A MATLAB package for the entropic inequalities.

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Abstract

This is a documentation for MATLAB package of programs, which can be used to work with entropy vector method. This method allows one to derive entropic inequalities from basics axioms of entropy (e.g. Shannon inequalities) and some possible additional linear constraints. These additional constrains can be defined by the causal structure of some causal model (Bayesian Network or Markov Random Fields).

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1 Introduction

General introduction to write.

The main object, which this package operates with, is system of linear inequalities $Ax \leq b$ for some coefficient matrix A and vector of constant b. In this package such systems are given by structures, containing three fields. For a structure `S`

`S.A` – is a coefficient matrix A,
`S.b` – is a vector of constant b,
`S.var` – is a list of variable indexes.

List of variable indexes are given as decimals of binary encoding of variables. For example, for entropy of two variables X and Y, their binary codes are [1 0] and [0 1] respectively. For the joint entropy $H(XY)$ the respective code is [1 1]. Explain more.
Definition of entropy vector should be given above.

2 Basic inequalities

In this section we describe the commands which generate systems of inequalities

- `ShannonCone(N,[list])` : System of Shannon inequalities for variables from the `list`. If `list` is not specified `list` = [1:N] .

3 Causal structure

4 Some basic functions used in the package

- `i2v(N,[list])` : Translator of numbers from decimal system to binary. Used here to enumerate superset of variables.
  If `list` is not specified `list` = [1,... 2^N] . Example:

```
>> V = i2v(4,[3,5])
V =
    0 0 1 1
    0 1 0 1
```

- `v2i(list)` : Translator of numbers from binary system to decimals.

References

[1]