

## Opdrag 5

### Beeldsegmentasie, -voorstelling en -beskrywing

Inhandigingsdatum:  
Vrydag, 1 November 2019

#### Vraag 1

Hierdie vraag het betrekking op die beelde airport3.bmp en airport4.bmp.

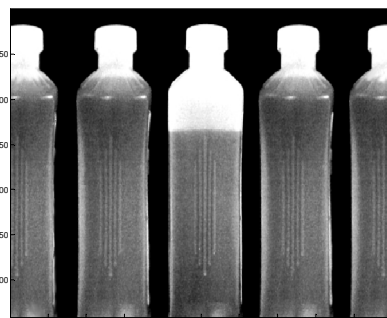
airport3.mat



Veronderstel dat hierdie twee foto's geneem is met behulp van digitale kameras vanuit die vlugkajuite van twee verskillende vliegtuie sodra hulle die onderskeie aanloopbane nader. Gebruik die lineêre Hough transform ten einde outomaties vas te stel watter een van hierdie twee vliegtuie mag voortgaan met die landing. Moet nie Matlab se radon funksie gebruik nie. Gebruik die algoritme in Afdeling 10.2.7 van Gonzalez & Woods.

#### Vraag 2

Hierdie vraag het betrekking op bottles.jpg en segments.jpg.



bottles.jpg

(a) Ontwikkel en implementeer 'n algoritme wat die ongevolde bottel in bottles.jpg outomaties identifiseer.

## Assignment 5

### Image segmentation, representation and description

Due date:  
Friday, 1 November 2019

#### Question 1

This question refers to the images airport3.bmp and airport4.bmp.

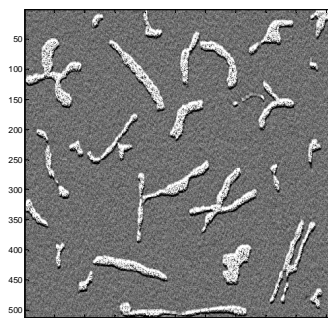
airport4.mat



Assume that these two photos were taken with a digital camera from the cockpits of two different aircraft as they approach the respective landing strips. Use the linear Hough transform in order to automatically establish which one of these aircraft may continue with the landing. Do not use Matlab's radon function. Use the algorithm in Section 10.2.7 of Gonzalez & Woods.

#### Question 2

This question refers to bottles.jpg and segments.jpg.



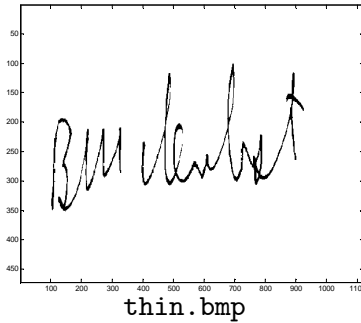
segments.jpg

(a) Develop and implement an algorithm that automatically identifies the imperfectly filled bottle in bottles.jpg.

- (b) Gebruik “region growing” om al die voorwerpe vanuit `segments.jpg` te onttrek. Die getal prominente voorwerpe moet dan outomaties afgeskat word. Gebruik u eie kriteria vir wat met “prominent” bedoel word.

### Vraag 3

Hierdie vraag het betrekking op die beelde `thin.bmp` en `thick.bmp`.



Ons wil die handtekeninge in hierdie beelde met mekaar vergelyk. Dit is dus nodig dat die pendikte van die handtekeninge dieselfde is.

- (a) Gebruik die verdunningsalgoritme op bladsy 835 van Gonzalez & Woods om die pendikte van beide handtekeninge na 'n enkele piksel te reduceer.
- (b) Verwyder nou alle haar-artifakte, wat as gevolg van die verdunningsproses ontstaan het, met 'n geskikte morfologiese filter.
- (c) Verdik weer die handtekeninge sodat beide handtekeninge 'n pendikte van 5 piksels het.

### Vraag 4

Hierdie vraag het betrekking op `fields.png`.

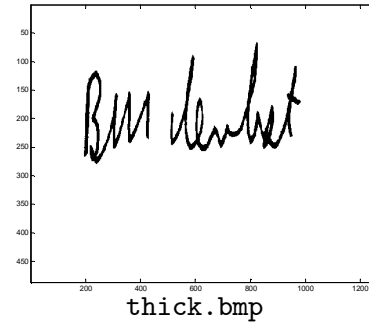
(a) Beskou die informele stedelike gebied (wit pyl) en onttrek 'n 80x80 subbeeld vanuit hierdie gebied. Onttrek nou geskikte tekstuur- en intensiteitsinligting hieruit, noteer dit en gebruik dan hierdie inligting om so veel as moontlik stedelike piksels te vind. Gebruik morfologiese filters om die aaneengeskakeldheid van die piksels te behou. *Consider the informal urban area (white arrow) and extract an 80x80 subimage from this area. Now extract appropriate texture and intensity information from the subimage, document it and then use this information to detect as many urban pixels as possible. Use morphological filters to maintain the connectivity of the pixels.*

(b) Herhaal (a) vir die aangeduide tipe landery (swart pyl). *Repeat (a) for the indicated type of field (black arrow).*

- (b) Use region growing to extract all the objects from `segments.jpg`. The number of prominent objects must then be estimated in an automatic way. Use your own criteria for what is meant by “prominent”.

### Question 3

This question refers to the images `thin.bmp` and `thick.bmp`.

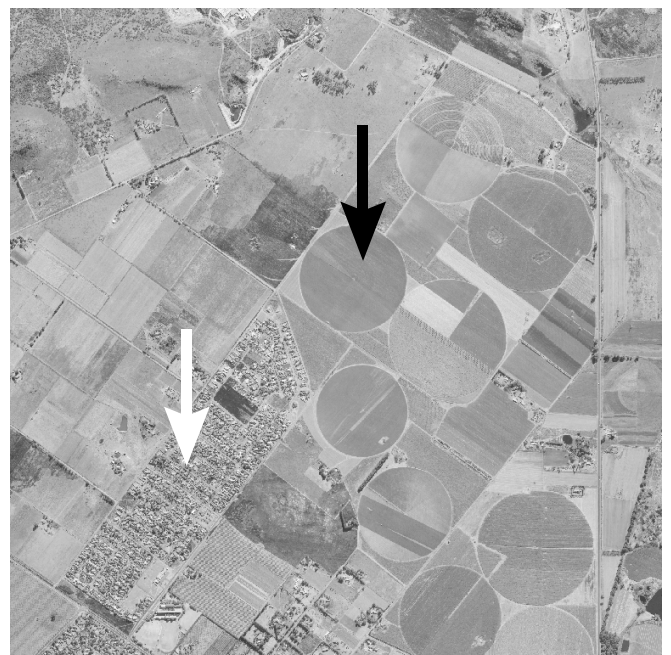


We want to compare the signatures in these images. It is therefore necessary that the signatures have the same stroke-width.

- (a) Use the thinning algorithm on page 835 of Gonzalez & Woods to reduce the stroke-width of both signatures to a single pixel.
- (b) Now remove all hair artifacts, that were created as a result of the thinning process, with a suitable morphological filter.
- (c) Dilate the signatures again so that both signatures have a stroke-width of 5 pixels.

### Question 4

This question refers to the image `fields.png`.



`fields.png`