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## Answere to Question No-1

(a) Spatial Redundancy: In this case, the neighboring pixels have similare values.

(b) Psycho-visual Redundancy: In this case, the pixel values are ignored to the human eyes. If this pixels are removed, they do not affect the perception of human brain.

(c) Coding Redundancy: In this case, the bit representation can be reduced without any information loss.

(d) Temporal Redundancy: This occurs in video. One frame has similare pixel values to the previous frame.

## Answers to the Question No-02

Given message –

MMMMMRRR MMMMMMRRRRRMMMMMMRRRRR
AAAMM

Considering 8-bits to represent one symbol, ~~total bits required for this message would be = (8×32) bits~~
~~= 256 bits~~

(a) Huffman Coding:

Probability of M = $\frac{16}{32}$ = 0.5

Probability of R = $\frac{13}{32}$ = 0.40625

Probability of A = $\frac{3}{32}$ = 0.09375

| Symbol | Probability | | |
|---|---|---|---|
| M | 0.5 | 0 | 0.5 (0) |
| R | 0.40625 | 10 | 0.5 (1) |
| A | 0.09375 | 11 | |

Hence, M can be represented with 0. R can be represented with 10 and A can be represented with 11.

So, number of bits required per symbol on average for ~~the~~ the f-f man coding would be = $0.5 \times 1 + 0.40625 \times 2 + 0.09375 \times 3$

$= 0.5 + 0.8125 + 0.1875$

$= 1.5$ bits

$\therefore$ Compression Ratio, $C = \frac{8}{1.5}$

$= 5.33$

$\therefore$ Redundancy, $R = 1 - \frac{1}{C}$

$= 1 - \frac{1}{5.33}$

$= 0.8125$

(b) Run-length Coding:

M4R3M5R5M5R5A3M2

Considering 8-bits per symbol for coded message, number of bits per symbol required for the actual message would be $= \frac{16 \times 8}{32} = 4$ bits

$\therefore$ Compression Ratio, $C = \frac{8}{4} = 2$

$\therefore$ Redundancy, $R = 1 - \frac{1}{2} = 0.5$

Ans