



UNDERGRADUATE THESIS

**CONTRAST ENHANCEMENT TECHNIQUES ON
LUNG CT-SCAN IMAGES TO IMPROVE THE
PERFORMANCE OF MOBILENETV2-BASED
LUNG CANCER CLASSIFICATION**

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FACULTY OF COMPUTER SCIENCE
INFORMATICS STUDY PROGRAM
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2026**

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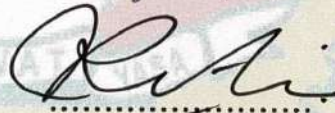
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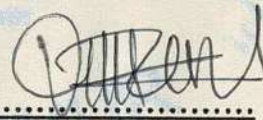
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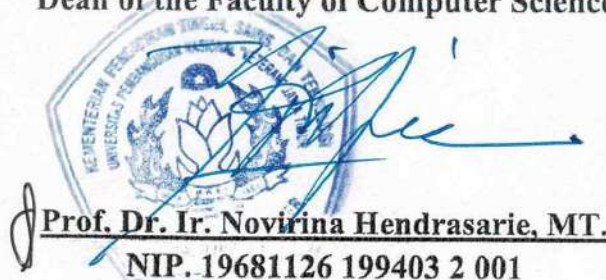
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ABSTRACT

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ABSTRACT

Lung cancer remains the leading cause of cancer-related deaths globally, with delayed diagnosis frequently occurring due to asymptomatic conditions in the early stages. Although Computed Tomography (CT-Scan) is the gold standard for early detection, the resulting image quality often suffers from low contrast and visual noise, which hinders the accurate identification of nodules by intelligent systems. This study aims to comparatively analyze the effectiveness of four contrast enhancement techniques, namely Histogram Equalization (HE), Contrast Limited Adaptive Histogram Equalization (CLAHE), Gamma Correction, and Contrast Stretching, to overcome these issues. The performance of each method was evaluated based on its ability to increase accuracy and minimize the loss value in a Deep Learning-based lung cancer classification model using the MobileNetV2 architecture. In this study, the MobileNetV2 architecture was also evaluated using four hyperparameter configuration scenarios (frozen base and fine-tuning, as well as different learning rates). The results indicated that the application of contrast enhancement techniques can improve the performance of the MobileNetV2 architecture when compared to the baseline data, with Histogram Equalization (HE) emerging as the best method. The HE technique achieved the highest accuracy rate of 99% with a loss value of 1.20. In conclusion, the histogram equalization technique is recommended as the most optimal contrast enhancement technique. This is due to the technique's ability to sharply define the edges of cancer cell nodules, thereby improving the performance of the MobileNetV2 architecture in both the feature extraction and testing stages.

Keywords: *Lung Cancer, CT-Scan, Contrast Enhancement, MobileNetV2, Deep Learning, Histogram Equalization.*

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Surabaya, May 21th, 2026

Author

LIST OF CONTENTS

COVER PAGE.....	i
APPROVAL SHEET	i
APPROVAL SHEET	iii
STATEMENT OF ORIGINALITY	v
ABSTRACT.....	vii
ACKNOWLEDGEMENTS	ix
LIST OF CONTENTS	xi
LIST OF FIGURES	xv
LIST OF TABLES	xix
CHAPTER I INTRODUCTION	1
1.1 Background	1
1.2. Problem Statements.....	5
1.3. Objectives.....	5
1.4. Benefits of the Research.....	5
1.5. Scope of the Research	6
CHAPTER II LITERATURE REVIEW.....	7
2.1. Previous Researchs.....	7
2.2. Lung Cancer	10
2.3 Image Computed Tomography (CT-Scan)	12
2.4 <i>Image Enhancement</i>	13
2.5 Contrast Enhancement Method.....	14
2.5.1 Histogram Equalization.....	15
2.5.2 Contrast Limited Adaptive Histogram Equalization (CLAHE).....	16
2.5.3 Gamma Correction	18
2.5.4 Contrast Stretching.....	20
2.6 Deep Learning.....	22
2.7 Convolutional Neural Network (CNN).....	24
2.7.1 CNN Architecture	25
2.7.2 Activation Function.....	26
2.8 MobileNetV2	27
2.9 Metrics Evaluasi.....	30

