

BACTERIA STRIP SEGMENTATION:

Image segmentation and cropping is done using OpenCV module.

How to do?

- Place all the images to be cropped in “**Test_Images**” folder.
- Run “**Bact_Strip_Segmentation.py**” code.
- Check cropped images in “**Results**” folder.

Our input:



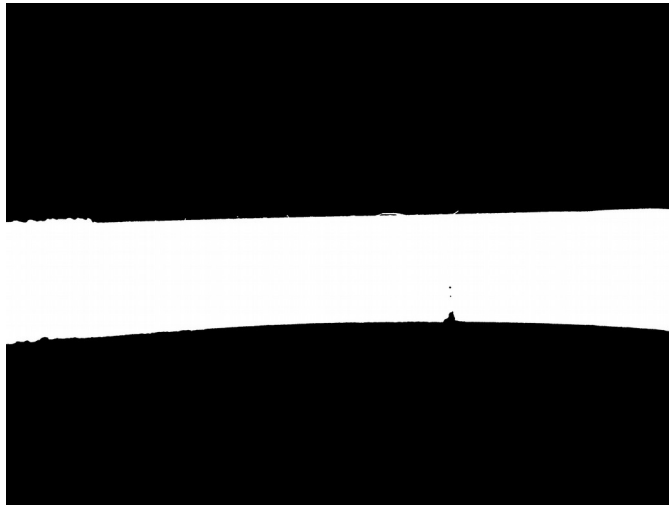
Our output:



1. OpenCV, os and Numpy are the 3 main modules, which are imported first.
2. os is used to grab the current directory and navigate to ‘/Test_images/’ directory. All the directories and files under ‘/Test_images/’ are captured by two lists created, namely ‘files’ and ‘directories’.
3. Iterating a for loop, for all the images in ‘/Test_images/’ one by one.
4. We grab two versions of the same file, variable named ‘orig’ and ‘img’, the first one is in BGR format whereas the later in GRAYSCALE.
5. We take the GRAYSCALE image, and apply a smoothening/blurring filter, ‘**Bilateral filter**’ for noise reduction.

6. Next we apply OTSU thresholding to the smoothed image, this led to convert the image into a **binary image**, which means pixel value becomes either 255 (**white**) or 0 (**black**).

7. Next we are creating a **mask**, a (8*8) kernel. This kernel is used in morphological transformation. We are doing “**opening**” (erosion followed by dilation) and “**closing**” (dilation followed by erosion). This helps in removing minor scratches from image



There are some **visible scratches** in the thresholded binary image, which are removed after morphological changes.



Final image.

8. From this final image, we do “**contour detection**”, and here we can see, this big white strip is the biggest contour, so we detect that (using findContours).

9. Detect the boundaries of the contour (x to x+w) and (y to y+h).

10. Now, we detect an **issue here**, all the strips are not perfectly aligned. Some are **bent** so while detecting contours we are detecting some part outside of the strip too.

To remove this problem, we are shortening the **y** values, we are capturing all values in top-most and bottom-most line of **y** and take the mean of them. If they are returning 255 (white), that means all the values in the line are inside the strip and all of them are in **white** region. If they are not satisfying the condition **decrement line in both sides**.

11. Replace the value of **y** and (**y+h**) with the new found value of **y_top** and **y_bottom**.

12. **crop** the initial image, the '**orig**' with bounding box as (**x and x+w**) for the x-axis and (**y_top and y_bottom**) for y-axis.

13. save the image with a '**_cropped.png**' at the end under '**/Results/**' folder.