Report 22th June

Detection of Ellipse

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Project Target

To detect ellipses in the images/videos.

Figure: Input

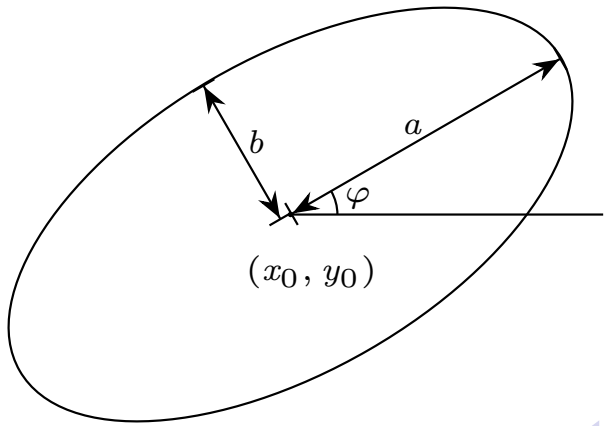
Figure: Output

Ellipse

To describe an ellispe we need 5 parameters:

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0, \text{where } B^2 - 4AC < 0.$$

Or in another way, we need the coordinates of ellipse's center (x_0, y_0), semi-major/semi-minor axes (a, b), and a rotation angle (φ).



Two major ways

Hough Transform

- Slow
- Sacrifice accuracy for efficiency

Edge Following

- Derived from Arc-support LS
- use greyscale image (gradient)
- Greedy for efficiency

Methods

- To detect the arc segements;
- (To form arcs;)
- To predict the 5 parameters for ellipses;
- Co-clustering;
- Validation.

LSD: A Fast Line Segment Detector with a False Detection Control

IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE

- Finding line-support region (region growing algorithm)
- Rectangular Approximation of Regions
- Validation

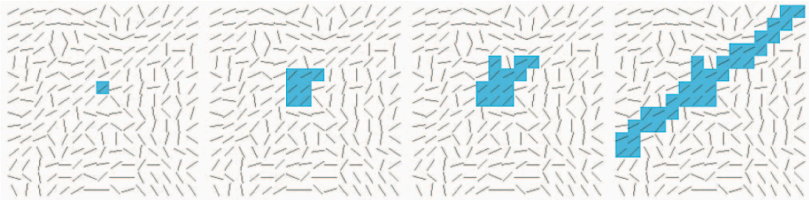


Figure: Region generation

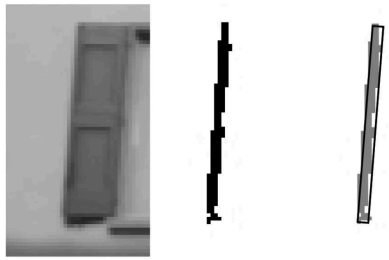


Figure: Rectangular Approximation

Arc segments' result

Figure: Source Images

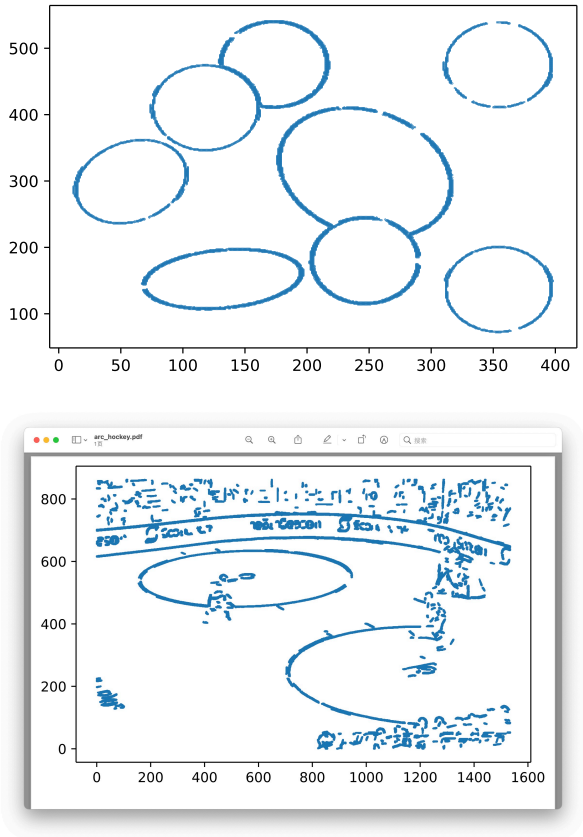


Figure: Arc Detection Results