2.9.1 Accuracy	30
2.9.2 Loss.....	30
CHAPTER III RESEARCH METODOLOGY	33
3.1 Research Metodology	33
3.2 Data Collection	35
3.3 Split Data	38
3.4 Image Contrast Enhancement Process.....	39
3.5 Data Augmentation.....	48
3.6 <i>Resize</i> Image	50
3.7 Building the MobileNetV2 Model.....	50
3.8 Training & Testing Model MobileNetV2.....	53
3.9 Accuracy and Loss Evaluation	54
3.10 Comparative Analysis of Accuracy and Loss.....	57
3.11 Determining the Best Contrast Enhancement Method	57
3.12 Research Scenario and Hyperparameter Testing.....	58
CHAPTER IV RESULTS AND DISCUSSION	63
4.1 Data Collection	63
4.2 Split Data	65
4.3 Image Contrast Enhancement Process.....	65
4.3.1. Application of Contrast Enhancement Using the Histogram Equalization Method.....	67
4.3.2 Application of Contrast Enhancement Using the Contrast-Limited Adaptive Histogram Equalization (CLAHE) Method.....	70
4.3.3 Application of Contrast Enhancement Using the Gamma Correction Method.....	74
4.3.4 Application of Contrast Enhancement Using the Contrast Stretching Method.....	78
4.4 Augmentation Data and Resize Imge	82
4.5 Building the MobileNetV2 Model.....	85
4.6 Training and Testing the MobileNetV2 Model	89
4.6.1 Performance Analysis of Scenario 1 (Frozen Base and LR 10^{-3}).....	91
4.6.2 Performance Analysis of Scenario 2 (Frozen Base and LR 10^{-4}).....	95

4.6.3 Performance Analysis of Scenario 3 (Fine-Tuning and LR 10^{-3})	100
4.6.4 Performance Analysis of Scenario 4 (Fine-Tuning and LR 10^{-4})	106
4.7 Accuracy and Loss Evaluation.....	111
4.7.1 Accuracy and Loss Evaluation Results from Scenario 1	112
4.7.2 Accuracy and Loss Evaluation Results from Scenario 2	113
4.7.3 Accuracy and Loss Evaluation Results from Scenario 3	115
4.7.4 Accuracy and Loss Evaluation Results from Scenario 4	116
4.8 Performance Evaluation Based on Confusion Matrix, Precision, Recall and F1-Score Model.....	117
4.9 Determining the Best Contrast Enhancement Method.....	126
4.10 Implementing the Best-Case Scenario on a Website	128
CHAPTER V CONCLUSIONS AND SUGGESTIONS.....	135
5.1 Conclusions	135
5.2 Suggestions	137
BIBLIOGRAPHY	139
APPENDIX.....	143

LIST OF FIGURES

Figure 2.1 Deep Learning Architecture	23
Figure 2.2 Convolutional Neural Network Architecture.....	25
Figure 2.3 MobileNetV2 Architecture	27
Figure 3.1. Stages of the Comparative Experimental Research Method	33
Figure 3.2 Lung CT Scan Dataset Example.....	35
Figure 3.3 Histogram Visualization of Lung CT Scan	36
Figure 3.4 Lena’s Image	37
Figure 3.5 Lena Image Histogram Visualization	37
Figure 3.6 Visualization of Original Image Pixel Intensity Histogram	39
Figure 3.7 Histogram Visualization Results Histogram Equalization	41
Figure 3.8 CLAHE Histogram Visualization Illustration Results	43
Figure 3.9 Gamma Correction Histogram Visualization Results.....	45
Figure 3.10 Contrast Stretching Histogram Visualization Results	47
Figure 3.11 MobileNetV2 Model Architecture Used in the Research.....	51
Figure 4.1 Example of a Lung CT-Scan Image Dataset	66
Figure 4.2 Visualization of the Initial Lung CT Scan Histogram	66
Figure 4.3 Comparison of Images Between the Results of HE Application and the Original Images.....	68
Figure 4.4 Comparison of Histogram Visualizations Between the Results of HE Application and the Original Image.....	69
Figure 4.5 Image Comparison Between the CLAHE-Processed Image and the Original Image	72
Figure 4.6 Comparison of Histogram Visualizations Between the Results of CLAHE Application and the Original Image.....	73
Figure 4.7 Comparison of Images: Results of Gamma Correction vs. Original Images	76
Figure 4.8 Visual Comparison of Histograms Between the Results of Gamma Correction and the Original Image.....	77

