Tracking People in Airports

Group 926 - 9. semester:
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As a service provider the airport underlies costumer demands and therefore has to react according to the behaviour of these. The airport is a busy place due to the functionality of being a transit between modes of transportation, and to manually monitor the passengers would take an enormous effort. Automatic tracking with the use of computer vision is a possible solution, that does not require substantial changes to the layout of the area and allows discreet monitoring and analysis in real-time. Achieving execution time within real-time requirements may however result in a trade-off between precision and computational power.

The information obtained by such a system may be utilised in many usefully ways:

- Crowd statistics
- Service evaluation (queue length)
- Security
- ...

The study is limited to working on a test environment here on NOVI and with a maximum of three cameras. The aim of the study is to develop the computer vision system that forms the basis for a crowd statistics or service evaluation system. It is not the aim of the study to move into the more elaborate parts of crowd statistics.

Applied methods:

At the moment we don't know exactly witch methods we want to use. In general a person tracking system can be described as consisting of four parts; Environment modelling, motion detection, prediction and tracking. I these four areas we are considering the following methods:

- Environment modelling
  - Camera calibration
  - Background model (If background subtraction is used)
- Motion detection
  - Background subtraction

  - Temporal differencing
  - Optical flow
- Prediction
  - Kalman Filter
  - Condensation
  - None!
- Tracking algorithm
  - Template match
  - Contour / Active shape match
  - Blob
  - Feature based

Status:

We have the framework of our system (A program in C++ that can load and show up to four movies simultaneously and we can write and draw on top of them). We are using OpenCV and OpenGL.

We have made test recordings with a S-VHS camera (The best camera available to us, because we need 3). We don't have recordings with three synchronised cameras. We haven't worked with camera calibration yet.

We have read a lot of articles and summarised them. We still need to read more articles since this field of research is huge. Our aim is to implement the best known methods and then try to make an improvement in some smaller area.

Problems:

- Lighting invariance - The system must work in the worst conditions (both artificial light and with sunlight from large glass frontings.
- Occlusion - We want the system to work even if the room is full of people! This means that even if the background is successfully removed we have problems separating people from each other.

Timetable:

We are in a hurry!!!