

## COMP 4421 (Fall 2018) Assignment 2

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### Exercises

#### 1. Opening and Closing

$$\begin{aligned}(A \bullet B)^c &= ((A \oplus B) \ominus B)^c \\ &= (A \oplus B)^c \oplus \hat{B} \\ &= (A^c \ominus \hat{B}) \oplus \hat{B} \\ &= A^c \circ \hat{B} //\end{aligned}$$

#### 2. Dilation

A dilate B1

0	0	0	0	1	1	1	1
0	0	0	1	1	1	1	1
0	0	0	1	1	1	1	1
0	1	1	1	1	1	1	1
1	1	1	1	1	1	1	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	0	0	0	0

**A dilate B2**

0	0	0	0	0	1	1	0
0	0	0	0	1	1	1	1
0	0	0	1	1	1	1	1
0	0	1	1	1	1	1	0
0	1	1	1	1	1	0	0
1	1	1	1	1	0	0	0
1	1	1	1	0	0	0	0
0	1	1	0	0	0	0	0

**A erode B1**

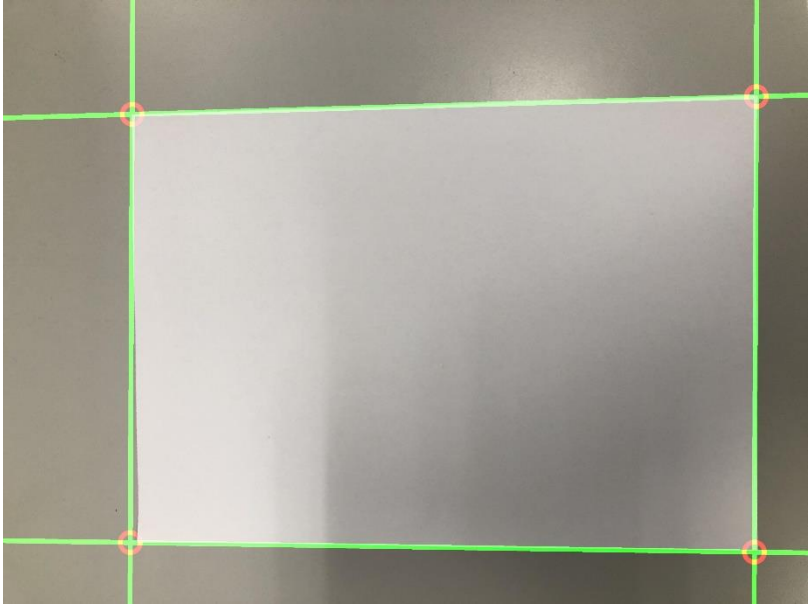
[illegible]

### A erode B2

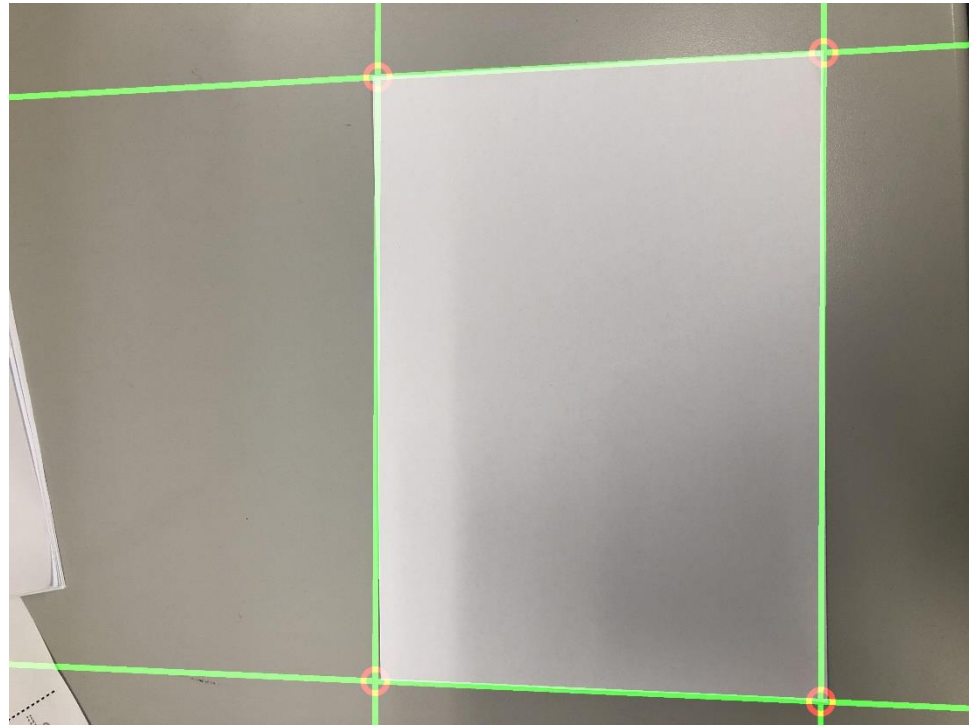
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

