

DSP2 SS2020 – Exercise 5.2: Segmentation - Hough Transformation

1. The new src folder includes the usual main.cpp file and two new files:
 - Segmentation.h: declaration of the class for the Hough Transformation
 - Segmentation.cpp: implementation of the class for the Hough Transformation
2. The data folder includes one new image:
 - lines.tiff: Float value image with the lines for the Hough Transformation. The lines are white (1f) and the rest of the image is black (0f)
3. Implement the function “void Segmentation::houghTransform(const cv::Mat &input, float phiStep, cv::Mat &output)”
 - “Input”: float value input image
 - “phiStep”: step size of the angle for the Hough Transformation
 - “output”: output image (accumulator array) for the result
 - a. What is the largest angle we need to check for straight lines?
 - b. What is the largest distance from the origin a point can have?
 - c. Think about the number of rows and columns you need for the output image and create it accordingly
 - d. Implement the algorithm for the Hough Transformation

Appendix: Pseudo-Code for Hough Transformation

```
for each white pixel  $(x_k, y_k)$  do:  
    for  $\varphi = 0$  to  $\text{max\_}\varphi$  do:  
         $d = x_k \cos \varphi + y_k \sin \varphi$   
         $\text{accumulator}(\varphi, d)++$ 
```