Name: ROTHA Dapravith

ID: e20190915

Group: I5-GIC(B)

**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) = 7/19 = 0.1304

. P(b) = 3/19 = 0.1739

. P(c) = 3/19 = 0.0434

. P(d) = 4/19 = 0.1304

. P(e) = 1/23 = 0.0434

- 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