INTRODUCTION TO IMAGE PROCESSING

Ball Detection From Video

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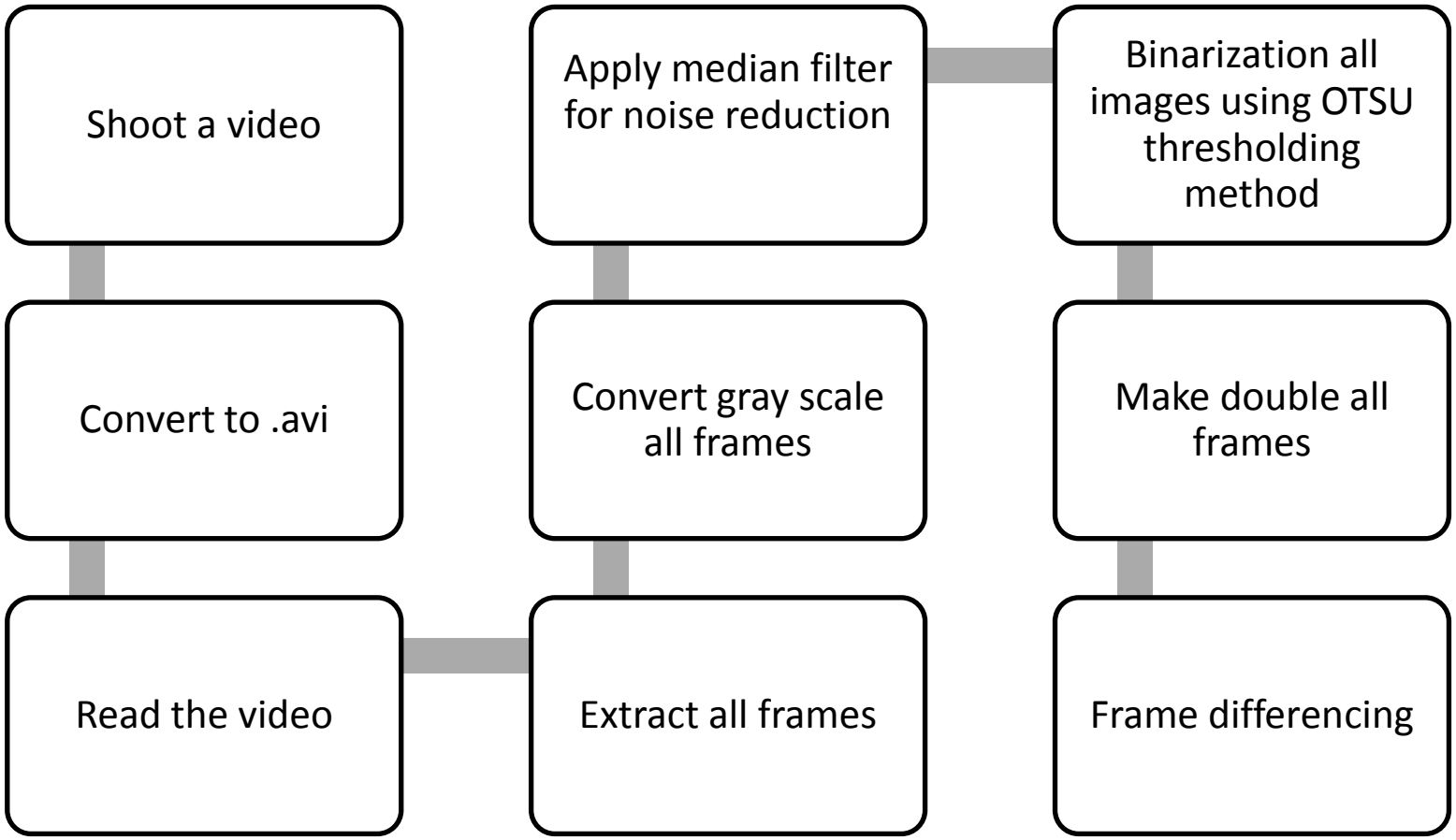
Project Data

- There are two different data that have different size and color of ball and background conditions.
- 90. frame is used as reference frame in first data.
- 65. frame is used as reference frame in second data.

