SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE351 – IMAGE PROCESSING AND COMPUTER VISION

III B.E. ECE / V SEMESTER

UNIT 3 – IMAGE COMPRESSION AND IMAGE SEGMENTATION

TOPIC – RUN LENGTH CODING (RLC)

RUN LENGTH CODING

Run-length coding (RLC) exploits the repetitive nature of the image

- RLC tries to identify the **length of the pixel values** and encodes the image in the form of a run
- Each row of the image is written as a sequence
- Then **length** is represented as a **run of black and white pixels**. This is known as Run-length coding
- It is very effective way compressing an image
- If required, **further compression** can be done using **variable length coding** to code the run lengths themselves

RLC is a CCITT (Consultative Committee of the International Telegraph and Telephone) standard that is used to encode binary and grey level images

RUN LENGTH CODING

Example: Given a sample binary image. Apply Run-length Coding.

0	0	0	0	0
0	0	0	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

5×5

Solutions → ① Horizontal RLC

* Run Length vectors ⇒ (0,5) (0,3), (1,2) (1,5) (1,5) (1,5)
* No. of vectors = 6
* Max. Length = 5 → 3 bits in binary
* No. of bits per pixel = 1 (0 or 1)
* Total no. of pixels = 6 × (3+1) = 24 ✓
* No. of Pixels for original image = 5 × 5 = 25 ✓
* Compression Ratio = $\frac{25}{24}$ = 1.042:1

② Vertical RLC

* Run length vectors ⇒ (0,2), (1,3) (0,2), (1,3) (0,2), (1,3) (0,1) (1,4) (0,1) (1,4)
* No. of vectors = 10
* 3 bits
* 1 bit per pixel
* Total no. of pixels ⇒ = 10 × (3+1) = 40 ✓
* original Image = 5 × 5 = 25
* Compression Ratio = $\frac{25}{40}$ = 0.625:1

RUN LENGTH CODING

It has been observed that the compression ratio changes with the scan line

Theoretically, if:

- The estimate of the entropy of the black run is H_0
- The estimate of the entropy of the white run is H_1
- The estimate of the average value of the black run is L_0
- The estimate of the average value of the white run is L_1

The approximate Run-length entropy of the image can be given as:

$$H_{\text{run length}} = \frac{H_0 + H_1}{L_0 + L_1}$$


Thank
you!