Re: Probability of picking a positive rational number at random

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- *From*: "Ross A. Finlayson" <raf@xxxxxxxxxxxxxxx>
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On Mar 14, 8:05 pm, Tim Little <t...@xxxxxxxxxxxxxxxxxxxxxxxxxx>
wrote:

> On 2008−03−14, Ross A. Finlayson <r...@xxxxxxxxxxxxxxx> wrote:
> [... "distribution" based on arbitrary well−orderings ...]
>
>> That's a random natural integer no different than uniformly random from all the natural integers.
>
> To make sense of this, start with the definition of a probability distribution: a measure over a sigma−algebra of sets such that the measure of the universal set is 1.
>
> In particular, you start with the Lebesgue measure on the reals. Then from each Lebesgue measurable set you construct a set of distributions over the natural numbers via two arbitrary well−orderings (which had better have the same order type).
>
> Now, what are you doing with the measure over these sets of distributions? That wasn't clear.
>
> The rest of your post appeared to be based on false premises.
>
> − Tim

Maybe that's a misperception. Maybe it just is so that there's an infinitesimal iota, greatest among infinitesimals, just like there's a least inductive set, least among infinities.

(Certainly the real universe exists, and as the functions between physical objects are physical objects, and there's a universe, assigning to objects ordinals leads to there being a certain truth in that the universe is itself, i.e., Cantor's paradox, towards redirection about false premises.)

I'm not sure how to describe the sigma−algebras of distributions of distributions of integers, in countable additivity (i.e., in systems that are partitionable into countably many "equal" sized partitions). The notion is basically about using uniformity and symmetry as first principles in describing densities for probability density functions, instead of standard measure theoretic ones. There is a consideration that of all the possible distributions, there could be a uniform distribution over them, in that: given a random ordinal, or asymptotically for much larger ordinals in abandon than the order type of all the possible distributions, in selecting among those, that there is a uniformity in the continuum as a principle. Now, that's rather unstructured but those are actually technical words with specific meanings. (That's meant for mathematical sophisticates.)

A random real is generated as an infinite sequence and in ZFC there is an ordinal for that real. For each o in O there is a well−ordering <R (O)> such that r is the o'th element. In general, given a well−ordering of R, there is absolutely no idea, no algorithm to conclude, what ordinal o maps to each element of r. Then, in selecting a real number at random, where each real number has the exact same probability of being the sample selected because it is an infinite sequence of independent Bernoulli trials (i.e. fair coin tosses, yes/no, true/false, 0/1), that indicates an ordinal. Then, in well−ordering the distributions D of natural numbers N, <D>, that ordinal which is just as likely as any other to be selected is mapped to only one distribution.

Now, I should carefully consider the notion that there could be a distribution with no most probable value, because before I said to just select uniformly among the most probable elements of d, because there's no way to say that one of those is any different than a totally random natural integer with no way to describe its probability of selection except as being the same as any others'. Having infinitely many probabilities' sum converge to a value would have that for those events, their sum would be less than or equal to one, so then there would be infinitesimal probabilities. So, standardly, there are no nonzero infinitesimals.

So, by sampling a real (and figuring the order type of c was the same as the order type of the set of distributions, where having it not be is funny) as infinitely many independent Bernoulli trials, notwithstanding earlier considerations of the sampling (and statistical) algorithm as generating infinitely many samples, there is a totally random ordinal that no standard logician can dare say what it is, in terms of well−ordering the reals, except that it's an ordinal. (Choice is useful for facts like every vector space having a basis.) Then, using the distribution that happens to be marked by that ordinal in a "random" well−ordering of the distributions of the naturals a natural number is indicated, and: there is absolutely no knowledge of it other than that it's a random natural integer, thus,

it's probability of selection is the same as that of any other, thus,
it's uniform in selection, and probability.

Also, mod two it's either zero or one, with equal probabilities of
either.

Ross

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