Figure 4.9 Comparison of Images: Results of Contrast Stretching vs. Original Image	80
Figure 4.10 Comparison of Histogram Visualizations Between the Results of Contrast Stretching and the Original Image	81
Figure 4.11 Visualization Results of the Development Graph of the Training Process for Scenario 1 with the Baseline Dataset.....	91
Figure 4.12 Visualization Results of the Development Graph of the Training Process for Scenario 1 with the HE Dataset	92
Figure 4.13 Visualization Results of the Development Graph of the Training Process for Scenario 1 with the CLAHE Dataset	93
Figure 4.14 Visualization Results of the Development Graph of the Training Process for Scenario 1 with the Gamma Correction Dataset.....	93
Figure 4.15 Visualization Results of the Development Graph of the Training Process for Scenario 1 with the Contrast Stretching Dataset	95
Figure 4.16 Visualization Results of the Development Graph of the Training Process for Scenario 2 with the Baseline Dataset.....	96
Figure 4.17 Visualization Results of the Development Graph of the Training Process for Scenario 2 with the HE Dataset	96
Figure 4.18 Visualization Results of the Development Graph of the Training Process for Scenario 2 with the CLAHE Dataset	97
Figure 4.19 Visualization Results of the Development Graph of the Training Process for Scenario 2 with the Gamma Correction Dataset.....	98
Figure 4.20 Visualization Results of the Development Graph of the Training Process for Scenario 2 with the Contrast Stretching Dataset	99
Figure 4.21 Visualization Results of the Development Graph of the Training Process for Scenario 3 with the Baseline Dataset.....	101
Figure 4.22 Visualization Results of the Development Graph of the Training Process for Scenario 3 with the HE Dataset	103
Figure 4.23 Visualization Results of the Development Graph of the Training Process for Scenario 3 with the CLAHE Dataset	103
Figure 4.24 Visualization Results of the Development Graph of the Training Process for Scenario 3 with the Gamma Correction Dataset.....	105

Figure 4.25 Visualization Results of the Development Graph of the Training Process for Scenario 3 with the Contrast Stretching Dataset.....	106
Figure 4.26 Visualization Results of the Development Graph of the Training Process for Scenario 4 with the Baseline Dataset	107
Figure 4.27 Visualization Results of the Development Graph of the Training Process for Scenario 4 with the HE Dataset.....	108
Figure 4.28 Visualization Results of the Development Graph of the Training Process for Scenario 4 with the CLAHE Dataset.....	109
Figure 4.29 Visualization Results of the Development Graph of the Training Process for Scenario 4 with the Gamma Correction Dataset	109
Figure 4.30 Visualization Results of the Development Graph of the Training Process for Scenario 4 with the Contrast Stretching Dataset.....	110
Figure 4.31 Confusion Matrix of Evaluation Results of Scenario 4 Model on Baseline Data	120
Figure 4.32 Confusion Matrix of Evaluation Results of Scenario 4 Model on HE Data	122
Figure 4.33 Confusion Matrix of Evaluation Results of Scenario 4 Model on CLAHE Data.....	123
Figure 4.34 Confusion Matrix of Evaluation Results of Scenario 4 Model on Gamma Correction Data	124
Figure 4.35 Confusion Matrix of Evaluation Results of Scenario 4 Model on Contrast Stretching Data	125
Figure 4.36 CT-Scan Detection Form Display	129
Figure 4.37 Display of Normal Lung Detection Results.....	130
Figure 3.38 Display of CT-Scan Detection Results Indicating Lung Cancer Risk	132

LIST OF TABLES

Table 2.1 Previous Researchs	8
Table 3.1 Calculation of the Contrast Enhancement Histogram Equalization Method	40
Table 3.2 Calculation of Contrast Enhancement Gamma Correction Method	45
Table 3.3 Calculation of Contrast Enhancement Contrast Stretching Method	46
Table 3.4 Parameter Data for All Methods	48
Table 3.5 Hyperparameter Testing Scenario.....	59
Table 4.1 Results of Accuracy and Loss Evaluation of Scenario 1	112
Table 4.2 Results of Accuracy and Loss Evaluation of Scenario 2	114
Tabel 4.3 Results of Accuracy and Loss Evaluation of Scenario 3	115
Table 4.4 Results of Accuracy and Loss Evaluation of Scenario 4	117
Table 4.5 Precision, Recall and F1-Score Evaluation Results in Scenario 4.....	126
Tabel 4.6 Rangkuman Hasil Evaluasi Akurasi dan Loss dari 4 Skenario.....	127