Bhawan Gakhar, 2019417
Kumud Tayal, 2019429
Yash Verma, 2019456

COMPUTER VISION

Dr. Koteswar Rao Jerripothula.

Zonal Distribution of Player Locations based on Football Goal Scene

Table of Contents

I Problem Statement

Our idea consists of taking an image of a football goal scene and converting them into a 2D top view plane where players would be identified as a point on the field. We then count the number of players in each zone which could be used in further analysis by football experts for better understanding of tactics. thus, ultimately helping in developing a better defense/attack for their team

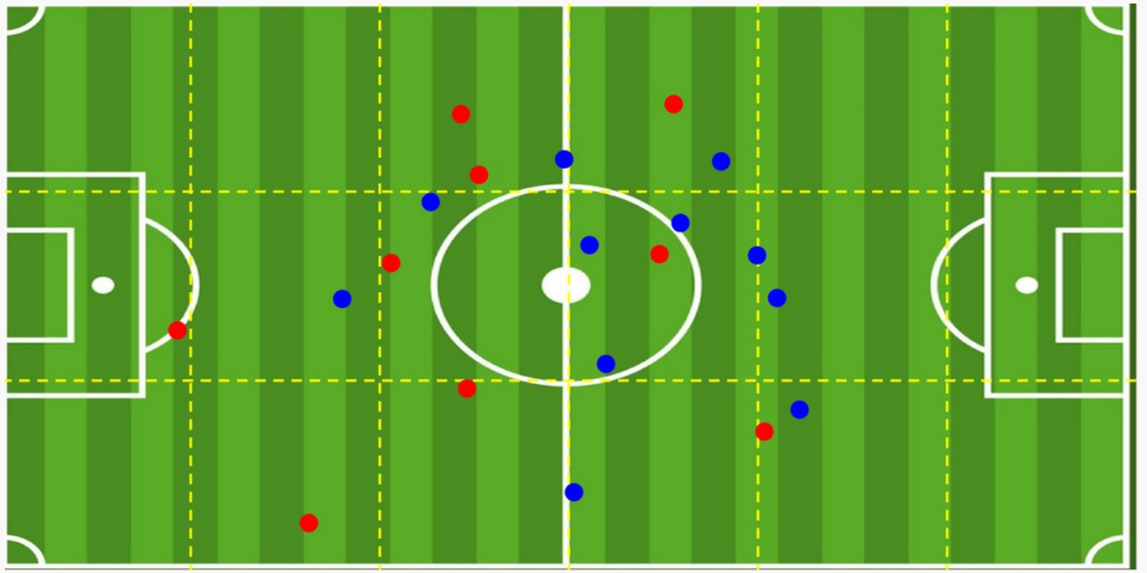
Data Preprocessing

Some pre-processing is required for better detection and functioning

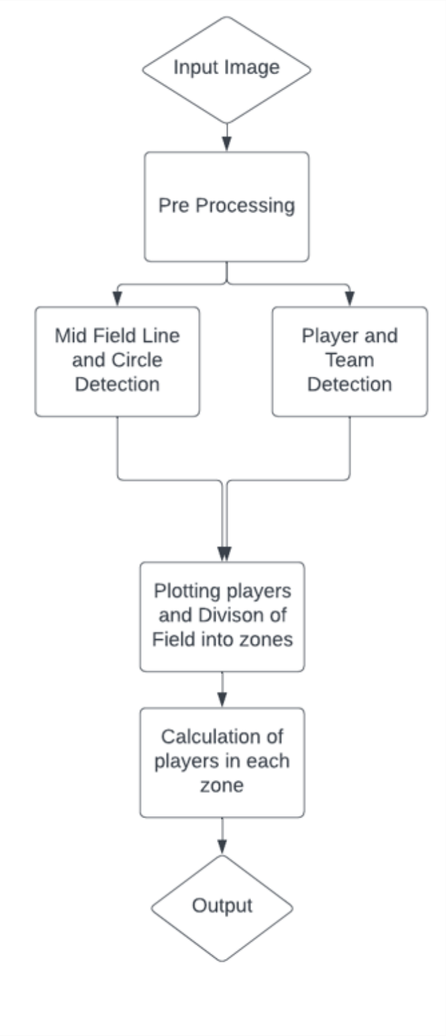
- Masking
- Noise Correction

Input

Output



II Project Approach and Summary



As we are given real-time images that can be from any angle, we must first plot the player positions on a predefined field to maintain uniformity and better analysis. For this, we must convert the real-time images into a 2D map of players on the field. To achieve the same, the process is divided into 5 parts.

- Field Detection
- Projection from Real-time to Predefined
- Player Detection
- Plotting of Players
- Dividing into Zones

Field Line and Circle Detection

Methodology

- Involves white-masked image as an input
- Detection of edges (vertical and all edges)
- Subtraction of vertical edge
- Extracting the bounding box coordinates for the circle
- Extraction of start and endpoints for line

Experiments

- Tried out various methods for circle detection including binary image connected components detection , usage of inbuilt functions etc.
- For line detection used houghlines involving playing with arguments for noise removal.

Player and Team Detection

Methodology

- To supplement player detection through YOLO, we used the SAHI library for better accuracy.
- we created a bounding box over players and separated foreground and background.
- We segregate these values into two different teams using the Fuzzy C-Means algorithm.

