

Point Detection with Laplacian Kernel

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1 Objective

To detect points in the given image based on a qualifying criteria (confidence) using a Laplacian kernel.

2 Analysis

Some of the concepts that were used to solve this task are covered here.

2.1 Point detection

This is a technique used to segment the image based on whether a pixel is a point or not and segments the image based on this discontinuity. It can also be thought of as a detection or template matching solution for points. It is performed by running a mask through an image, convolving the image with a window of the mask's size in the image. The laplacian operator is an excellent choice of mask here as it models discontinuities very well. The resultant image gives points where the laplacian mask responds well, these are the points detected in the image. A threshold can be used to collect only points which respond really well to the mask, since all responses may not actually correspond to points in the image.

3 Method

3.1 Point Detection

The following steps were followed to detect points in the given image.

1. A 5x5 laplacian operator was chosen as a point detection mask.

0	0	1	0	0
0	1	2	1	0
1	2	-16	2	1
0	1	2	1	0
0	0	1	0	0

2. The mask was applied to the input image, and the weighted sum of the coefficients of the mask with image pixel intensities were calculated for each pixel centred at a window (size of mask) in the image.
3. A threshold of $0.9 \times \text{max pixel intensity}$ of the resultant image was used to get good points detected. The detected points were labeled on the image and stored.

4 Results

On applying the laplacian mask described in the previous section to the given image, and selecting only points with at least a threshold of $0.9 \times (\text{max intensity of the resulting image})$. One point (249,445) was obtained. This point corresponds to the porosity in the turbine blade in the given image. Figure 1 shows the point detected in the image (next page).

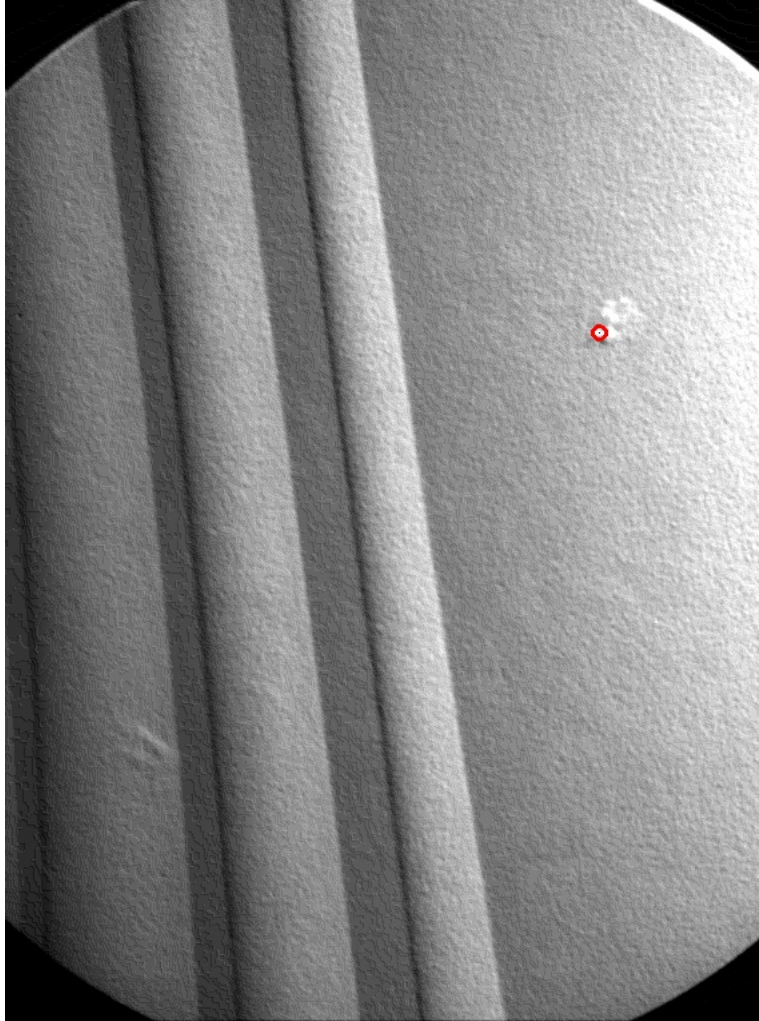


Figure 1: Porosity point detected on the turbine blade in the given image.