

**A NONLINEAR FILTER FOR SALT AND PEPPER NOISE  
REMOVAL FROM IMAGES USING MATHEMATICAL  
MORPHOLOGY AND MEDIAN FILTER**

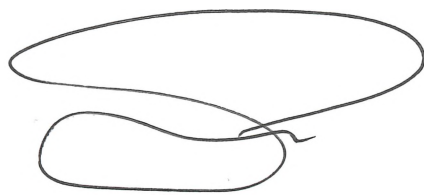
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**Thesis Submitted in Fulfillment of the Requirement for  
Bachelor of Science (Hons.) Computational Mathematics in the  
Faculty of Computer and Mathematical Sciences  
Universiti Teknologi Mara**

**July 2018**

## DECLARATION BY CANDIDATE

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Teknologi MARA or other institutions.

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke at the end.

Signature : \_\_\_\_\_

SITI NABIHAH BINTI OTHMAN

JULY 19, 2018

## ABSTRACT

Around 1964 mathematical morphology has been developed by Georges Matheron and Jean Serra at Ecole Des Mines de Paris, France. Mathematical morphology is one of theory and technique in analysis and processing for describing shape using sets. This technique widely applied in digital images. Median filter is a technique that often used to remove noise from images. This technique has been widely used because it preserves edges while removing noise. Both techniques are effective to remove salt and pepper noise. This research will investigate the effectiveness of mathematical morphology and median filter in removing salt and pepper noise measured by peak signal to noise ratio (PSNR) and mean square error (MSE). The results are analyzed using computer software matlab . From the investigate, the effectiveness and strength of this technique can be shown by images that have been corrupted by impulse noise from 0.01% until 0.1% and filtered image.

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