DIP ASSIGNMENT 3
REPORT ON APPLIED METHOD
201401074

Problem-1

- ➔ The outline of the proposed solution is :
  - ◆ Removal of the football field.
  - ◆ Removal of the football field lines.
  - ◆ Removal of the spectator stands.
- ➔ Removal of football field - It is obvious that Green channel would have the maximum value for the ground pixels. It was experimentally found out that for better results, we must also check that the Value of Red channel was greater than Blue channel value for the ground pixels. Therefore football field detected using :
  - ◆ G = max(R,G,B) and R > B or otherwise,
  - ◆ G > R and R > B.
  - ◆ Result : Ground and lines are removed. Players come out as white blobs. (Fig. 1)
  - ◆ Issues : The player's' limbs are disjoint or not present, also the crowd also comes out as a big white blob.
- ➔ Recover the players' bodies - We apply sobel edge detector to the original image (Fig. 2) and add it to the previous result (Fig. 3).
  - ◆ Issues : Player's limbs are joined by the lines from the sobel, but not like a whole white blob, Lines of the football ground are introduced.
- ➔ Remove the football field lines, We know that the lines come from only the sobel edge detector, thus them being thin. Therefore they can be easily removed using morphological techniques. Here, we use *bwmorph(imt,'branchpoints');* which reduces each line segment to it's origin i.e. the branchpoint (Fig. 4).
  - ◆ Only dotted lines remain, which can be removed using morphological methods.
  - ◆ Drawback : Some of the players' minor details are lost.
- ➔ Convert spectator stands to blobs - We can see from Fig. 3 that the crowd consists of a big part consisting of white pixels. We can remove it by converting it into a blob and removing the largest connected component of white pixels. We can convert these big blob(s) of crowd pixels into a single blob using morphological methods. Here, we use image closing (Fig. 5).
  - ◆ Advantage : We also retrieve the player's broad shapes in form of white blobs.
- ➔ Removal of dotted field lines - We can remove these dotted lines easily using morphological methods. Here we used image opening (Fig. 6).
- ➔ Removal of spectator stands - Now that we know the crowd is the largest component, we can remove the spectator stands by removing the largest component thus getting the final output (Fig. 7).

