Sinead Plunkett - Abstract -

Tracking with Height Estimation in an Autonomous Surveillance System

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The goal of this project is to correctly estimate the height of people on video to be used to aid in people tracking and identification.

The approach of this dissertation is to use an object of a known size to estimate height of standing people in a scene to better track and re-identify them as they move between fields of view. This would help solve the occlusion problem when one person walks in front of another. This approach would be able to calculate the size of any detected object in the scene by comparing it to the size of the known object which would normally be found in the scene.

This object used is a bicycle wheel. Most road and racing bicycles today use 622 mm diameter rims. By first identifying the bicycle wheel and its position in the two dimensional representation of the scene, it would be possible to calculate the real world height or size of any other identified object (in this case a person) at that point in the image.

A system was developed to test this using C++ and OpenCV. The system first finds all moving objects in the video. Each moving object is identified as either a bicycle, person or unidentified object (neither bicycle nor person). If the moving object was found to be a bicycle, its wheels are found and measured in pixels. The pixel height of the wheels are stored as well as each wheel's position. If the moving object was found to be a person, that person's real world height is calculated using the stored wheel values.

For this, a background subtraction algorithm was used to detect moving objects, as well as a people detector. A bicycle wheel detector was developed.