

Visual Tracking with PQS

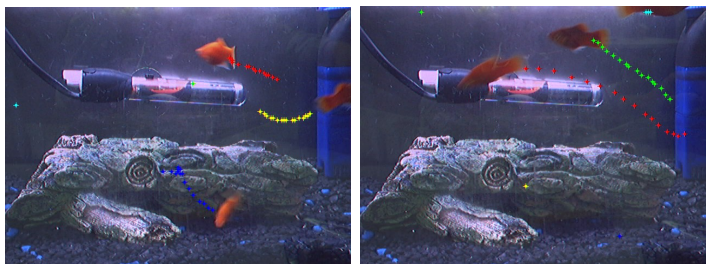
Project description

INTRODUCTION

Our ability to visually follow objects is second nature to the human brain. The complexity of this ability is often under appreciated, as it requires both visual understanding of an environment, as well as an understanding of the kinematics of the objects in the environment. This complexity has become apparent when computers were first programmed to track radar objects in the late 1980's. Problems arise when the space is filled with many moving objects close together, or when objects are obscured by obstacles and later reappear. It is also possible for objects to obscure each other, or to move into view of another camera. By describing the way that objects move and behave (their kinematics) we have created process models for use by a PQS that can track and accurately predict the positions of many objects in visual range, even when they are occluded. This way our software knows, from frame to frame, which objects are the same, where they are going, and how fast. It is even possible to tell the difference between different types of objects simply by observing their behavior.

THE APPLICATIONS

To demonstrate the visual tracking abilities of a PQS we created two demo applications. The first tracks fish in a tank using a \$100 web cam and a commodity PC. The models differentiate between fish, bubbles, plants, debris, and correctly follow the fish, even when they are behind obstacles. More advanced models are able to identify specific complex behaviors, such as feeding, chasing, and idle behavior.



The second application tracks humans walking in the field of vision of an infrared camera. The PQS

models detect if persons are approaching or departing from the position of the point of view of the camera, and correctly track and predict even when persons disappear from view temporarily.



Both applications demonstrate capabilities that have the potential to significantly advance visual tracking for monitoring and security purposes.

PROCESS QUERY SYSTEMS

A PQS is a generic correlation engine that puts the focus on the dynamics of an environment, instead of using traditional static methods. By describing how things change over time, a PQS is able to achieve previously unseen levels of detection and correlation in environments too complex for conventional techniques.

FUNCTIONAL SPECS

This PQS-based application was implemented using the following system requirements:

- PQS platform (either PQSlite or C-TRACK)
- Pentium 4 or better
- SPARC III or better
- 512 MB RAM
- Webcam or framegrabber TV card (PAL/NTCS)
- MS Windows XP/2000, Linux 2.6, Solaris > 8
- or: Mac OS/X with Quicktime 7

WOULD YOU LIKE TO KNOW MORE?

If you would like to learn more about this PQS application, or if you would like to use this functionality in your environment, please contact:

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