### Programming

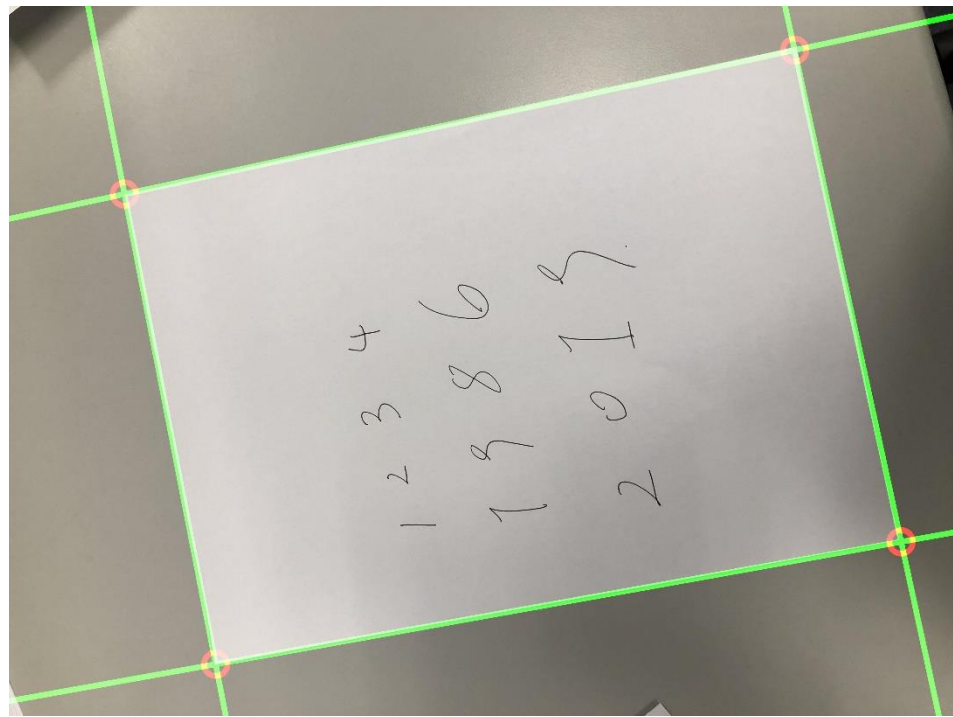
#### 1. Hough Transform

Filename	Image
1_marked.jpg	 A grayscale image of a document page. A green bounding box is drawn around the central content area. The four corners of this bounding box are marked with red circles. The background is dark and slightly textured.

2\_marked.jpg

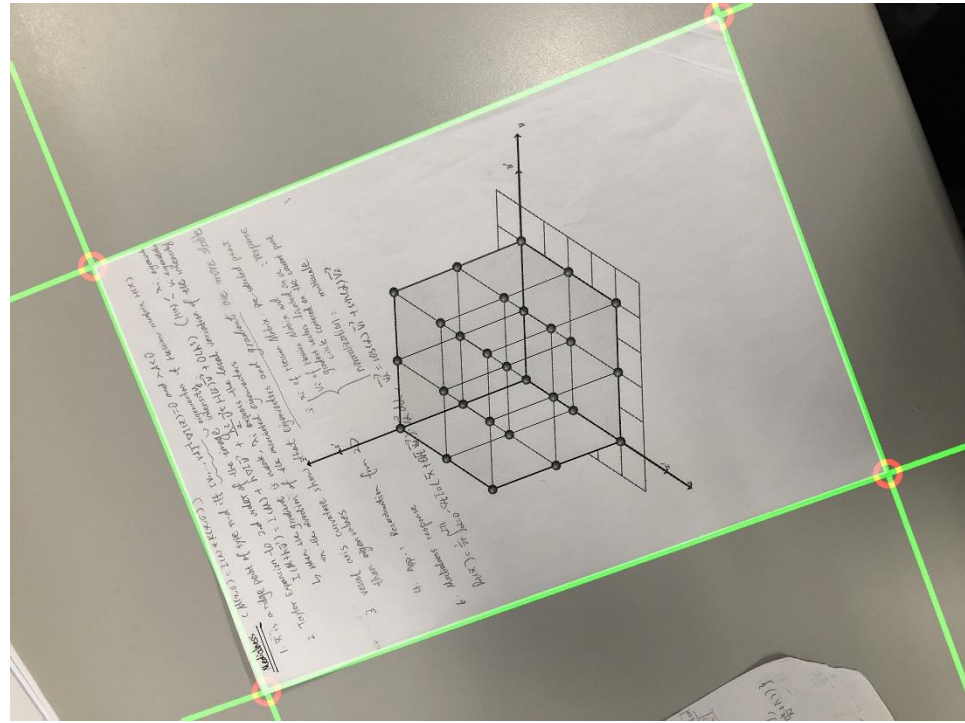


3\_marked.jpg





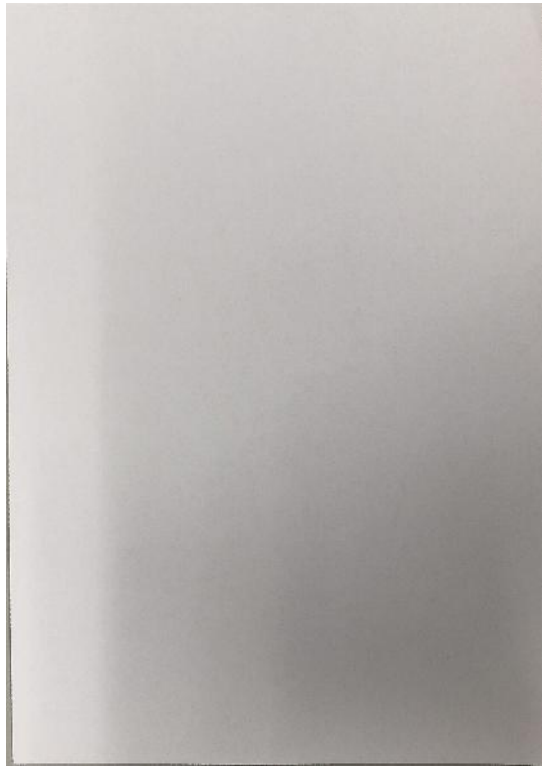
6\_marked.jpg



## 2. Image Warping

Filename	Image
1_warped.jpg	

2\_warped.jpg



3\_warped.jpg

