Subject: Surface Rendering from Stereo-pairs
Posted by Larry Busse on Fri, 31 Dec 1999 08:00:00 GMT
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Is anyone aware of a method or software package that is capable of doing surface mapping using a pair of stero images as input? I realize it may be necessary to mark (or manually identify) common points in the images. Any guidance or suggestions in this regard would be greatly appreciated.

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Subject: Re: Surface Rendering from Stereo-pairs
Posted by Jonathan Joseph on Thu, 06 Jan 2000 08:00:00 GMT
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Larry,

While the theory behind photogrammetry (reconstructing the 3D topography from images) is, I believe, well understood, in practice, it's really not that simple.

In the idealized case, if you have N images in each of which you can see the same M landmarks (there are minimums for N and M) then you can figure out the 3D locations of the landmarks and the positions and orientations of the cameras - to a factor of scale.

There are commercial products on the market which do this. I remember looking into a few, but decided that they were too specific for my needs. Sorry I don't have any names (it was a couple of years ago).

People that do GIS (forgive me but I'm not sure what that stands for - maybe Geological Information Systems) or anyone that wants to make a topographic map are, I believe, the largest group of people to make use of photogrammetry. They are usually dealing with the special case of reconstructing topography on what is basically flat ground with lumps, from aerial photographs.

Another set of users are those who want to reconstruct the shape of objects without spending $$ on a 3D scanner. Or to reconstruct the shape of buildings.

If you want just the locations of a few points that you then triangulate to form surfaces, that can generally achieved pretty well if you have "good" landmarks - and images from "good" vantage points.

The programs are basically triangulating to find the locations of the points. A landmark is generally not a precise point and error is easily introduced in picking their locations.
A small amount of error in marking the location of a landmark will be greatly magnified if the images are taken from vantage points with a small angular separation.

If you want a very high resolution surface - then you won't want to mark thousands of points in each image - you will want something that uses pattern matching on a pair of images to calculate control points for you. Depending on the type of image, this can work very well or very poorly. Of course, pattern matching will work best when images are very similar (which is exactly when triangulation will magnify any errors).

I'm not sure exactly what your need is, but maybe I have given you some leads on where to search.

The more variables you can remove from the equation (such as exact location, orientation and optic paramaters of the camera for instance) the easier it will become.

The more images you have, the more you can reduce the error (usually). And the longer your processing time will be.

Good luck.

-Jonathan

Larry Busse wrote:

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-Jonathan