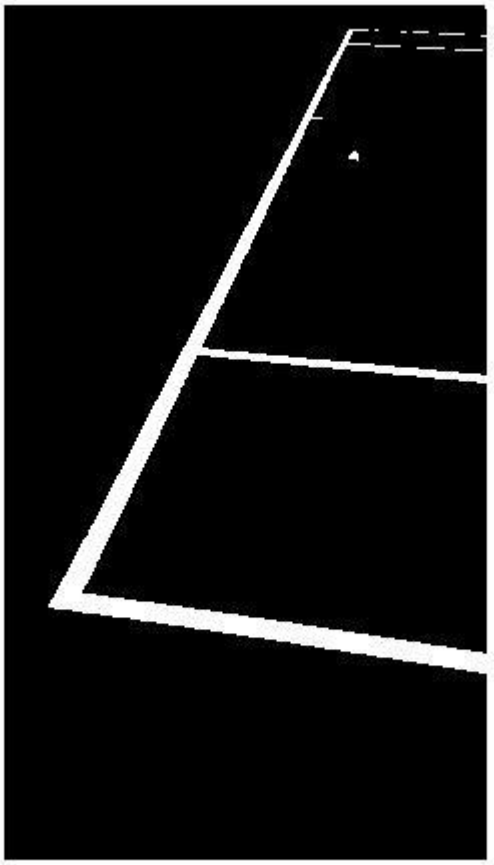
Data 1
Video Properties

- Duration = 4.2667 sec.
- Name = video_3.avi
- BitsPerPixel = 24
- **FrameRate = 30.0000**
- **Height = 1280**
- NumberOfFrames = 128
- VideoFormat = RGB24
- **Width = 720**

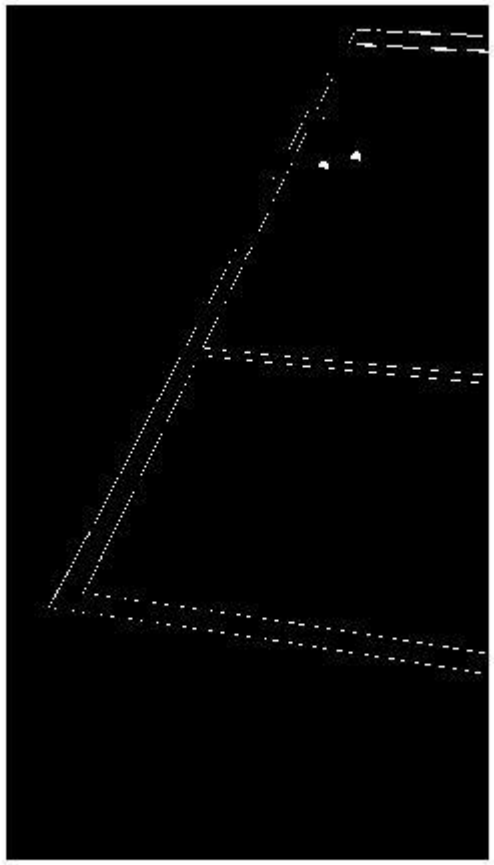

Shoot a video
Convert to .avi
Read the video
Extract all frames
Convert gray scale all frames
Apply median filter for noise reduction
Binarization all images using OTSU thresholding method
Make double all frames
Frame differencing

Result Images Up To Here

gray frame (#90)