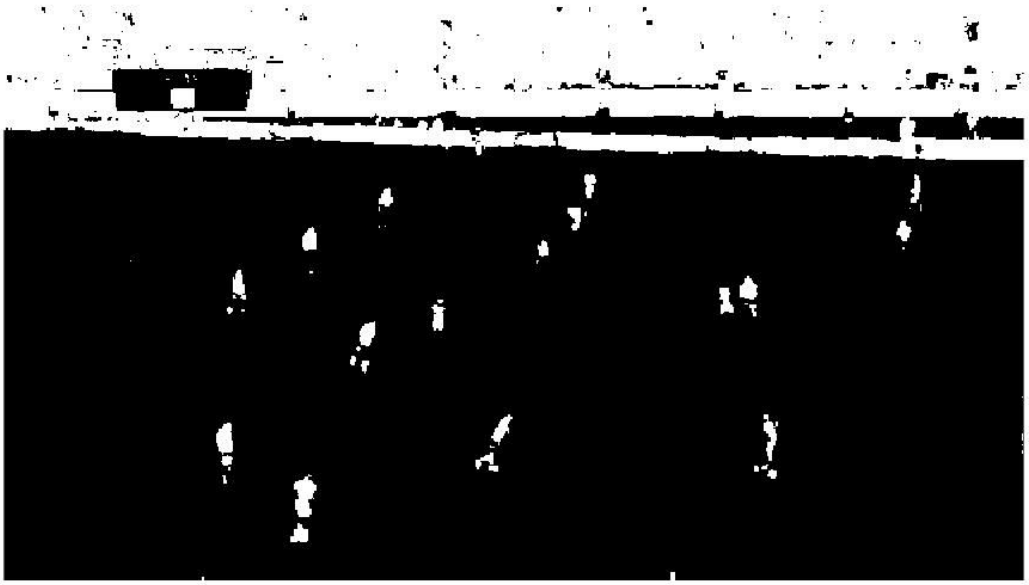


Fig. 1

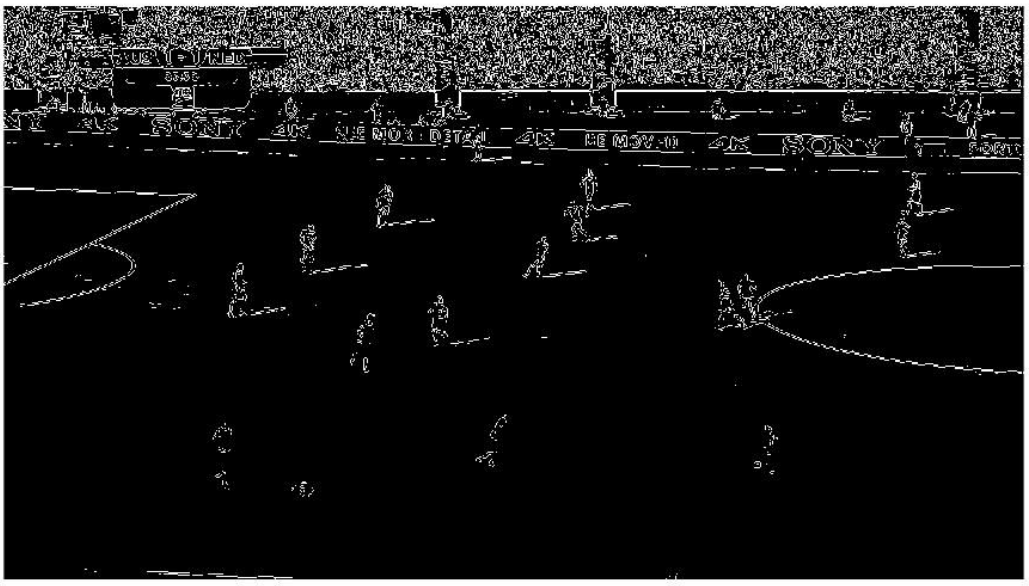


Fig. 2

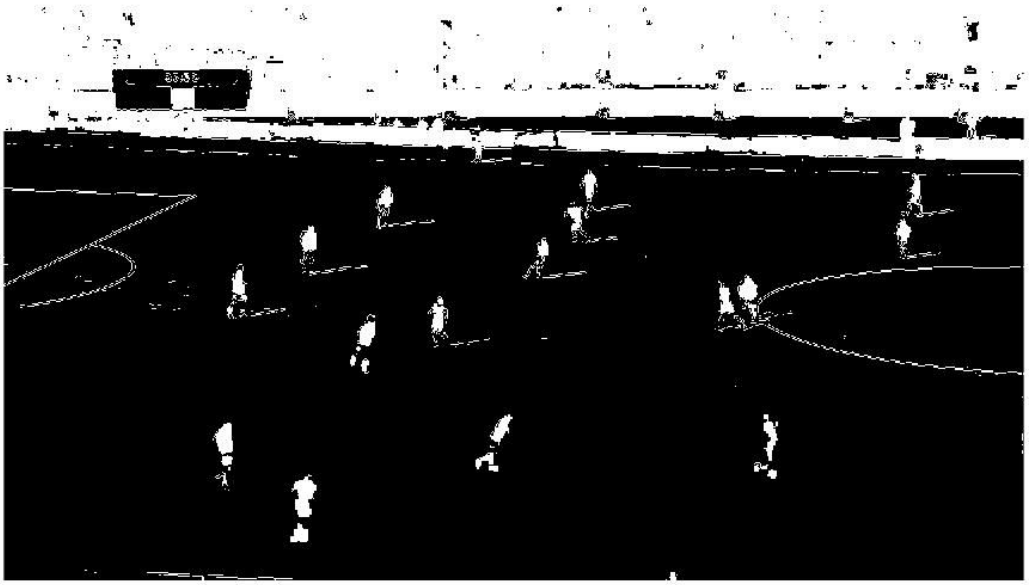


