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Newsletters
#07 - September 2013

TEC2011-25995 EventVideo (2012-2014)

Strategies for Object Segmentation, Detection and Tracking in Complex Environments for Event Detection in Video Surveillance and Monitoring

<http://www-vpu.eps.uam.es/eventvideo/>

Seventh trimester progress report

During this semester the project has evolved on plan. Due to the holiday's season, the most relevant activity has been the kick-off in September of the development of demonstrators based on the algorithms developed and under development within the project.

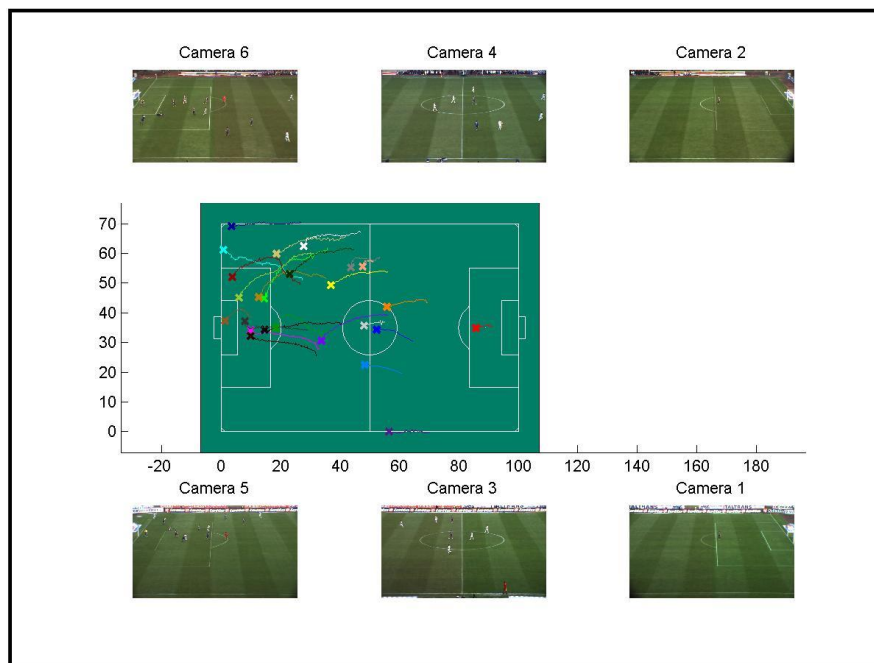
Seventh trimester results

Publications

Rafael Martín, Jose M. Martínez, "A semi-supervised system for players detection and tracking in multicamera soccer videos", *Multimedia Tools and Applications*, (on line August 2013), Springer, ISSN 1380-7501 (DOI [10.1007/s11042-013-1659-6](https://doi.org/10.1007/s11042-013-1659-6)).

Abstract: This paper presents a complete, general and modular system which after a simple previous configuration is able to detect and track each player on the court or field. The presented multi-camera system is based on a mono-camera object detection and tracking system originally designed for video surveillance applications. Target sports of the developed system are team sports (e.g., basketball, soccer). The main objective of this paper is to present a semi-supervised system able to detect and track the players in multi-camera sports videos, focusing on the fusion of different tracks of detected blobs in order to match tracks across cameras. The proposed system is simpler than other systems from the state of the art, can operate in real time and has margin to be improved and to reduce supervision adding additional complexity. In addition to the detection and tracking system, an evaluation

system has been designed to obtain quantitative results of the system performance.



Diego Ortego, Juan Carlos San Miguel, "Stationary foreground detection for video-surveillance based on foreground segmentation and motion history images", in Proc. of 2013 IEEE International Conference on Advanced Video and Signal-based Surveillance, AVSS 2013, Kraków, Poland, 27-30 August 2013, pp. 75-80

Abstract: Stationary foreground detection is a common stage in many video-surveillance applications. In this paper, we propose an approach for stationary foreground detection in video based on the spatio-temporal variation of foreground

and motion data. Foreground data are obtained by Background Subtraction to detect regions of interest.

Motion data allows to filter out the moving regions and it is estimated using median filters over sliding windows.

