

ITSP 2K16

HAWKEYES

TEAM MEMBERS

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CRUX OF THE PROJECT :

- Identification of the ball in any given image.
- Finding the 3D coordinates of the ball with respect to world frame.
- Interpolating the obtained data points to get the trajectory of the centre.
- Finding the pitching area.

IDENTIFICATION OF THE BALL IN AN IMAGE :

- Creating the background model with the method of Mixture Of Gaussians for each pixel.
- Background subtraction to obtain the foreground mask.
- Color filter to remove candidates that are way different from the color of the ball.
- Applying morphological operators to eliminate non-ball candidates and also making the ball's contour a continuous one.
- Applying some more constraints(like aspect ratio, number of pixels a.k.a area) to obtain the ball.

FINDING THE 3D COORDINATES OF THE BALL :

- 3D coordinates of a point can be obtained from multiple views of the same point at the same instant by the method of triangulation.
- Solving a system of linear equations and obtaining the closest possible solution solves the problem(the system of equations is obtained from the matrix equations of two cameras relating world coordinates to pixel coordinates).
- All this is done only after calibrating the two cameras with the help of a chessboard.

INTERPOLATING THE DATA POINTS :

- Firstly the data points are split into two sets :
- Before pitch and
- After pitch.
- Then each set is interpolated separately(a spline fit with a cubic).
- The end part of the first set and starting part of the second set are extrapolated till z-coordinate is ball radius then a cubic fit is done between end points so obtained.

FINDING THE PITCHING AREA :

- The cubic curve that is mentioned in the end of the previous slide is used to obtain the pitching area.
- By using the z-coordinate of the centre the impact area can be found at each instant from which the impact area can be calculated.

THE END