Fig. 3

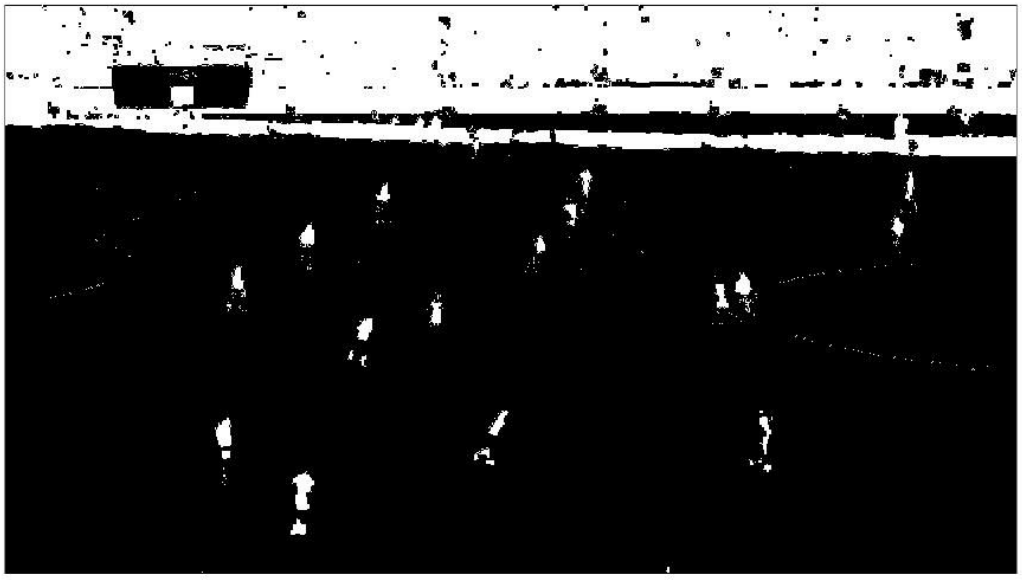


Fig. 4

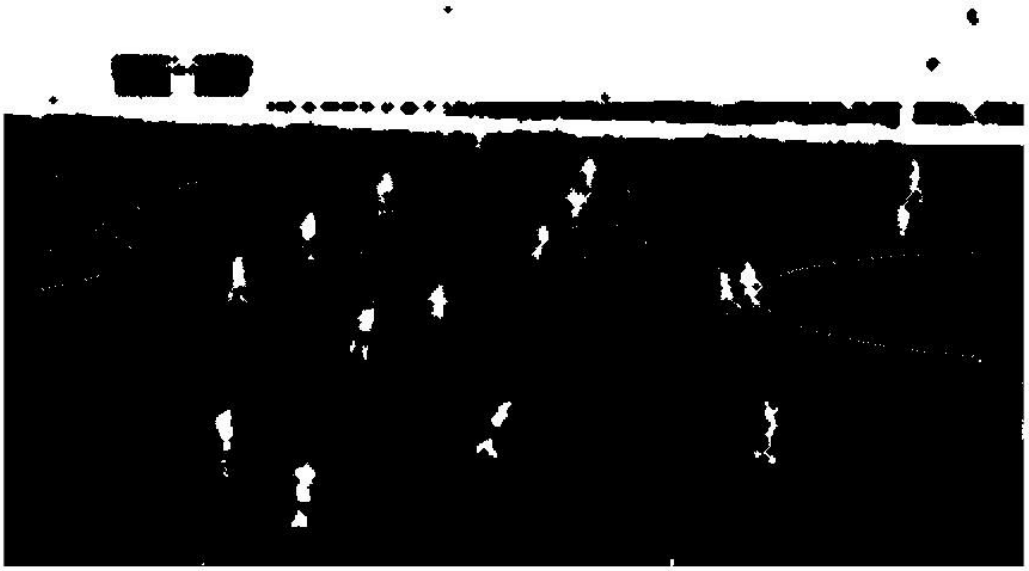


Fig. 5

