List of Experiment

1. Write program to calculate normal and joint entropy.
2. Write program to calculate conditional entropy and mutual information.
3. Write program to implement Shannon-Fano coding algorithm.
4. Write program to implement Huffman coding algorithm.
5. Write program to implement Adaptive Huffman coding algorithm.
6. Write program to implement Arithmetic coding algorithm.
7. Write program to implement LZW coding algorithm.
8. Write program to implement Block Code algorithm.
9. Write program to implement Convolutional Code
10. Write program to implement STBC

Experiment Number 1

Name of the Experiment:

1. Write program to calculate normal and joint entropy.
2. Write program to calculate conditional entropy and mutual information.

**Pre Lab**

What is Entropy? How can it measure the Information?

Write down the expression for Normal, joint and conditional entropy. Also write the expression for the mutual information.

Calculate the entropy in bits for each of the following random variables:

1. Pixel values in an image whose possible grey values are all the integers from 0 to 255 with uniform probability.
2. Humans classified according to whether they are, or are not, mammals.
3. Gender in a tri-sexual insect population whose three genders occur with probabilities 1/4, 1/4, and 1/2.
4. A population of persons classified by whether they are older, or not older, than the population’s median age.

**Sample Code**

**Task 1**

**Examples**

**I = imread('anypicture.tif');**

**J = entropy(I)**

**Task 2:**

**Draw Histogram of image data (imhist)**

**Task 3**

%Entropy and Mutual Information of BSC

clc;

close all;

clear all;

i=input('Enter the number of elements:');

p=input('Enter the probabilities:');

q=input('Enter the conditional matrix:');

sum=0;

for n=1:i

H=sum+p(n)\*log(1/p(n))/log(2);

sum=H;

end

disp('H(x):');

disp(H);

%Joint probability matrix

for n=1:i

for m=1:i

a(n,m)=q(n,m)\*p(n);

end

end

disp('H(x,y):');

disp(a);

%Entropy H(y|x)

d=0;

for n=1:i

for m=1:i

H1=d+(a(n,m))\*log2(1/q(n,m));

d=H1;

end

end

disp('H(y|x):');

disp(H1);

%Probability p(y)

for n=1:i

w=0;

for m=1:i

s(n)=w+a(n,m);

w=s(n);

end

end

disp('P(y):');

disp(s);

%Entropy H(y)

k=0;

for n=1:i

H2=k+s(n)\*log2(1/(s(n)));

k=H2;

end

disp('H(y):');

disp(H2);

%mutual Information

m=H2-H1

disp('Mututal Information');

disp(m);

Task 4

Write a Matlab program for entropy anf mutual information of a noiseless channel

Task 5

Draw the relationship between H(x) and P(x), and show that H(x) is maximum for two equally likely symbols, i.e., P1=P2=1/2