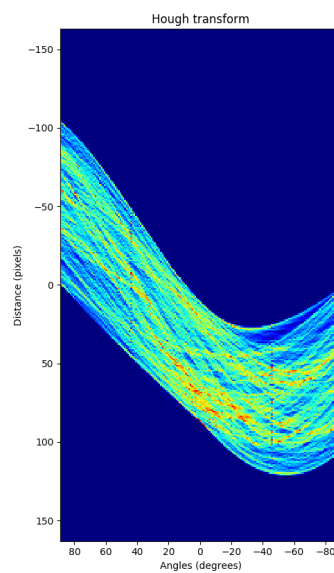
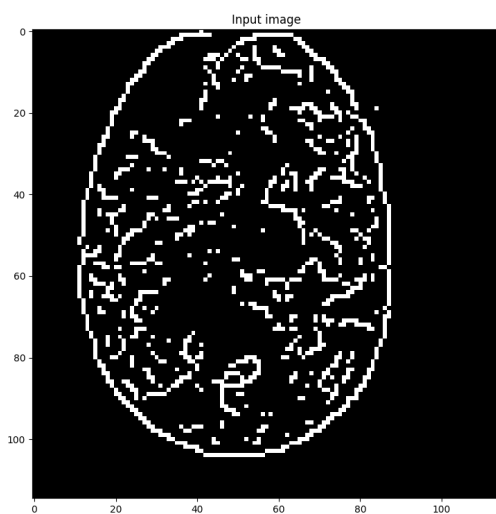


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CS534
9/28/19
HW 5

1.



Here the Line Hough transform is densist around the line gap at the top of the image.

2.

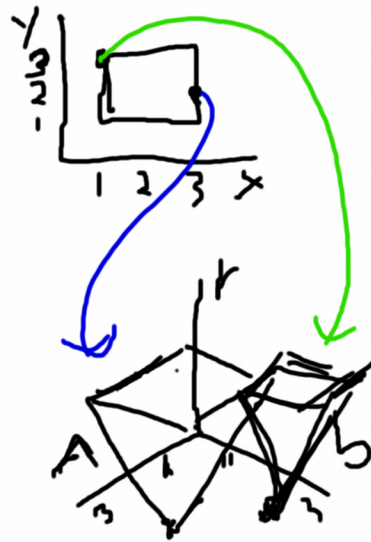
1. L1 corresponds to (0,2) and L2 corresponds to (-3,3)
2. $y = -1/3x + 2$
3. $P3 = (0,6)$
4. $P4 = (1/3,0) \rightarrow y = 3x+0$: intersection = **(0.5,1.5)**

3.

1. $\text{MAX}(|x-a|, |y-b|) = r/2$
(This makes it such that only squares aligned with the x,y axes are considered)
Where in SH space the axis are x position, y position and side length = (a,b,r)

2. Image Space

Square Hough (SH) Space



3. These two points currently describe the perfect square at center (2,2) and all increasing squares from any point along $x=y$. In SH space, the intersecting volume of the two points represent all possible side lengths as r increases.

4. The histogram shows the magnitude (occurrence) and orientation (bins) for all pixels around a point. This is then used to label a pixel with a gradient as a key point / feature.

5.

1. The original image can be summed by Integral Image from the region $(x_0, y_0) \rightarrow (x_1, y_1)$ as $(x_1, y_1) + (x_0, y_1) - (x_0, y_0) - (x_1, y_0)$
2. The box filters for SURF can be calculated as the second integral image in respect to y . As given in the determinant of the Hessian.