Re: Binary Tree and Pairs of Nodes

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- *From*: Virgil <Virgil@xxxxxxxxx>
- *Date*: Thu, 09 Oct 2008 22:55:27 −0600

In article
<871188cc−f053−4ab5−870f−0b57ce13e72e@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
WM <mueckenh@xxxxxxxxxxxxxxxxx> wrote:

> On 9 Okt., 16:49, LauLuna <laureanol...@xxxxxxxx> wrote:
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> > >
> > > And so on.
> >
> > Your game is just a countable sequence of choices, a countable
> > choice function. We have no guarantee that such a device will
> > 'finally' give us the entire tree.
>
> Of course there is no "finally". All we can say is that "iff there
> was an infinite countable set of nodes" and "iff infinite sets could
> be worked through completely", then every node would get its turn.

But every node occurs in infinitely many paths, as many paths as in the
entire infinite complete binary tree. So that every node gets infinitely
many
"turns".

> But if every node of the tree has been used to mark one path

Unless that node is a terminal (leaf) node, it marks more than one path, and in any infinite complete binary tree there are no terminal (leaf) nodes at all.

Thus WM's picture is, as usual, flawed.

> Therefore I do not express a criterion, but show that there can no path start at the root and lead out of the conquered domain without getting its node. That is a *forcing* logical element.

That is an illogical argument that carefully misrepresents the essential nature of infinite complete binary trees.

> This shows that there is no set of all reals. It is impossible to define more than a countable set of reals.

But not impossible to imagine them, wad as nothing mathematical is any more or less that a figment of imagination, they are there.

> There are no uncountable sets at all.

Outside of the imagination, there are no sets at all, but at least in my imagination, and the imaginations of many mathematicians, there are plenty of uncountable sets

> It is conceivable and it is countable (obviously the nodes are). It simply does never end, as every infinite set. There is no finished infinity. But that is not directly under discussion. What the tree shows is the falsity of the concept of uncountability.

Only to those for whom such falsity is a part of their creed.
To those with open minds there is no such artificial restriction of the

imagination.

> > As far as I can see, this would (perhaps) amount to refuting the
> > existence of the set of all reals.

> The tree does it.

The set of all paths of any infinite complete binary tree establishes the existence of at least one uncountable set.

> For instance, if I was forced to give an algorithm
> for my game, then I could say: Put the next node on the path that
> afterwards always turns left, i.e., on a terminating rational of the
> form 0.xxx...xxx000... with x either 0 or 1. Obviously the whole tree
> will be exhausted by this procedure (I conquer the whole tree). So no
> path remains. But I could also say: Put the next node on the path
> that afterwards always turns right, like 0.xxx...xxx111... Obviously
> I could find (countably) many such algorithms. Each one would exhaust
> the binary tree and let me win my game.

Where in the path that forever alternates between left and right do you place your node?

> How can that be? There are not all reals in that tree!

There are all infinite binary strings of left and right branchings in such a tree, including uncountably many paths each branching infinitely many times in both directions.

> But a tree is merely a picture for the binary, or decimal,
> representation of the reals (of [0. 1]).

Except that in a tree one does not combine two paths into one real.

> Therefore there are not *all* binary, or decimal,
> representations of the reals, not even those of all rationals.

Then your trees are either not infinite or not complete.

> The
> number of infinite sequences is countable and is much smaller than
> expected.

Only in WM's incomplete trees, not in any actual complete infinite
binary (or decimal) tree.
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