Experiments

- Using YOLO without any additional support brought inefficiency in detecting player locations.
- Image segmentation (using imsegmeans and superpixels) was tried to separate the green background.
- To segregate these mean values, clustering methods like K-means.

Transformation into 2D Topview

Methodology

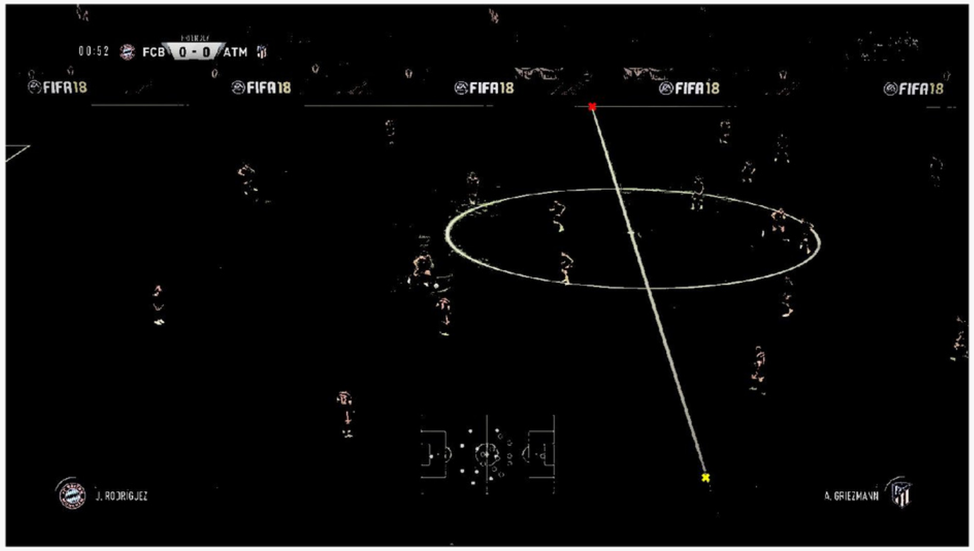
- Calculated a projection matrix which transforms the co-ordinates from the real-time image to the coordinates in the 2D top view
- Calculation of transformation equation using at least 4 coordinates and their corresponding projected co-ordinates

Experiments

- We could have calculated the projection matrix using only 4 known co-ordinates which would bound the center circle, but the results were not so good.
- to avoid the projections getting out of frame we took the edge points of the halfway line

V Results

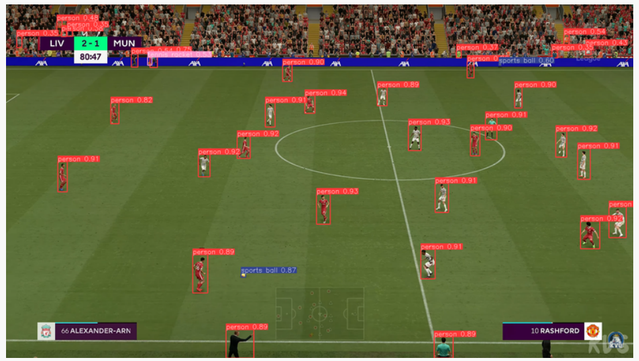
Line Detection



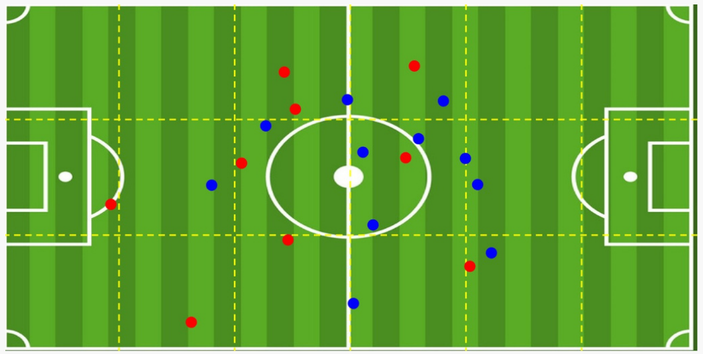
Circle Detection

V Results

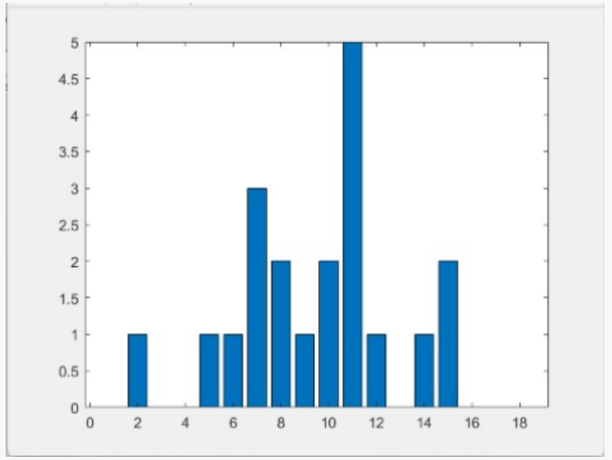
Player Detection



Final Output



Count Graph



IV Conclusion

Our proposed methodology works well in most cases. There are certain shortcomings due to noise detection. More work and ideas can be used to make this methodology more robust. Our approach can be extended to all possible scenarios with further research and trials on the dataset. It is currently naive and intuitive but provide a unique solution to the problem.

Thank you for listening!