Studying the Hough Transform

**Theory/Purpose**

Edge detectors and automated digital image analyses may leave missing points/pixels on curves, ellipses, or line edges. By using the Hough transform, it can group together edge points into object candidates by “voting” over a set of image objects.

**Implementation**

For computing lines, (circles are more expensive if the radius isn’t known,) the transform most commonly uses the Hesse normal form

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where *r* is the distance from the origin, *θ* is the angle between x axis and *r,* and *x* and *y* make up a point to use. Around (x,y), straight lines are determined through the point and added into the accumulator’s “bin” for every line found. The higher each bin’s count, the “better” those particular points will show up on a graph. (Usually, the high count points are rendered brighter against darker backgrounds.)

(Note: line equation can be used, but since y is undefined at slope m = 0, vertical lines may cause issues.)

Resources

Ol’ Reliable Wikipedia <https://en.wikipedia.org/wiki/Hough_transform>

21 minute YouTube video <https://www.youtube.com/watch?v=XRBc_xkZREg>

MATLAB Implementation <https://www.mathworks.com/help/images/ref/hough.html>