

Multiple Player Motion Tracking for Sport Applications

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Motivation

During a sports game, it is nearly impossible to pay attention to the movement of all the players on the field during any given play. Our project aims to track the motion of players, displaying the data in a simple format so that all aspects of the play are revealed. This would allow sports fans, coaches, and analysts to quickly identify how different players contributed to the play without having to re-examine replays.

Goal

The purpose of our project is to track players on a sports field and display the movement of the players as a 2D X,O map seen in playbooks. We will use MATLAB to accomplish this task and will split the processing into three steps:

1. Determine the locations of players in each frame
2. Track movement of players between frames
3. Compile data in a flow chart and display as a 2D map

Approach

We first calibrate the video region with a playing field by detecting features such as goalie box or free throw line. These areas can be detected using color filtering and width tests. To extract players from the frame, we can perform detection of the dominant background region and subtract that away from the frame to detect foreground objects. Players can be differentiated through home and away jersey colors.

Human movement in sports is typically continuous and consistent; to track the players between frames, we match detected players from one frame to the next by using statistical methods such as Kalman filter prediction. We expect some difficulties when players collide or overlap when their trajectories might suddenly change.

Finally, player coordinates detected from the frames can be transformed onto a top-down view of the playing field by estimating the shooting angle of the frame. Using the information we have gathered can construct an X,O map with arrows indicating the movement of the players and X's and O's that represent players of opposing teams.

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