level comparison rather than pixel level to decide which blocks for the difference is to be coded
- May work when the motion is relatively small of foreground objects
- If the motion is large and not limited to portion of image then it may not be effective

