

**UNIVERSITI TEKNOLOGI MARA
CAWANGAN PULAU PINANG**

**DATA AUGMENTATION BY USING
IMAGE PROCESSING TECHNIQUE
FOR LOW LIGHT
CHARACTERISTICS WATER OF
INTELLIGENCE UNDERWATER
VISION SYSTEM**

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Data augmentation is used to significantly increase the number of available datasets for training models in Convolutional Neural Network or CNN. CNN required a lot of datasets in order for training and testing the models to acquire better accuracy of overall project. However, an available dataset for underwater images are vast and unmatched with low light characteristics due to cloudy water in pond environment. Therefore, this paper proposed the data augmentation by using image processing techniques for low light characteristics water of intelligence underwater vision system. The objective of this study is to develop an augmented underwater dataset by using various image processing techniques and to evaluate the effect of image augmentation on underwater images in the CNN performance. The data augmentations are using Gaussian Noise and Grayscale Conversion for augmenting the original datasets. Histogram Equalization is used to enhance the shrimp and underwater images as part of the image processing technique applied. Lastly, the CNN model is trained and validated using both before and after augmented datasets to compare the performance in terms of the percentage and the losses. The results show that after augmentation reached 99.3% for training and 99.1% for validation accuracy. In conclusion, this study has shown that by performing data augmentation, it is able to boost the number of datasets for training and testing the CNN model and also enhancing the accuracy of the trained models.

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TABLE OF CONTENTS

	PAGE
AUTHOR'S DECLARATION	i
ABSTRACT	iii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS	x
CHAPTER 1 INTRODUCTION	1
1.1 Overview	1
1.2 Background of Study	1
1.3 Problem Statement	3
1.4 Objectives	4
1.5 Scope of Study	4
1.6 Relevance of The Study	5
1.7 Thesis Organization	6
1.8 Summary	7
CHAPTER 2 LITERATURE REVIEW	8
2.1 Overview	8
2.2 Shrimp Aquaculture	8
2.3 Underwater Images	9
2.4 Convolutional Neural Network	11
2.4.1 Application of CNN	11
2.4.2 CNN Structure	12
2.4.3 Convolutional Layer	13
2.4.4 Non Linear Layer	13

2.4.5	Pooling Layer	14
2.4.6	Fully Connected Layer	14
2.5	Data Augmentation	16
2.5.1	Adding Noise	16
2.5.2	Image Conversion	17
2.5.3	Image Enhancement	18
2.6	Summary	19
 CHAPTER 3 RESEARCH METHODOLOGY		20
3.1	Overview	20
3.2	Overall Proposed Work	20
3.3	Data Acquisition	22
3.4	Image Augmentation	24
3.4.1	Adding Noise	24
3.4.2	Image Conversion	25
3.4.3	Image Enhancement	26
3.5	Experimental Setup for Deep Learning Model	29
3.5.1	Convolutional Neural Network Architecture	29
3.5.2	Machine Specification	30
3.5.3	Flowchart of CNN Programming	30
3.6	Training and Testing	33
3.7	Performance Evaluation	34
3.8	Summary	35
 CHAPTER 4 RESULTS AND DISCUSSION		36
4.1	Overview	36
4.2	Results for Data Augmentation	36
4.2.1	Data Augmentation with Gaussian Noise	36
4.2.2	Data Augmentation with Grayscale Conversion	39
4.2.3	Results for Histogram Equalization	42
4.3	CNN Performance	44
4.4	Summary	50

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS	51
5.1 Conclusion	51
5.2 Future Recommendation	52
5.2 Summary	52
REFERENCES	53
APPENDICES	57