

TABLE OF CONTENTS

UNDERGRADUATE THESIS	1
APPROVAL PAGE	1
ABSTRACT	2
TABLE OF CONTENTS	4
TABLE OF FIGURES	8
TABLE OF TABLES	10
INTRODUCTION	11
1.1 Research Background	11
1.2 Research Problem	13
1.3 Research Scope	14
1.4 Research Objective	14
1.5 Research Benefits	14
LITERATURE REVIEW	15
THEORETICAL BASIS	26
3.1 Sentiment Analysis	26
3.2 Emotion Classification	27
3.3 Pre-processing Techniques	28
3.3.1 Case Folding	28
3.3.2 Non-Alphanumeric Removal	28
3.3.3 Normalization	29
3.3.4 Stemming	29
3.3.5 Tokenization	29
3.4 Generative Model	29
3.5 Semi-supervised GANs	30
3.6 Generative Adversarial Networks (GANs)	32
3.7 BERT	33
3.8 IndoBERT	35
3.9 GAN-BERT	36
3.10 Evaluation	37
3.10.1 Accuracy	37
3.10.2 Precision	38
3.10.3 Recall	38
3.10.4 F1-Score	38
RESEARCH METHODOLOGY	39
4.1 Research Description	39
4.2 Data Acquisition	41
4.3 Data Pre-Processing	43
4.4 Modeling	47

4.5 Evaluation	49
IMPLEMENTATION	50
5.1 Data Acquisition	50
5.2 Import Library Implementation	51
5.3 Device Selection Implementation	52
5.4 Dataset Handling and Sampling Implementation	53
5.5 Parameter Configuration Implementation	55
5.5.1 Transformer Parameters	55
5.5.2 GAN IndoBERT Specific Parameters	56
5.5.3 Optimization Parameters	57
5.5.4 Adopted Transfomer Model	59
5.6 Handling Unlabeled Data	59
5.7 Data Preprocessing and Setting Tokenizer Model	60
5.8 Setting Up Training and Testing DataLoaders	61
5.9 The Generator	66
5.10 The Discriminator	67
5.11 Configuration and Initialization	69
5.12 Training and Evaluation of GAN IndoBERT	72
5.12.1 Model Initialization	72
5.12.2 Training Process	73
5.12.3 Testing on the Evaluation Dataset and Model Evaluation	75
RESULTS AND DISCUSSION	78
6.1 GAN IndoBERT Results	78
6.1.1 GAN IndoBERT with 1% Labeled Data Results	78
6.1.2 GAN IndoBERT with 5% Labeled Data Results	86
6.1.3 GAN IndoBERT with 10% Labeled Data Results	93
6.1.4 GAN IndoBERT with 50% Labeled Data Results	100
6.1.5 GAN IndoBERT with 100% Labeled Data Results	108
6.1.6 GAN IndoBERT Comprehensive Comparison with IndoBERT	117
CONCLUSION AND FUTURE WORKS	120
7.1 Conclusion	120
7.2 Future Works	121
REFERENCES	122