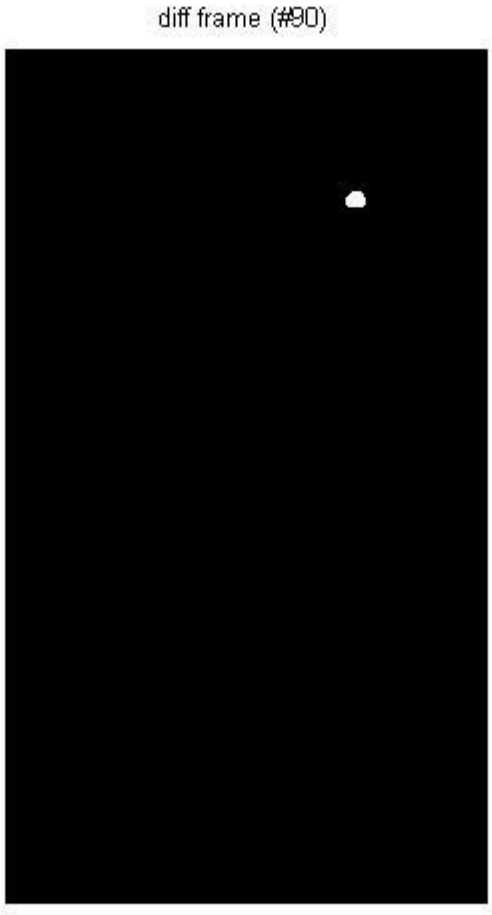
diff frame (#90)



Times differece frame by gray frame

Determine structure elements

Eresion and diltion is applied



Find connected component

Properties of the conn. Comp. (to get radii and centeroid)

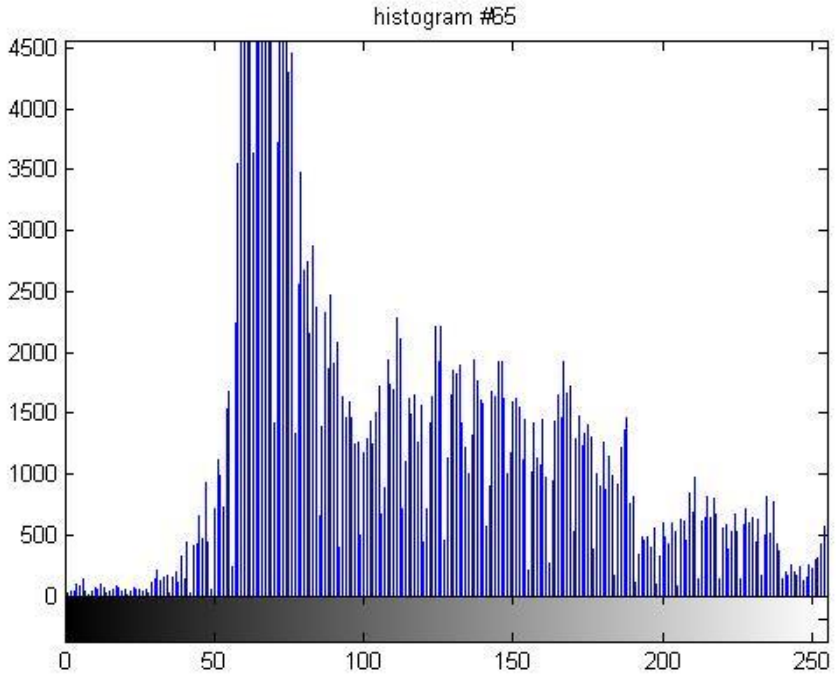
Plot the circle using radii and centeroid

Data 2
Video Properties

- Duration = 5.0050
- Name = test2.avi
- BitsPerPixel = 24
- **FrameRate = 29.9701**
- **Height = 480**
- NumberOfFrames = 150
- VideoFormat = RGB24
- **Width = 640**

When apply the first method a problem is occured.

- Background gray levels and ball gray levels are close so hard to detect using first method. (low contrast)

