STB600 Lab 3: Morphological image processing

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1. Objectives

The objective of this lab is to learn techniques for extracting "meaning" from an image by different morphological operations.

2. Tasks

This lab consists mainly two tasks: basic morphological operations on an image and the second task is to extract meaning from an image.

2.1. Basic morphological operations

This task is to perform basic morphological operations image erosion, dilation, opening, closing, hit or miss transform on the given image shown as shown in Figure 1. Beside, try to extract the boundary of the object.

Fig. 1

These commands can be used for these operations are given in the list.

```
1  import cv2
2  # Read image
3  # cv2.getStructuringElement(shape, size)#create the kernel
4  # cv2.erode() method
5  # cv2.dilate()
6  #opening = cv2.morphologyEx(img, cv2.MORPH_OPEN, kernel)
7  #closing = cv2.morphologyEx(img, cv2.MORPH_CLOSE, kernel)
8  #hit or miss transform hmt=cv2.morphologyEx(img, cv2.MORPH_HITMISS,
       kernel)
9  #Extract the boundary of the object by: boundaryImg=img-img_erosion
10
11 # Show the images
```

The shape of the kernel can be:

```
1  cv2.MORPH_RECT, cv2.MORPH_ELLIPSE or cv2.MORPH_CROSS
```

2.2. Object Localization and Size Estimation

In vision applications, it is sometimes necessary to measure the size of an object and locate it in an image. The aim of this task is to measure the melt pool width and length and localize the melt pool in an image as shown in Figure 2, where the melt pool is indicated by orange dots.
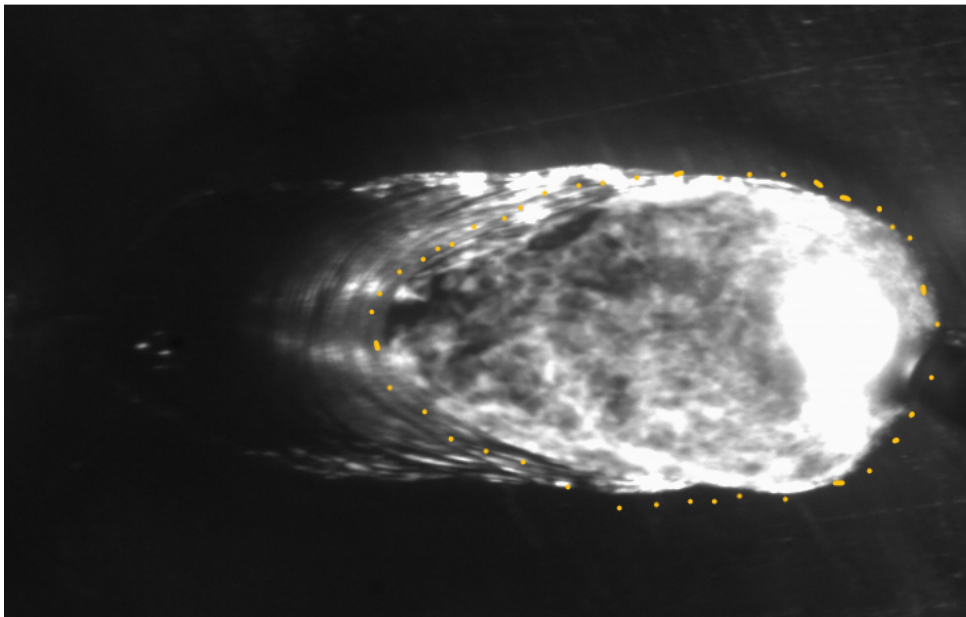
Fig. 2. Orange spots indicating melt pool region

Hint: Apply these different morphological operations to extract the melt pool region.

Then find the extreme points in four directions (leftmost, rightmost, up and down points). With these points it is possible to measure the melt pool size (width and height) and find the centroids of the melt pool.

```
1  import cv2
2  import numpy as np
3
4  # Read image
5  #image filtering
6  #morphological operations
7
8  #Binarize img using cv.threshold() or apply this before morphological
       operations
9  ##
10 ind=np.where(processedImg == 1)##find the index the pixels of region of
       interest
11 rows=ind[0]##index of the rows of the pixels of the ROI
12 cols=ind[1]##index of the columns of the pixels of the ROI
13 ##find the extreme points of the ROI by finding the minimal and maximal
       of the rows and columns.'
14
15 ##Find the width and height and centroids
```

3. Additional resource

References