Subject: Re: CALCULATION OF AREA ON A SPHERE
Posted by Med Bennett on Tue, 22 Feb 2000 08:00:00 GMT
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This is an interesting problem and I was hoping that someone would have provided a slick answer by now. I started searching the Web and came up with the following. It seems as though you could triangulate your points and then use the theorem presented below:

http://www.geom.umn.edu/docs/doyle/mpls/handouts/node16.html

Geometry on the sphere

We want to explore some aspects of geometry on the surface of the sphere. This is an interesting subject in itself, and it will come in handy later on when we discuss Descartes's angle-defect formula.

Discussion

Great circles on the sphere are the analogs of straight lines in the plane. Such curves are often called geodesics. A spherical triangle is a region of the sphere bounded by three arcs of geodesics.

1.Do any two distinct points on the sphere determine a unique geodesic? Do two distinct geodesics intersect in at most one point?
2.Do any three `non-collinear' points on the sphere determine a unique triangle? Does the sum of the angles of a spherical triangle always equal pi? Well, no. What values can the sum of the angles take on?

The area of a spherical triangle is the amount by which the sum of its angles exceeds the sum of the angles (pi) of a Euclidean triangle. In fact, for any spherical polygon, the sum of its angles minus the sum of the angles of a Euclidean polygon with the same number of sides is equal to its area.

A proof of the area formula can be found in Chapter 9 of Weeks, The Shape of Space.

Kyong-Hwan Seo wrote:

> I am looking for a way to calculate area on sphere.
> I have arrays of the position of the connected points (i.e, longitudes
> and latitudes).
> If somebody has an idl program, please let me know.
> Thanks in advance,
>
> K.H. Seo