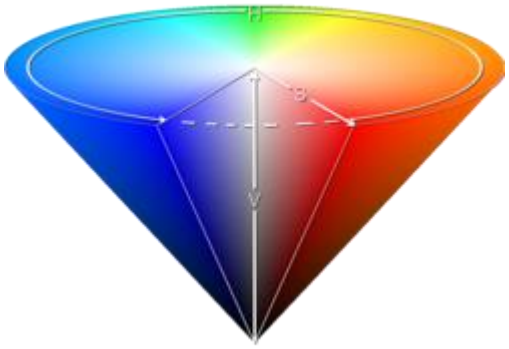


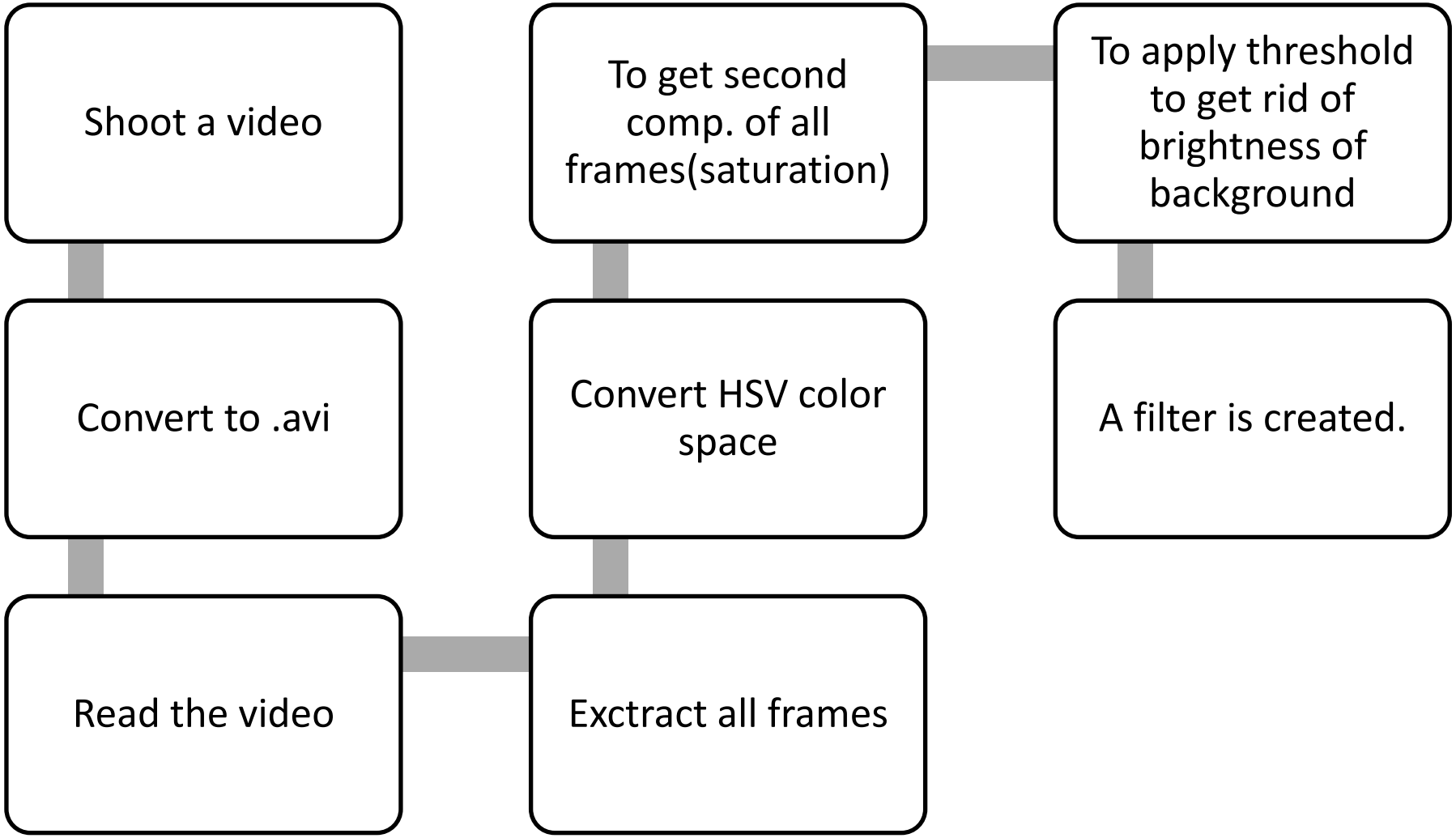
Saturation component of the all frames are used to detect the ball.
What is the saturation of an image?

- Saturation is the intensity of the color which ranges from 0 to 1.

0 represents ‘no color’

1 represents ‘intense color’




Shoot a video
Convert to .avi
Read the video
Exctract all frames
Convert HSV color space
To get second comp. of all frames(saturation)
To apply threshold to get rid of brightness of background
A filter is created.

