

Re: Simple question on Shannon's 1948 paper

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- *From:* "Michael" <mchl@xxxxxx>
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Inf wrote:

I have (if you don't mind) one last question.

I assume $N(t-t_i) = 0$ if $t-t_i < 0$.

My question is what to assume about $N(0)$.
If t_1 is the smallest of the t_i 's and I choose
 $t=t_1$ then I would expect that $N(t_1)=1$.

Plugging this into the formula Shannon derived,
I get $N(t_1)=N(0) + 0 + 0 + \dots$

So I evidently need to take $N(0)=1$. Is this correct
and if so what is its interpretation?

Ah, yes, the base cases. I hadn't thought of that, but here's what I
can work out:

Remember that $N(t)$ is "number of sequences of duration t ."

Clearly there are no sequences of duration < 0 , so $N(t) = 0$ for $t < 0$.

For $t = 0$, there is exactly one sequence, namely the empty sequence
(i.e., a sequence of length 0). Assuming $t_1, t_2, \dots, t_n > 0$, which
is a reasonable assumption. So $N(0) = 1$, as you said.

So your example:

$$\begin{aligned} N(t_1) &= | \{ \text{set of sequences of duration } t_1 \} | \\ &= | \{ S1 \} | \\ &= | \{ "" + S1 \} | \\ &\dots \end{aligned}$$

$$\begin{aligned} N(0) &= | \{ \text{set of sequences of duration } 0 \} | \\ &= | \{ "" \} | \\ &= 1 \end{aligned}$$

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Michael