No more getting lost in the crowd: New technology tracks multiple athletes at once

November 7 2011

Using standard cameras and without physical tags on the players, EPFL's CVLab has developed a powerful tool for tracking athletes. Credit: EPFL

International sports federations would like to be able to follow the movements of individual athletes more easily during televised matches, even when they're hidden from view. Today, EPFL's Computer Vision Laboratory announces an innovative system that accomplishes this task -- and the implications go far beyond sports.

EPFL's Computer Vision Laboratory (CVLab), led by professor Pascal Fua, now has a new tool that makes it possible to follow multiple players at once on a field or court, even when they're buried under a pile of bodies in a rugby match or crouched behind another player. The athletes are represented on a screen with a superimposed image bearing their jersey color and number, so spectators, referees, and coaches can easily follow individuals without mixing them up. And there's no need for the

players to wear extra gear or RFID chips.

At the International Conference on Computer Vision in Barcelona today, Fua and his team describe their method for tracking players continuously from the time they enter the field. The system is made up of eight standard cameras - two on each side of the field or court, two that film from above and two that zoom – and three algorithms. After a tackle, goal, basket, or pileup, the system reattributes the jersey number to each player automati-cally. No more getting lost in the crowd.

The same system can be used in the operating room or to observe crowd flow. Credit: EPFL

Three algorithms developed by Jerôme Berclaz, Horesh Ben Shitrit, Engin Turetken, and Pascal Fua in collaboration with François Fleuret from Idiap make the system work. The first detects individuals at a specific moment in time, independently of where they were the moment before or after. To do this, it slices the playing area into small 25 cm2 squares, removes the background in all the images simultaneously, and from this deduces the probability of the presence of a player in each of the small squares. The other two al-gorithms connect the results obtained for each moment in order to establish individual trajectories. All three use global optimization methods, resulting in a very robust system

capable of tracking people in real time in a reliable manner.

Horesh Ben Shitrit, a Ph.D. student in the CV Lab, improved on a prototype of the tracker that had been installed in Lausanne's Olympic Museum. In the process, he and his collaborators have created a marketable tool that can be used for international sporting competitions. A student in the lab is now making final adjustments that will allow television cameras to provide direct input to the system. But the researchers see value beyond sports.

"Other applications, like tracking pedestrians to monitor traffic in an area, or following the movement of clients in a store for marketing purposes, are being planned," Ben Shitrit adds.

Provided by Ecole Polytechnique Federale de Lausanne