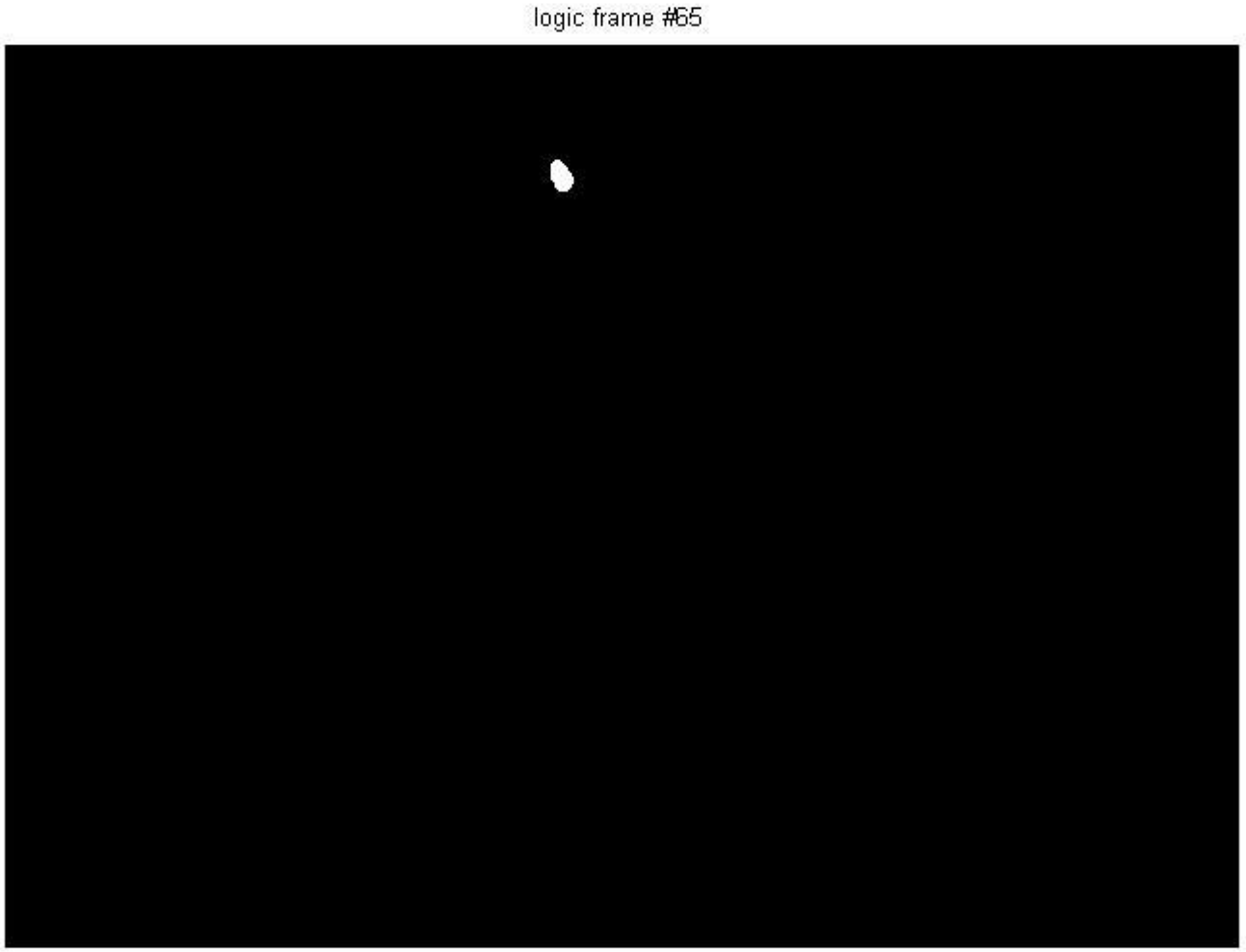
Result Image Up To Here

saturation comp. #65

After threshold a logical matrix gets and it will be used as a filter

All color frames times by filter

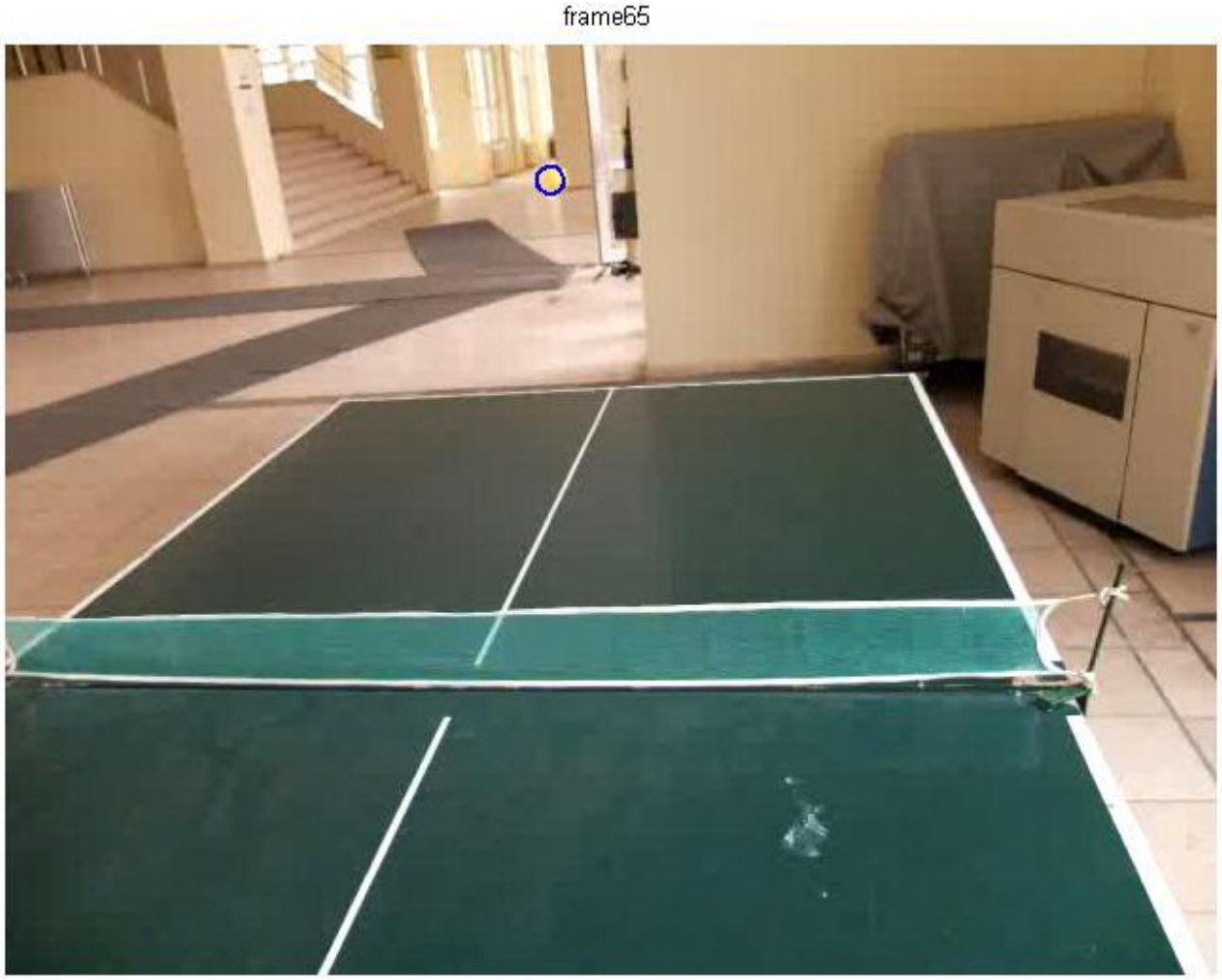
Convert all frames gray level → Apply a threhold → Morphological operation



Find connected component

Properties of the conn. Comp.(to get radii and centeroid)

Plot the circle using radii and centeroid



Future works

- Ball detection, determine the speed, track the trejectory and reconstruct the scene with more than two camera in real time