Camera Calibration

First approach

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Outline

Importance: many apps for

Pre- processing: gauss filters ,Media filter

Threshold segmentation : basic global threshold, Adaptive threshold

Noise Reduction and eliminations: geometrical criteria(ratios aspects)

Recognition of circles : fit ellipse

Tracking

Pre processing

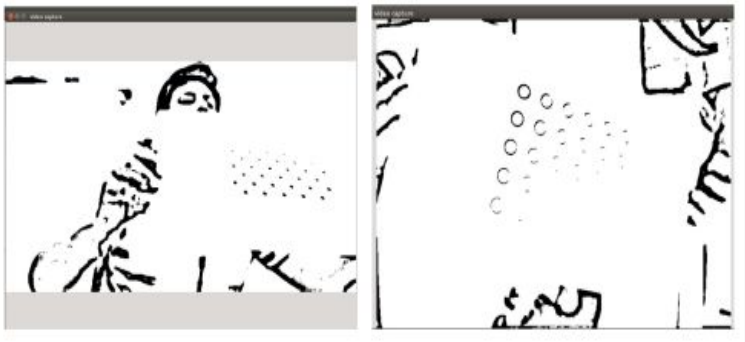
Media filter:

This technique serves to reduce the noise in the image a lot, but the main problem is that distorts the contour of circles and rings, which are important for the calculation
of the centers, which is why we chose not to use it.

Gauss filtering It also allows cleaning the noise in the image, but without affecting much the contours of the Pattern. The values that have been used with this filter are:
Rings: 3x3 window with the value of 0.5 for the standard deviation in both X and Y.
Circles: 5x5 window with standard deviation on X axis equal to 2.5 and on Y axis with value equal to 3.

Threshold Segmentation

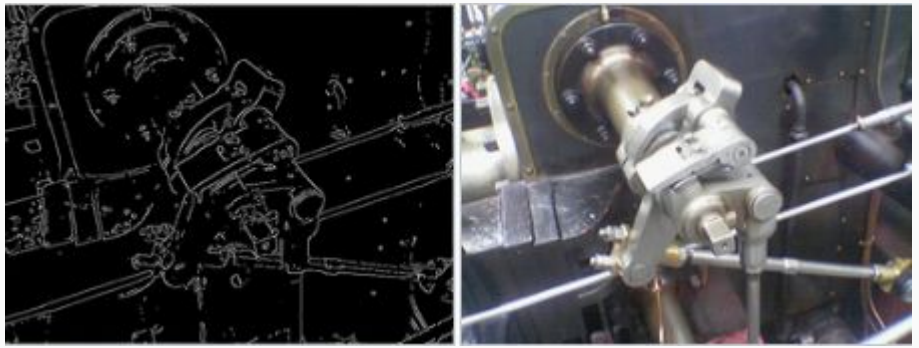
Basic global threshold



Adaptive threshold

Canny edge detector

technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed.

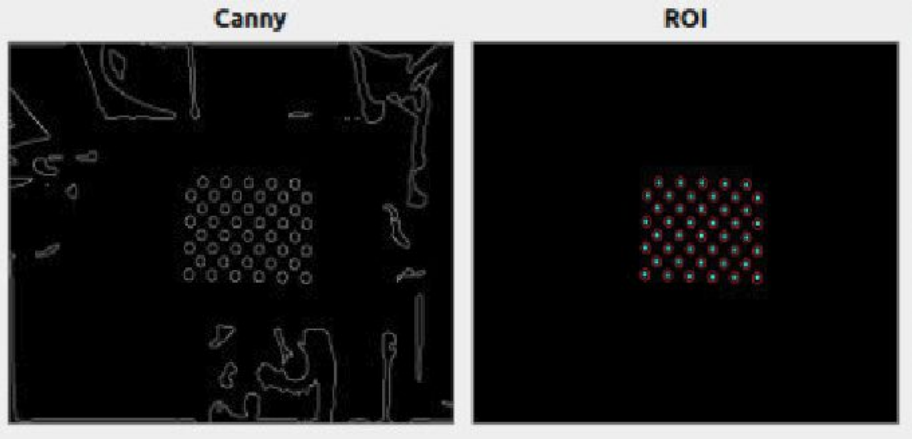


Noise elimination and reduction

In this stage, the contour analysis is carried out and the geometrical properties of the
the ways to be able to discard certain contours that do not meet the minimum properties for
be considered as possible candidates to conform the pattern

aspect Ratio

Rectagularity



Recognition of rings

Once the segmented one frame in the video was done, the following was the recognition of contours,as part of it the fitellipse function was used, this function initially returned noise that could be perceive.

ROI

Fitellipse de una región

Tracking

1. Assemble lines of all points against all points.
2. Select those lines that pass through "n" points, where n (is the number of points per column of each pattern, n = 4 for the pattern of circles and n = 5 for the pattern of rings), consider that it should be considered an allowable error, because the points are not collinear.It results in: