Subject: Re: equally spaced points on a hypersphere?
Posted by Craig Markwardt on Fri, 29 Oct 2004 15:29:31 GMT
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Matt Feinstein <nospam@here.com> writes:
> On 29 Oct 2004 07:51:58 -0700, robert.dimeo@nist.gov (Rob Dimeo)
> wrote:
>
>> Hi,
>>
>> I would like to create (n+1) equidistant points on an n-dimensional
>> sphere. The initial information provided is the center of the sphere,
>> the radius, and *any* point on the sphere. From that you need to find
>> the coordinates for the remaining n points. As a simple example,
>> three equidistant points on a 2-dimensional sphere (a circle), can be
>> located 120 degrees apart. Any hints on how to do this in general for
>> n-dimensions?

This is commonly called "tesselating" the sphere, or hypersphere in
this case.

> Unfortunately, when you go to dimension greater than two, there are
> constraints on the number of 'equidistant' points you can have on a
> sphere. For example, in 3-D, there are (only) five regular polyhedra,
> so n can only have the values 4, 6, 8, 12, and 20 for a tetrahedron,
> octahedron, cube, icosahedron, and dodecahedron.

So is there any requirement that the tesselation produce a regular
polyhedron?

Clearly it is possible to place *any* number of equidistant points on
a sphere via an iterative approach. As discussed on line, start
with random placement of points, allow the points to repel each other,
iterate until you reach the lowest energy configure.

Whether such an approach will work for Rob, I don't know.

Craig

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