

## Boundary Extraction of 2D Image

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### ABSTRACT

The process to reconstruct the curve or surfaces in CAGD should begin with the boundary extraction of the original image. The feature and the information of the image can be obtained from the boundary of the image. This process can help us to implement the other processes such as data extraction, corner detection, curves fitting or surface reconstruction. The implementation and result of the boundary extraction are discussed in this project.

**KEY WORDS:** Boundary extraction, boundary of the image, preprocessing, binary image, boundary outline.

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### 1. INTRODUCTION

Extracting the boundary is the important process to gain the information and understand the feature of an image. Boundary extraction is the first process in preprocessing in order to present the features of the image. This process can help the researcher to gain the data from the image.

There are a lot of proposed methods in detecting the boundary of the image. Yahya (2009) introduced a spatial filter in order to extract the boundary. In the initial process, the 7 by 7 average spatial filter is used to smooth out the digital image. In the next process, thresholding is applied to convert the digital image into binary image. The boundary image is obtained from the binary image by using the method in mathematical morphology. Every third pixels of the boundary image is chose to get a final boundary image. This process is suitable for the boundary image that has the same distance for every pixel.

### 2. METHODS

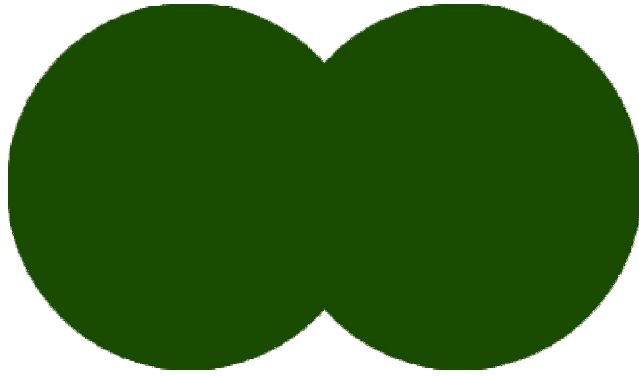
Boundary extraction is a process to extract the boundary of a sample curve or an image. In this project, some modification is made to the algorithm from Eddins (2006) to extract the boundary. This algorithm is chose because it can extract the boundary properly and the result can be used to extract the data. Before extracting the boundary, the selected image should be edited with the Adobe Photoshop and Adobe Illustrator to remove it from noise so that it will becomes smoother. If the image is not smooth, the algorithm of boundary extraction cannot produce a good result. However, when the image is already clean and smooth, the process of editing is skipped. The figure of original image and the image after editing with the Adobe Photoshop and Adobe Illustrator are displayed in the Figure 1 and Figure 2.



**Figure 1:** The image before editing with Adobe Photoshop and Adobe Illustrator.

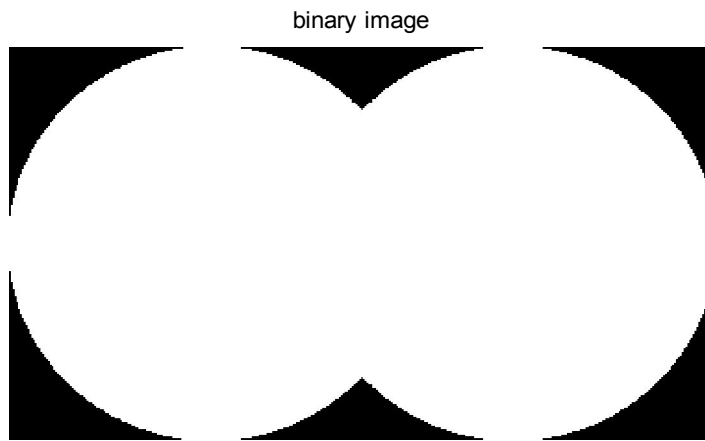
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**Figure 2:** The image after editing with Adobe Photoshop and Adobe Illustrator.

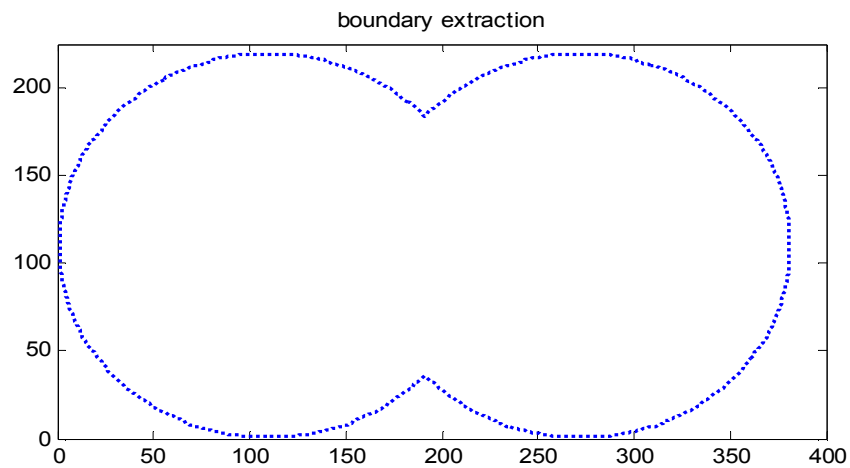
The process is continued to obtain the binary image by threshold the image. The algorithm from Eddins (2006) is used to threshold the image. The binary image is in black and white colour and only has two pixel values. The object is in white colour and the background of the object is in black colour. The pixel value for the object is one and the background of the object is zero. The picture of binary image is shown by the Figure 3.



**Figure 3:** The binary image of the sample image used.

### 3. RESULTS

By using the algorithm of boundary extraction, the boundary or outline of the image is detected. The result of the boundary extraction is shown in Figure 4.



**Figure 4:** The result of the boundary extraction

#### 4. DISCUSSION AND CONCLUSION

The objective in this project is to gain the information and features of the image. Therefore boundary extraction is the best process in order to have the feature of the image so that the data can be extracted. The process to extract the boundary is begins with editing the image to remove the noise so that it will becomes smoother. The image has to be clear and smooth so that the process of boundary extraction will become easier.

The boundary of the image obtained from the process of boundary extraction is very useful to implement another preprocessing such as data extraction and corner detection. As a conclusion, this process is recommended because it is very simple and easy for the researcher to implement it in the first process of preprocessing.

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