EE 368 Project Proposal

Students:

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Title:

Real-time Hough transform for Directional Orientation

Description:

We aim to implement a real-time Hough transform on the DROID for directional orientation.

The usage scenario is as such: the user points the camera viewfinder in some arbitrary orientation at some manmade object or objects. Presumably as with any manmade structure, there'd be many "lines" that would all be parallel or perpendicular to each other. However, due to the orientation of the camera the resulting image would suffer from perspective distortion- for example, parallel lines appearing to converge.

A Hough transform is then performed to detect these lines, and subsequently extract the vanishing points. From there, the program would be able to understand the perspective with which the phone is oriented. For example, if one were inside a long hallway it'd ideally be able to tell which way is up, which way is down, which "direction" the hallway is pointing in.

We expect two major algorithmic challenges. First is finding a suitable implementation of the Hough transform and massaging it for our own purposes. As the Hough transform is computationally intensive, for performance reasons the images will have to be downsampled first. Second is the vanishing point extraction. We foresee as a first pass making our system work in MATLAB for still images, and then proceeding onto the real-time Android implementation.

There are many possible extensions, but as a "base" system we hope to accomplish a real time system that detects hallway orientation in some building on campus, possibly Gates or Packard.

References:

Real-time Hough Transform:

"Real-time line detection through an improved Hough transform voting scheme"
http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6V14-4NN0W4B-2-1&_cdi=5664&_user=145269&_pii=S0031320307001823&_orig=search&_coverDate=01%2F31%2F2008&_sk=999589998&view=c&wchp=dGLzVlz-zSkWA&_valck=1&md5=28044683082d0ecbaec8ebe0fc3a6a2c&ie=/sdarticle.pdf

Vanishing Point Extraction:

"Vanishing Points and 3D Lines from Omnidirectional Video"
http://cml.mit.edu/~jleonard/pubs/tvc_final.pdf

"Experiments in Building Recognition"

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.112.6290&rep=rep1&type=pdf