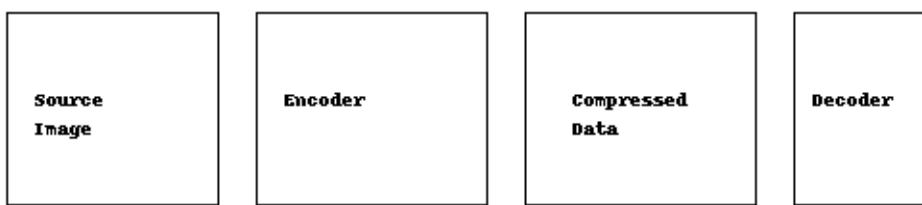


UNIT 5 – IMAGE COMPRESSION (Digital Image Processing) This PDF explains Unit 5 in a clear teacher-like manner, with supportive diagrams.

- 1. What is Image Compression? Image Compression reduces the amount of data required to represent a digital image. It removes redundancies while trying to preserve important information.
- 2. Types of Redundancies
 - Coding Redundancy – Using variable-length codes like Huffman.
 - Interpixel Redundancy – Strong correlation between neighboring pixels.
 - Psychovisual Redundancy – Human eye cannot perceive all information.
- 3. Classification of Compression
 - Lossless Compression (No information lost) Examples: Huffman, Arithmetic, LZW, PNG.
 - Lossy Compression (Some information lost) Examples: JPEG, JPEG2000, Transform-based compression.
- 4. Image Compression Model



5. Huffman Coding (Lossless) A variable-length coding technique.

- More frequent symbols shorter codes • Less frequent symbols longer codes
- 6. Arithmetic Coding (Lossless) Encodes whole message into a single number between 0 and 1. More efficient than Huffman.
- 7. Predictive Coding Predicts next pixel using neighbors: Prediction Error = Actual – Predicted Used in JPEG-LS.
- 8. Transform-based Compression (Lossy) Most widely used technique. Steps:
 - Divide image into blocks
 - Apply DCT (Discrete Cosine Transform)
 - Quantize coefficients
 - Encode using entropy coding
- 9. JPEG Compression Standard
 - Uses DCT
 - 8×8 blocks
 - Quantization table controls quality
 - Achieves high compression
- 10. JPEG2000 Standard
 - Uses Discrete Wavelet Transform (DWT)
 - Better quality at high compression
 - Supports progressive coding