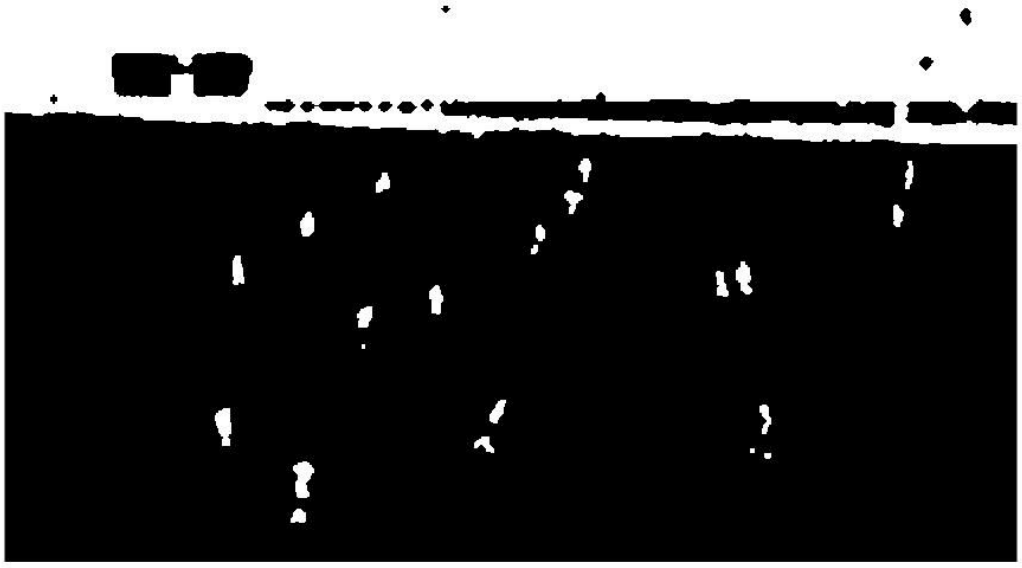


Fig. 6

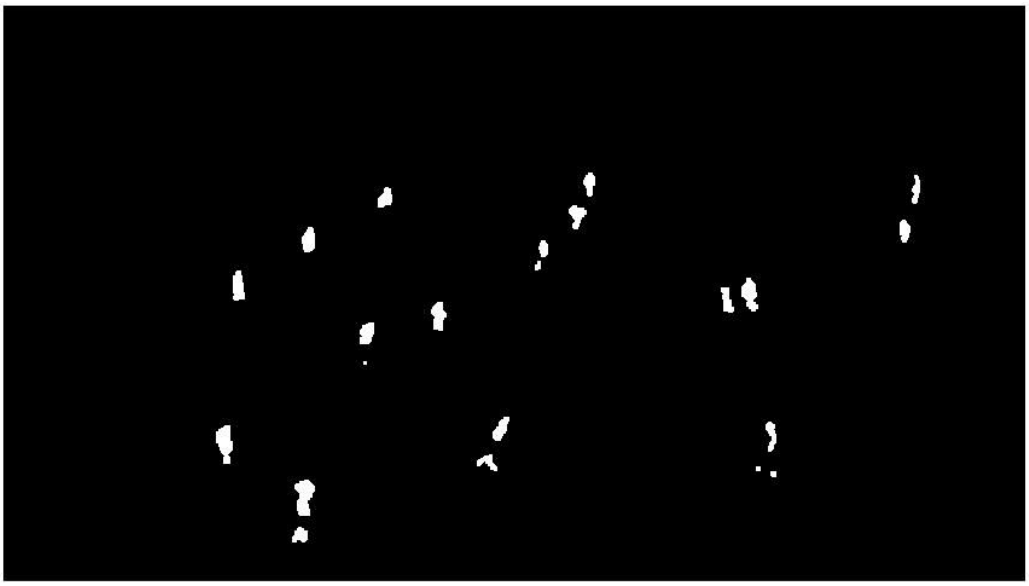
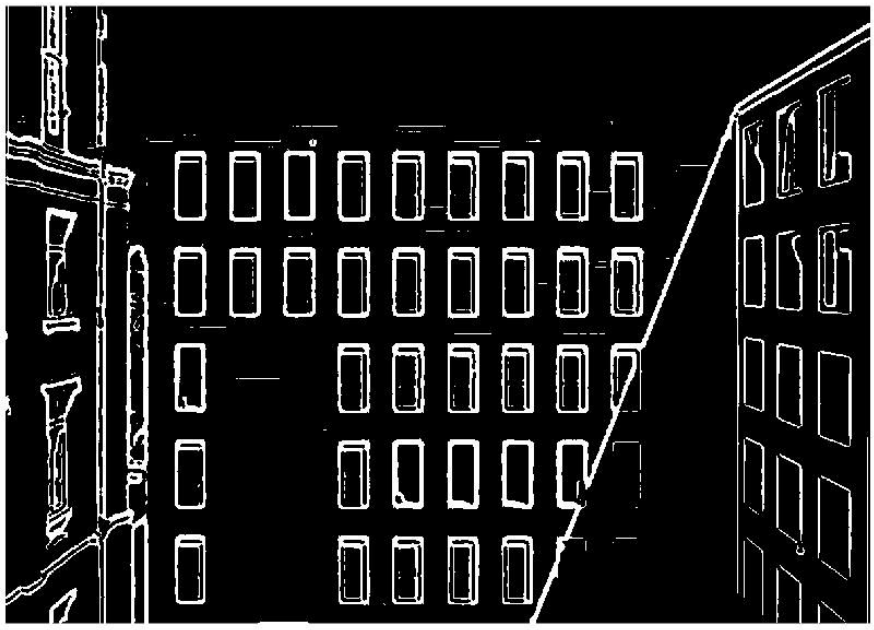