Spatiotemporal patterns of both data are computed through history images and the final detection is obtained using a

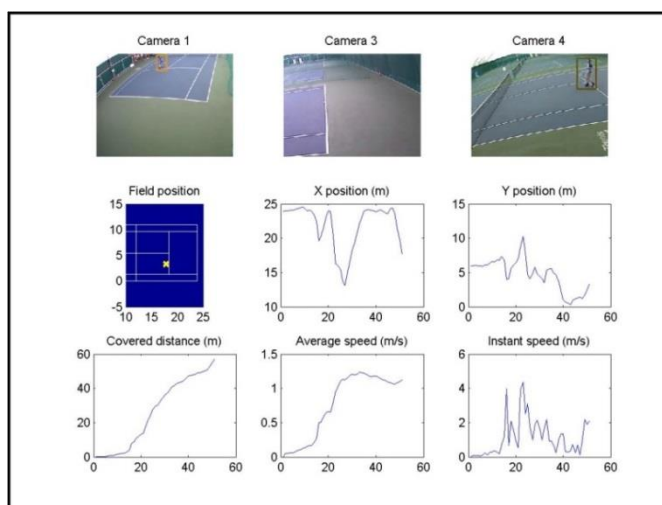


two-threshold scheme that considers motion activity. Partial visibility of stationary

foreground for short-time intervals is handled to increase robustness. The results over challenging video-surveillance sequences show an improvement of the proposed approach against the related work.

Rafael Martín, Jose M. Martinez, "An automatic system for sports analytics in multi-camera tennis videos", in Proc. of Activity Monitoring by Multiple Distributed Sensing (AMMDS) Workshop 2013 in conjunction with 2013 IEEE International Conference on Advanced Video and Signal-based Surveillance, AVSS 2013, Kraków, Poland, 27-30 August 2013, pp. 438-442

Abstract: This paper presents an automatic system which after a simple previous configuration is able to detect and track each one of the players on the court or field in single player sports. After that, the system is able to extract statistics and performance of the players. This system is complete, general and modular, to be improved and modified by future work. The



system is based on a moncamera detection and tracking system, originally designed for video surveillance, which has been adapted for its use in the individual sports domain. Target sports of the developed system are individual sports (e.g., tennis, paddle tennis) where the players have its own side of the field.

Fabrizio Tiburzi, Jesús Bescós, "Robust camera motion estimation in presence of large moving objects", en Proc. of 2013 IEEE International Conference on Image Processing, ICIP 2013, Melbourne, Australia, 15-18 Septiembre 2013, pp. 2509-2513

Abstract: Estimation and compensation of the camera motion is the first step in many video analysis applications. Existing robust global motion estimation (GME) techniques have proven to tolerate reasonable amounts of outliers in the data. However, when these outliers convey the motion of large objects, GME remains a major challenge. This paper reviews the main causes that make GME with large objects particularly difficult.



Then it proposes an iterative RANSAC-based approach that, by exploiting the

properties of the different types of fits that can be found in the data, determines the most suitable scale a-posteriori and can recover the camera motion even when objects are dominant. Evaluation with synthetic and natural sequences demonstrates the good performance of our approach.

Master Thesis

Rafael Martín Nieto, “**On the Fusion of Single-Target Video Objects Tracking Algorithms**”, Trabajo Fin de Master (*Master Thesis*), Master Universitario en Investigación e Innovación en TIC (i2TIC), Escuela Politécnica Superior, Universidad Autónoma de Madrid, September 2013.

Abstract: The final objective of this work is to create a fusion system which improves the performance of several object trackers, within a methodological and rigorous evaluation framework. The considered algorithms are moncamera single target trackers. After analyzing in detail the state of the art, an evaluation framework is selected and presented. The sequences selected in this evaluation try to consider the main problems that are faced by trackers (scale changes, illumination changes, occlusion, noise, ...). Then, classical and modern tracking algorithms are selected and evaluated individually, in order to understand its functioning in different scenarios and problems.

Finally, some fusion methods are described and evaluated.

Diego Ortego Hernández, “**Detección de objetos estáticos de primer plano en escenarios altamente concurridos de video-seguridad (*Detection of foreground static objects in crowded video-surveillance scenarios*)**”, Proyecto Fin de Carrera (*Master Thesis*), Ing. Telecomunicación, Escuela Politécnica Superior, Universidad Autónoma de Madrid, September 2013.

Abstract: In this work, we propose an approach for stationary foreground detection in video-surveillance based on spatio-temporal variation of foreground, motion and structure data. First, a study of related work has been done. Then the work is focused on the combination of different features to reduce false positives to the minimum. To achieve this target, the regions of interest are obtained by background subtraction. Motion information allows to filter out the moving regions and it is estimated using median filters over sliding windows. Furthermore, structure information is used to compute which areas are activated in the foreground just for being a shadow or illumination change, with the purpose of remove them from the final result. Finally, the results over challenging video-surveillance sequences show a notable improvement of the proposed approach against the related work.

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