Subject: Re: Averaging quaternions
Posted by John Lansberry on Fri, 19 Mar 2004 14:53:45 GMT
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"Craig Markwardt" <craigmnet@REMOVEcow.physics.wisc.edu> wrote in message news:on65d167y8.fsf@cow.physics.wisc.edu...
>
> GrahamWilsonCA@yahoo.ca (Graham) writes:
>
>> Does anyone know if it is possible to take an average of regularly
>> sampled quaternions to get a mean orientation (i.e. a mean rotation
>> matrix)? I seem to recall there being a trick involved but beyond
>> re-normalizing the resuling (averaged) quaternion, I cannot remember
>> what it is.
>
> I am sure I will be scolded by somebody, but I believe that you can
> average the quaternion components, and then normalize as you say.
> This is assumes that you are noise dominated.
>
Averaging components is a bad idea no matter what, since the result is never a "quaternion." The OP doesn't imply anything about "noise."

> Also, there is one trick that I can think of, which is that
> quaternions are degenerate. For each unique rotation, there are two
> possible quaternions whose components have opposite signs. This is
> because a positive rotation about axis V is identical to a negative
> rotation about axis -V.
>
> If your system is capable of both signs indiscriminately, then you
> must make the sign conventions uniform. For example, by always making
> one component positive.

You are correct that q and -q represent the same rotation - that's not "degenerate", it's just not "unique." Typically, the "scalar" part of the quaternion, cos(theta/2), is chosen to be the component that's always positive.

John