
Subject: Re: Image warping in IDL

Posted by [James Kuyper](#) on Fri, 10 Nov 2006 16:38:59 GMT

[View Forum Message](#) <> [Reply to Message](#)

Wox wrote:

> On Fri, 10 Nov 2006 10:05:25 +0100, Wox <nomail@hotmail.com> wrote:

>

>> 2. Is there a "magic operation" for converting CP's and uvec/vvec so

>> that xmap and ymap describe distortion of output pixels?

>

> Maybe some simple analog example to make this clear:

>

> Take a 1D polynomial for which you know the coeff. and degree:

> $y(t)=a+b.t+c.t^2+d.t^3$

>

> Is there a "magic operation" that can estimate/calculate a',b',c' and

> d' in the following :

> $t(y)=a'+b'.y+c'.y^2+d'.y^3$

>

> The 2D splines are a little bit more complicated, but they are just

> piecewise polynomial surfaces.

The solution is straightforward, in one dimension. Choose a set of t values that is sufficiently large, and use your splines for the forward transformation to calculate corresponding y values. Then fit a spline in y to your t values. This will provide a spline approximation to the inverse of your first spline. It will be exactly correct at the points you chose, and less accurate as you move away from those points.

However, this approach doesn't generalize to 2-D data very well. I hope someone else can help you, but the only efficient algorithms I know of for fitting 2-D splines require that the function being fitted, $z(x,y)$, is tabulated on the outer product of a set of x values and a set of y values. When the only way to determine the x and y values is by evaluating a spline interpolant, I don't see any easy way to arrange that they form an outer-product set.