Fig. 7

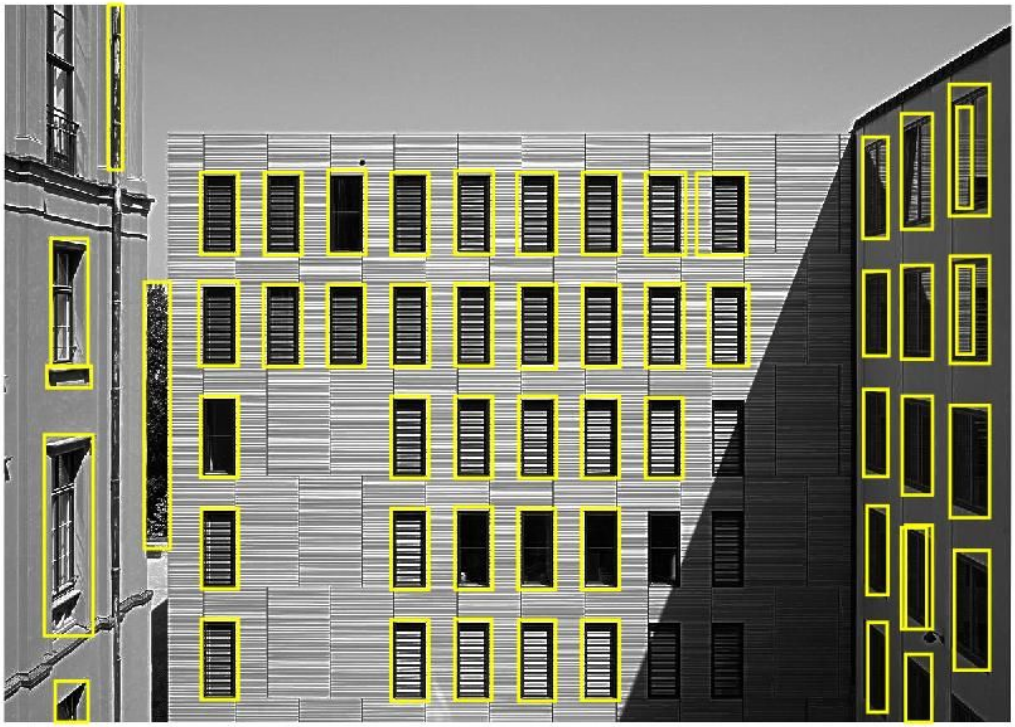
Original Image

Problem-2

- ➔ The outline of the proposed solution is :
  - ◆ Finding a good edge image (which detects windows well).
  - ◆ Finding possible windows.
- ➔ The motivation behind the solution is - After we find the edge image, we get connected components (of white pixels) of various convex areas. If we do a frequency distribution of the convex area of these connected components it is quite trivial to guess (and observe) that the largest frequency will be of smallest convex areas (contributed by edges which contribute to noise; here noise means edges not part of a building boundary or window boundary), the largest convex areas (contributed by the wall and building edges) will have very small frequencies and sparsely distributed and there will be decently high frequency terms and densely distributed frequencies in the middle portion. Therefore from this observation, we can easily find the components which represent windows in the original image.
- ➔ Finding a good image - We can find good image (an image in which every connected component represents a window and is disjoint from its surroundings) by using edge detection techniques and other morphological techniques. This method uses Sobel edge detection, image erosion, image closing, image erosion to get such edge images.
- ➔ Finding possible windows and Generating bounding boxes for them - We can find such possible windows using the logic explained in the motivation section described in our method.



Edge Image



Detected Windows (in yellow)

➔ Drawbacks - This method depends wholly on the quality of the edge image generated. Thus a bad edge image will highly reduce the result quality.