

Re: correlation of rotated image with perspective

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- *From:* serg271 <serg271@xxxxxxxx>
 - *Date:* Tue, 31 Jul 2007 06:16:16 -0000
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On Jul 30, 11:36 pm, Adam Chapman
<adam.chap...@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx> wrote:

On Jul 30, 9:11 pm, Martin Leese <ple...@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
wrote:

Adam Chapman wrote:

Thanks for the reply Bob,

This visual system is designed to go on a military UAV in urban environments, so anything that lights up will likely be shot at!

I think that a rotated 'H' could be identified using a Fourier-mellin transform, but it's the distortion from perspective that's really confusing me.

As Bob said, this is a difficult project to do with image processing. Given this, any solution you come up with is unlikely to be robust.

You need to simplify the problem. Having a laser on the 'H' sounds good to me. You are going to need to distinguish your 'H' from fake 'H's painted by the enemy anyway, and GPS would seem to be appropriate for this.

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If the UAV shoots then, presumably, it will be fitted with IFF. This can prevent the thing shooting at the friendly 'H'.

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Regards,
Martin Leese
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Thanks for the suggestions.
Ignoring if the 'H' is friendly or not for now, if I could find the corners of the H shape it would be fairly simple to estimate the perspective projection, orientation and distance from the landing pad if the dimensions of it are known.

I did try finding straight lines with a Hough transform, then finding the equations of those lines and identifying corners as the line intersections. However, multiple lines were found on the vertical edges of the H and hence gave me loads of possible corners!

any better ideas?

That is a classical marker registration problem, there are many solutions for it. Specific solution depend on how noisy image, resolution and how much calculating power you can spend. First you can google for "marker registration" "augmented reality" and "mixed reality". BTW there were some threads about it in this ng. I myself working with cell phone, so I'm well versed only in low-cost low-resolution methods. For you situation low-cost method would be to use not pure edge-detector but threshold/adaptive threshold, or combination of threshold-edge-detector. Idea is extract black connected components and analyze them. Make contour from the shape. Segment contour into straight lines (how to do it was discussed in this ng). Now count the number of straight lines to see if it the same as in H. If test pass run second test - analyze convexity of the contour, it should be the same as in H (external lines, internal lines should have the same relationship) . Now third test - using statistical projective invariants check all the points of the H. After all test passed you can be reasonably sure you have identified H. Using corners calculate projective transformation. Convert to "H" coordinates and make last test - check that all non-corner points have exactly correct coordinate. Now you have your H and it's projective transform. The way I described is "cheap" - that is what I do on cell phone (I dropped statistical projective invariants

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though – they were not much help in the low resolution image, but if your image is high-res they could be extremely helpful).
If you have unlimited calculation power you can use other approaches – for example there exist projective-invariant variation of Fourier-Mellin transform (don't ask me about it – never used it and even hadn't finished the article).

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