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Information Theory

Laboratory Exercise: Information Sources

- This Laboratory session is NOT assessed.
- As you proceed with this investigation, you must complete a personalized lab answer sheet and submit it before you leave this laboratory.
- You must also keep your own notes of your observations and results.

Aims: This lab session is designed to give you some practical experience of estimating information and entropy measures in real-life examples, and to enhance your understanding of the fundamental concepts of Information Theory in general.
Equipment: Software: Matlab.

Exercise 01: Consider two binary sources, X={A,B} and Y={C,D}, with p(A)=0.1, p(C)=0.4 and p(A,D)=0.05. Estimate

a) The entropy of each source
b) The entropy of the joint source XY
c) The conditional entropies H(X|Y) and H(Y|X)
d) The mutual information between X and Y.

Exercise 02: Consider two sources, X and Y, with joint distribution

y\x	1	2	3	4
1	1/8	1/16	1/32	1/32
2	1/16	1/8	1/32	1/32
3	1/16	1/16	1/16	1/16
4	1/4	0	0	0

Estimate

a) The probability distribution of each source
b) The entropy of each source
c) The entropy of the joint source XY
d) The conditional entropies H(X|Y) and H(Y|X)
e) The mutual information between X and Y.