Algorithm list

模板匹配

1. See Correspondence Matching, explanation of why template matching uses Normalized Cross Correlation as
2. An improved template matching with rotation and scale invariant

斑点分析

1. Top-hat transform to get a more uniform background
2. apply otsu thresholding and code
   - Minimize the intra-class variance
   - Or Maximize the inter-class variance

$$\sigma_b^2(t) = w_0(t)w_1(t)[\mu_0(t) - \mu_1(t)]^2$$

   - t - variant threshold, dividing the image intensity pixels into two classes - background and foreground;
   - $w_{0,1}(t)$ - class probability;
   - $\mu_{0,1}(t)$ - mean intensity of the class;

圆查找

1. Hough transform
2. cv.HoughCircles

直线交点

1. https://stackoverflow.com/questions/46565975/find-intersection-point-of-two-lines-drawn-using-houghlines-opencv

矩形查找

1. cv.findContours & cv.boundingRect
2. OpenCV - How to find rectangle contour of a rectangle with round corner?

圆拟合 & 圆周测量

1. cv.findContours & cv.fitEllipse
2. Demo: Creating Bounding rotated boxes and ellipses for contours

直线拟合

1. Least squares method
2. cv.fitLine

形状异常/轮廓残缺

Concepts in Mathematical Morphology(see the attached) might be of great help.

1. **Hit-or-miss** transformation: basic tool for shape detection.
2. **Morphological Reconstruction**: extract the connected particles.