**Image Processing Project**

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**1) Abstract**

Our project is about Object tracking movement, we are trying to track the ball and see how many passes were made by team X, team Y or passes in general,

we will use the previously mentioned algorithms and classifiers based on other papers made for tracking a moving object like a soccer ball or an American football and classifiers to include a broad range of decision-theoretic approaches to the identification of images.

Classification algorithms typically employ two phases of processing: training and testing. In the initial training phase, characteristic properties of typical image features are isolated and, based on these, a unique description of each classification category, i.e. training class, is created. In the subsequent testing phase, these feature-space partitions are used to classify image features.

Nowadays, sports video is one very popular research area, which involves players' movement analysis, tactics, referee's decisions, and so forth. So, automatic detection of players and a ball in the soccer video is notably important.

**Paper 1**

**2.1.1) Summary**

An effective algorithm for detection of a soccer ball and players in the currently available methods, the ball may not be detected when it is attached to the lines in the ground. To overcome this problem, we introduce a method to separate lines from the ball and segment the ball effectively. At first we detect the ground and the edges of the original image. Then an efficient line detection method is applied, and finally players and a ball are extracted. The experimental results show that our algorithm is robust when the ball is attached to the line.

**2.1.2) Proposed Algorithms**

Color based elimination (eliminate the ground), Sobel gradient (players and balls are extracted), Line detection and elimination (ground straight lines are eliminated), circle Hough Transform (detect circular shape ball), Unwanted objects elimination, density based approach, density based approach (separate the players and the lines), automatic ground detection (eliminate the ground)

**2.1.3) Accuracy**

Not mentioned

**2.1.4) Conclusion**

The main objective of this paper is to detect the soccer ball and players within a video footage, especially when the ball is attached with lines in the ground. The experimental results show the capability and robustness of detecting ball.

**Paper 2**

**2.2.1) Summary**Player localization, labeling and tracking is critical for team tactics, player activity analysis and enjoyment in broadcast sports videos. It is quite challenging due to many difficulties such as player-to-player occlusion, similar player appearance, varying number of players, abrupt camera motion, various noises, video blur, etc.

**2.2.2) Proposed Algorithms**

Particle filter, joint probabilistic data association filter, multiple hypothesis tracking, MCMC data association, tracks linking.

**2.2.3) Accuracy**

Not mentioned

**2.2.4) Conclusion**

The detection module combines background modeling and boosting detection. Labeling is achieved through unsupervised player appearance learning. MCMC data association is applied for tracking player.

**Paper 3**

**2.3.1) Summary**

The players and the ball are the most important objects in soccer videos. Detection and tracking of them are motivated by various applications, such as event detection, tactics analysis, automatic summarization and object-based compression.

Methods of locating the ball as well as players in soccer videos can be split in two groups: the first group makes use of fixed cameras (usually calibrated in advance) in a controlled environment; the second group uses only regular broadcasting videos. While the former can provide better performance, the latter is more flexible. In this paper, we focus on those efforts made in the second group.

**2.3.2) Proposed Algorithms**

Pixel Detector, Blob Detection, Shape Analysis for Foreground Cleaning.

**2.3.3) Accuracy**

Not mentioned

**2.3.4) Conclusion**

In this paper, a shape analysis-based soccer ball and the players detection method has been proposed. We propose a learned color histogram model to detect the playfield pixels and group them into a playfield region. Then, the foreground blobs are extracted with morphological processing. Shape analysis and skeleton pruning are performed to remove false alarms (non-players/referees and non-ball) and cut-off the artifacts (mostly due to playfield lines).

**3) Dataset Type**

Our dataset is composed of clips from soccer matches with various lengths, where we highlight team a, team b, the referees and tracking the ball.

**4) Classifiers used:** Supervised classification

1-Machine Learning, Dominant Color Learning and View-type Classification

2- Haar cascade for player’s detection

3- Clustering based trajectory matching method was proposed to solve the tracking of players in soccer video

**5) Algorithms used:**

1-Particle filter to deal with the multiple target tracking

2- Color-based elimination

3-Sobel Gradient

4-Threshold

5- Segmentation

6- Alpha matte

7- Saliency

8- Circle Hough Transform

9- Template matching

10- Morphological filtering (erosion and dilation) is applied to eliminate the noise.

11-Surf

12-Sift

**6) References**

1-<https://ieeexplore.ieee.org/abstract/document/6516867/metrics>

Authors (Wei-Lwun Lu- Jo-Anne Ting- James J. Little) (16 May 2013)

2-<https://ieeexplore.ieee.org/abstract/document/5674086/>

Authors (Junliang Xing - Haizhou Ai -Liwei Liu) (June 2011)