Player Identification and Tracking for Football Game Tape Analysis

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Motivation
American Football is highly competitive and well financed sport in which the slightest advantage can be exploited for large gains. In high school, college, and professional levels of play, a substantial amount of time is dedicated to film study and analysis. Both players and coaches spend hours analyzing film in order to detect tendencies, strengths, and weaknesses of their opponents and themselves. A large portion of the work is simply data collection on metrics such as, plays run, formations used, and personnel involvement. Currently this collection is done through graduate assistants, assistant coaches, or even the head coaches if a team is strapped for money. We believe that automated image processing software would be to analyze the game film at accurately label plays and reduce the amount of human capital put into data collection tasks.

Goals and Approach
Our overall project goal is to develop a program to analyze football game film.

1. Our first goal is to be able to perform video registration on the game footage. We would like to be able to identify exactly where we are on the football field with the hopes of being able to record location data for various plays.
   - We plan on using SIFT descriptors or Harris corners as well as color-matching and Hough transform algorithms in order to help us match the current frame with our position on the football field model.

2. Our secondary goal is utilize background removal based on the registration data, as well as human detection and tracking algorithms in order to track the players on the field.
   - We plan on using color-filtering as well as line detection algorithms to remove the background. We then plan on using HOG person detectors as well as movement, color matching, and/or particle filters to identify and track the players.

3. Our tertiary goal is to be able to use the tracking data in order to make some sort of prediction of what type of play has occurred. This is a reach goal and not one of the primary goals of this project, but if circumstance allows we would like to experiment with this aspect.

We intend to use MATLAB to implement the algorithms required to meet the above goals.

DROID Camera: No.
References:

1. Toward Learning Mixture-of-Parts Pictorial Structures by Roni Hess and Alan Fern, School of Computer Science and Electrical Engineering, Oregon State University
   [http://web.engr.oregonstate.edu/~afeh/papers/mopps-icml07.pdf](http://web.engr.oregonstate.edu/~afeh/papers/mopps-icml07.pdf)


3. Objects detection by expectation-maximisation algorithm application to football images by Mourad Moussa Jlassi, Ali Douik, Hassani Messaoud, Ecole Nationale d'Ingenieurs de Monastir

   [http://www.iis.ee.ic.ac.uk/~y.demiris/DeardenDemirisGrauCVMP06.pdf](http://www.iis.ee.ic.ac.uk/~y.demiris/DeardenDemirisGrauCVMP06.pdf)