Re: Distance Between 2 Randomly−chosen Points on a Sphere

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From: The World Wide Wade (*waderameyxiii_at_comcast.remove13.net*)
Date: 10/12/04

Date: Mon, 11 Oct 2004 18:05:53 −0700

In article <931f9c2.0410110931.5a4a838f@posting.google.com>,
cauchy_1@yahoo.com (Brett) wrote:

> *The World Wide Wade <waderameyxiii@comcast.remove13.net> wrote in message*
> *news:<waderameyxiii−229165.20571110102004@news.supernews.com>...*
> > *In article <931f9c2.0410101841.97b1f13@posting.google.com>,*
> > *cauchy_1@yahoo.com (Brett) wrote:*
> >
> > > > *The OP wrote "randomly selected points on a sphere" so there's really*
> > > > *no*
> > > > *ambiguity.*
> > >
> > > *My question is: What does "randomly selected points on a sphere" mean?*
> >
> > *I already answered this.*
> >
> > > *Maybe it is conventional to assign a uniform distribution on the*
> > > *sample space.*
> >
> > *That's what it means.*
>
> *Does this "convention" extend to all sets?*

No. It wouldn't make sense for every set.

> *What is a uniform*
> *distribution on the natural numbers? (other than assigning P(E)=0 for*
> *each subset E)*

There isn't one. That's why when someone comes on sci.math positing a
"random selection from the set of integers", he is given a warning, sent
out of the building, then allowed to come back in slowly.

> *Or is this convention restricted to say (appropriately*
> *scaled) n−dimensional Lebesgue measure on compact n−dimensional*
> *manifolds. Do you have any references?*

You have certain sets X that have well known and natural uniform distributions on them. [0,1], S^n, O(n), any finite set, ... For such X the language "randomly select" − without further qualification − almost always refers to this distribution. That's what my mathematical experience tells me, so that's my reference.

> > > But, that "interpretation" may not be what is desired.
> >
> > If it is not desired, then do not say it. Say something else instead.
> >
> > > For Bertrand's paradox, where chords
> > > are randomly selected on a circle, the uniform distribution of points
> > > on the circle does not satisfy scale and translation invariance.
> >
> > I do not understand what you mean (please explain),
>
> I included a reference that explains.
>
> > but even if it's true,
> > so what? I'm not saying "sample space = circle, uniform distribution" is
> > the best version of Bertrands' problem. I am saying that whatever version
> > you wish to state, do so clearly and precisely. There is no paradox here
> > beyond vague language.
>
> You must be aware that probability theory has some application to real
> world phenomena. So, given the problem of determining the
> "probability" that a chord chosen "at random", whatever that means, on
> a circle of radius R, has length greater than R(sqrt3) −−− which
> probability space is the best model for the problem?

This is a different question altogether. I do not address it, because I have a finite time to live.

> Obviously, once a
> space is fixed, an "answer" can be easily obtained. Is it your
> contention that a chord cannot be chosen at random?

It is my contention that the phrase "choose a chord at random" − without further specification − is seriously imprecise.

> That would seem to
> be an unnecessary restriction on the practical applicability of
> mathematics.

Just make it precise. If you can't do that, then what is this − literary theory?