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Assignment Discussion Lesson 5

1) How to calculate total size of a video per second?

2) Give an example of calculating total size of a video in 80 minutes? You can choose your own values.

3) Explain the concept of lossless compression?

4) What is entropy? Give an example of calculating entropy from 3 symbols? You can choose your own values.

5) Find the entropy of the word "helloeverybodyblablabla"?

Answer

1). To calculate total size of a video per second we need to follow this step:

- Resolution of an image (R): Width * Height

- Number of frames per second (Nf): find the total frames we need per second.

- Number of bits (Nb): How many bits we need to use, for example: 8 bits = 1 byte, 24 bits = 3 bytes.

2). Give an example of calculating total size of a video in 80 minutes:

- resolution of an image (R): 1280 * 720 = 921600 pixels

- number of frames: 30 f/s

- number of bites per pixel: 3 bites

- time : 80 * 60 = 4800

=> vns = 921600 * 30 * 3 * 4800 = 39813120000 bytes.

3). Explain the concept of lossless compression:

- Information source or input data : is a sequence of symbols from an alphabet.

- Encoder or compression : is a sequence of code words.

- Storage or network : is a place to store encode data in local or network.

- Decoder or decompression : is a sequence of alphabet.

- Recovered data: is a sequence of symbols from an alphabet which is exactly the same as input data.

4). Entropy is the number of bits needed to encode a media source which is lower bounded.

Give an example of calculating entropy form 3 symbols:

P(A) = 0.25, P(B) = 0.5, P(C) = 0.1

The Entropy will be:

H = 0.25*log(1/0.25) + 0.5*log(1/0.5) + 0.1*log2(1/0.1)

H = 0.25*2 + 0.5*1 + 0.1*3.32

H = 0.5 + 0.5 + 0.332 = 1.332

Thus H = 1.332 bits

5). Find the entropy of the word "helloeverybodyblablabla"?

- Total number of symbols n = 23

- Probability of each symbol

. P(a) = 3/23 = 0.1304

. P(b) = 4/23 = 0.1739

. P(d) = 1/23 = 0.0434

. P(e) = 3/23 = 0.1304

. P(h) = 1/23 = 0.0434

. P(l) = 5/23 = 0.2173

. P(o) = 2/23 = 0.0869

. P(r) = 1/23 = 0.0434

. P(v) = 1/23 = 0.0434

. P(y) = 2/23 = 0.0869

- H = P(a)log2[1/P(a)] + P(b)log2[1/P(b)] + P(d)log2[1/P(d)] + P(e)log2[1/P(e)] + P(h)log2[1/P(h)] + P(l)log2[1/P(l)] + P(o)log2[1/P(o)] + P(r)log2[1/P(r)] + P(v)log2[1/P(v)] + P(y)log2[1/P(y)]

- H = 0.1304log2[1/0.1304] + 0.1739og2[1/0.1739] + 0.0434log2[1/0.0434] +

0.1304log2[1/0.1304] + 0.0434log2[1/0.0434] + 0.2173log2[1/0.2173] + 0.0869log2[1/0.0869] +

0.0434log2[1/0.0434] + 0.0434log2[1/0.0434] + 0.0869log2[1/0.0869]

Therefore, H = 3.0821 bits