

Entropy, Meshalkin, and Determinism

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ABSTRACT: A little part of the talk I gave, at Matt Foreman’s invitation, at UC Irvine, on Thursday, 23May2002.

Meshalkin’s example

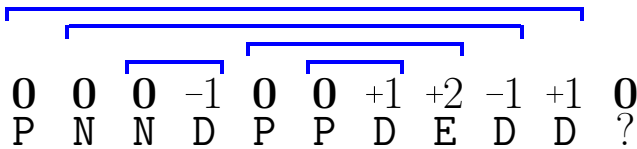
Let \mathbb{X} be the, doubly-infinite, shift-space over “*digit* alphabet” $\{0, +1, -1, +2, -2\}$. Let $S:\mathbb{X}^{\mathbb{Z}}$ be the independent $(\frac{1}{2}, \frac{1}{8}, \frac{1}{8}, \frac{1}{8}, \frac{1}{8})$ -process on \mathbb{X} .

And let $T:\mathbb{Y}^{\mathbb{Z}}$ be the independent $(\frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ -process over “*letter* alphabet” $\{E, D, P, N\}$; Even, oDd, Positive, Negative.

Each of $+1, -1, +2, -2$ is a **NZD**; a Non-Zero Digit. Given a point x

... 0 0 0 -1 0 0 +1 +2 -1 +1 0 ...
 ... ((() (()))) (...

regard each 0 as a left-parenthesis, and regard each NZD as a right-parenthesis; this is shown above, in the lower line. I.e, for each pair of the form 0 NZD, [i.e $x_n = 0$ and x_{n+1} is an NZD] link up the pair, then mentally “delete” these pairs. Apply this idea recursively.



Below each 0, write “P” or “N” as the 0 is linked to a *positive* or *negative* digit. And below the other digits, write “E” or “D” as the digit is *even* or *odd*. So the upper string is mapped to the lower strip.

Cylinder sets. A (*basic*) *cylinder set* is specified by listing symbols at an interval of coordinates. E.g

$$C := \llbracket +2 +2 -1 0 0 +1 \rrbracket_7$$

is the set of $x \in \mathbb{X}$ st.

$$x_7 = +2, x_8 = +2, x_9 = -1, x_{10} = 0, x_{11} = 0, x_{12} = +1.$$

We define the probability, $\Pr(C)$, to be the product of the probabilities of the individual symbols. Here,

$$\Pr(C) = \frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{8}.$$

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