Re: The complete infinite binary tree has only countably many infinite paths, says WM.

Source: http://sci.tech−archive.net/Archive/sci.logic/2009−03/msg00494.html

- *From*: Virgil <Virgil@xxxxxxxxx>
- *Date*: Thu, 26 Mar 2009 14:32:29 −0600

In article
<57912645−3985−40ce−a4b1−c935f59467ea@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
WM <mueckenh@xxxxxxxxxxxxxxxxx> wrote:

> On 26 Mrz., 11:58, "calvin.ost...@xxxxxxxxx" <calvin.ost...@xxxxxxxxx>
> wrote:
>
> > But have you done that? No. You merely *named*
> > the edges. That is not what you must do. You must
> > say what the edges are in terms of what nodes they
> > connect. Edges are a subset of the cartesian product
> > of the set of nodes with itself.
> > So, please continue, and specify what your tree is by
> > saying what the set of edges are, as a subset of NxN,
> > where N is the set of nodes defined above.
>
> Every edge leads to one and only one node. If we call the edge by E(x,
> y) where (x, y) is the node, then the edge is uniquely defined. There
> is not much work to do. Further if we work with edges, then we need
> not work with nodes at all. Therefore even the E can be dropped. Why
> do you see problems where they are not?

Label each node with a 1−origin natural assigned in row succession:

1
2 3
4 5 6 7
8 9 10 11 12 13 14 15
.....

Then the left child of node n is node 2*n + 0
and the right child of node n is node 2*n + 1

Then a left branching edge is a pair of form (n, 2*n + 0)
and a right branching edge is a pair of form (n, 2*n + 1)

And, in general left branches are even and right branches are odd, and a chain of edges depends only on its root node and the sequence of 0's for evens and 1's for odds identifying the direction of each successive branching.
Denote the leading node of any sequence of nodes by its number followed by a decimal point and the following edges by sequence 0's and 1's representing directins of brfanching, and one has a unique way of representing any chain of parent to child links.

Note the leftmost path is 1,2,4,8,...
And the rightmost path is 1,3,7,15,...

In that infinite tree (meaning with no terminal nodes), all PATH designators in that tree begin with '1.' followed by an endless sequence of 0's and 1's, and each different sequence denotes a different path.

> Then all the paths (except
> p_0) can be labelled by
> their last node
> that has value 1.

> Here, I think, is your problem. You are not
> noticing that when
> you add a single path, you are actually
> adding many paths.

> What many of paths do I add when I add 0.1000...?

> What I said here was based on trying to understand your
> account, and I did not. It is true that if
> you add paths only, you are adding only one
> path at a time. But you will not add all paths
> by doing that.

Before goning on, please anwer the question: Do you agree that I construct all the nodes respectively all the edges of the tree by my prescription?

But that is like only having all members of a set and then trying to count subsets. But for any set the number of members is strictly less than the number of subsets. This is certainly true for all finite sets, so that WM cannot logically object to it for infinite sets.

> Yes. You can construct the complete tree by all path that end by zeros. And you can deconstruct it by all paths that end by ones. You can construct it by all paths that end by the sequence of pi. Or you can construct it by path that end by whatever you choose from time to time.

> But you cannot construct it by using all paths that represent all real numbers of the unit interval unless you use some paths more than once.

In the complete infinite binary tree, which paths does WM claim must appear more than once?

> All paths simply do not fit into the tree.

And where do those alleged paths that don't fit come from, WM?

Since all paths are suitable sequences of edges, they are all necessarily IN the tree.
.