

Visual obstacle avoidance

Written by Lior

Thursday, 27 January 2011 23:44 - Last Updated Friday, 28 January 2011 00:03

Goals

- Learn to avoid obstacles using vision.
- Use optical flow for low-level obstacle avoidance and collision detection.
- Use gist to further determine and analyze the presence of obstacles. That is, don't run away from shadows.
- Learn to extract high-level features for object recognition to know what to do in a particular situation. For example, when entering a doorway, the optical flow can look like an obstacle (two edges moving away from the center). Learn the features of doors and other objects to determine the appropriate action.

Here is a movie of an RC car I have roaming around in my office. I am controlling the car. The car is being tested under various conditions, and in particular the sun (at one point the sun is right at the camera). The vertical and horizontal motions are plotted by normalizing the images from 0 to 255. It can be seen how pixels (in particular edges) that move to the right are shown in white while pixels that move to the left are in black. This also follows to the vertical motion, pixels moving up are white and pixels moving down are black.

Because of the sun, I can already see some challenges that we would need to overcome when driving outdoors. In particular, avoiding false obstacles (shadows) and automatic contrast selection for better picture under various light levels.

{youtube}bxRdB2uaY20{/youtube}