Subject: Re: lens distortion
Posted by JD Smith on Fri, 19 Sep 2003 18:17:53 GMT
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On Tue, 16 Sep 2003 15:10:04 -0700, Ale wrote:

> I need to develop an IDL routine to correct lens distortion
> (barrel/pincushion) for our CT camera. Where could I find suggestions or
> examples on this topics ?
>

Not too hard to develop on your own. Have a look at:

http://www.path.unimelb.edu.au/~dersch/barrel/barrel.html

Near the bottom, he describes the quartic radial polynomial which achieves barrel/pincushion correction. You can use just one of the terms to get decent correction, e.g.:

```
 r_src=(b*r_dest^2+(1-b))*r_dest
```

The idea is to transform the radius to each pixel using this equation, remap to cartesian coordinates, and use INTERPOLATE to get the results. Here's what I came up with:

```
function pincushion_correct,im,b
  d=size(im,/dimensions)

  ;; Create, scale and correct a radius to each pixel
  scale=.5*min(d)
  r_dest=shift(dist(d[0],d[1]),d/2)/scale
  r_src=(b*r_dest^2+(1.-b))*r_dest*scale

  ;; Convert back to cartesian coordinates
  l=lindgen(d) & dy=d[1]/2-l/d[0] & dx=l mod d[0]-d[0]/2
  angle=atan(double(dy),double(dx))
   r_theta=[reform(angle,1,product(d)),reform(r_src,1,product(d ))]
  new_xy=cv_coord(FROM_POLAR=r_theta,/TO_RECT)
  x_src=reform(new_xy[0,*],d)+d[0]/2 & y_src=d[1]/2-reform(new_xy[1,*],d)
  return,interpolate(im,x_src,y_src,/CUBIC)
end
```

And then try:

```
read_jpeg,filepath('people.jpg', SUBDIR=['examples','data']),im,/GRAYSCALE
tv,[im,pincushion_correct(im,-.15)]
```

Note that typical corrections for rectilinear lenses are around -.02 to .02 (this was exaggerated for demonstration purposes), and that negative b's correct barrel, positive b's correct pincushion. This same technique could be used for any distortions, including "rubber sheet". Be aware, however, that IDL's native interpolator isn't the best; see http://www.path.unimelb.edu.au/~dersch/interpolator/interpol ator.html to find out how various interpolation algorithms stack up when used with imaging data.

Good luck,

JD