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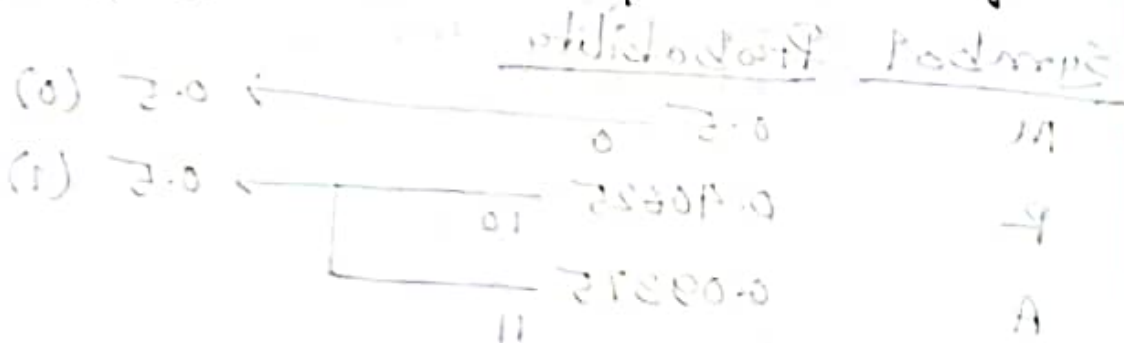
Answers to Question No. 1

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

(b) Psycho-visual Redundancy: In this case, the pixel values are ignored to the human eyes. If these 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 similar pixel values to the previous frame.



Answer to the Question No-02

Given message -

MMMMRRRMMMMRRRRMMMMRRRR
AAAMM

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

(a) Huffman Coding:

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

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

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

Symbol	Probability
M	0.5
R	0.40625
A	0.09375

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~~ Huffman coding would be = $0.5 \times 1 + 0.40625 \times 2 + 0.09375 \times 3$
 $= 0.5 + 0.8125 + 0.1875$
 $= 1.5 \text{ bits}$

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

$$= 5.33$$

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

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

$$= 0.8125$$

(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 = $\frac{16 \times 8}{32} = 4 \text{ bits}$

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

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