



UNDERGRADUATE THESIS

**OPTIMIZING HYBRID LSTM-GRU
HYPERPARAMETERS USING GENETIC
ALGORITHM FOR PREDICTING BANKING
STOCK PRICES LISTED IN THE LQ45 INDEX**

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UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAWA TIMUR
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INFORMATICS STUDY PROGRAM
SURABAYA
2026**

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OPTIMIZING HYBRID LSTM-GRU HYPERPARAMETERS USING
GENETIC ALGORITHM FOR PREDICTING BANKING STOCK PRICES
LISTED IN THE LQ45 INDEX

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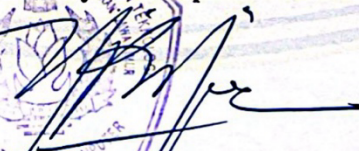
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ABSTRACT

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HYPERPARAMETERS USING GENETIC
ALGORITHM FOR PREDICTING BANKING
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This study is motivated by the high volatility of banking sector stock prices in the LQ45 index, which calls for accurate and adaptive forecasting methods. Advances in deep learning, particularly Recurrent Neural Network (RNN) models such as Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU), provide the capability to capture patterns in time-series data. However, model performance is highly influenced by the selection of optimal hyperparameters. Therefore, this study examines the application of a hybrid LSTM-GRU model optimized using a Genetic Algorithm (GA). The data used includes daily stock prices and internal company factors such as ROA and ROE for the period from November 2020 to June 2025. The research stages include collecting daily stock price data and financial ratio reports from 6 banking issuers listed in the LQ45 Index, data preprocessing, model training, and hyperparameter optimization using GA. Model evaluation was conducted using RMSE, MAE, and MAPE. The results show that the LSTM-GRU hybrid model optimized with GA significantly improves prediction accuracy compared to the unoptimized model, as evidenced by a cumulative reduction in the average error values across all evaluation metrics: 18.42% for RMSE, 20.61% for MAE, and 19.80% for MAPE. Thus, the combination of the hybrid method and evolutionary-based optimization has proven effective in improving stock price prediction performance.

Keywords: Hybrid LSTM-GRU, Genetic Algorithm, Hyperparameter Optimization, Stock Prediction, Time Series

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Finally, the author humbly acknowledges that this research is far from perfection and that the pursuit of knowledge is a continuous journey. Despite its inherent limitations, it is the author's sincere hope that this study provides valuable insights into the optimization of hybrid deep learning architectures and serves as a meaningful contribution to the advancement of the field of Informatics, particularly within the academic community of Universitas Pembangunan Nasional Veteran Jawa Timur. The author remains open to constructive criticism and suggestions that may further refine this work. May this thesis serve as a stepping stone for future exploration and be of benefit to all who seek to push the boundaries of science and technology.

Surabaya, 13rd April 2026

Author

TABLE OF CONTENTS

APPROVAL SHEET	i
APPROVAL SHEET	iii
STATEMENT OF ORIGINALITY	v
ABSTRACT	vii
ACKNOWLEDGEMENTS.....	ix
TABLE OF CONTENTS.....	xiii
LIST OF FIGURES	xvii
LIST OF TABLES	xix
CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Formulation.....	3
1.3 Research Objectives	4
1.4 Research Benefits	4
1.5 Scope and Limitations.....	4
CHAPTER II LITERATURE REVIEW.....	5
2.1 Previous Research	5
2.2 Theoretical Framework.....	11
2.2.1 Stocks	11
2.2.2 Internal Factors Affecting Stock Prices	12
2.2.3 Forecasting	14
2.2.4 Hyperparameter Optimization.....	15
2.2.5 Genetic Algorithm (GA)	15
2.2.6 Long-Short Term Memory (LSTM).....	17
2.2.7 Gated Recurrent Unit (GRU)	23
2.2.8 Hybrid LSTM-GRU	26
2.2.9 Root Mean Squared Error (RMSE).....	27

2.2.10 Mean Absolute Error (MAE)	27
2.2.11 Mean Absolute Percentage Error (MAPE)	28
CHAPTER III SYSTEM DESIGN AND IMPLEMENTATION.....	31
3.1 Research Methodology.....	31
3.2 Data Collection	32
3.3 Preprocessing Data.....	35
3.3.1 Handling Missing Values	36
3.3.2 Data Merging	38
3.3.3 Data Splitting	39
3.3.4 Data Normalization	40
3.3.5 Data Transformation	42
3.4 Hybrid LSTM-GRU Model.....	44
3.5 Hyperparameter Tuning	48
3.6 Model Evaluation	53
3.6.1 RMSE.....	54
3.6.2 MAE.....	55
3.6.3 MAPE.....	55
3.7 Testing Scenarios.....	55
3.8 Implementation of Graphical User Interface (GUI).....	57
CHAPTER IV RESULTS AND DISCUSSION	61
4.1 Data Collection	61
4.2 Data Preprocessing.....	64
4.2.1 Handling Missing Values	64
4.2.2 Data Merging	67
4.2.3 Data Splitting	70
4.2.4 Data Normalization	71
4.2.5 Data Transformation	74
4.3 Implementation of the Hybrid LSTM-GRU Model.....	77

4.4 Training and Evaluation Results of the Baseline Model	80
4.4.1 Baseline Model Configuration	82
4.4.2 Baseline Model Training History	83
4.4.3 Baseline Model Performance Evaluation	88
4.4.4 Baseline Model Prediction Results	90
4.5 Implementation of Genetic Algorithm for Hyperparameter Optimization	94
4.5.1 Genetic Algorithm Configurations	94
4.5.2 Operator Genetic Algorithm	98
4.5.3 The Evolutionary Process of Genetic Algorithm	107
4.5.4 Best Hyperparameter Found By GA	114
4.6 Training and Evaluation Results of the Optimized Model.....	116
4.6.1 Optimized Model Training History	116
4.6.2 Optimized Model Performance Evaluation	121
4.6.3 Optimized Model Prediction Results	122
4.7 Comparative Results Analysis	126
4.7.1 BBKA Model Comparison	128
4.7.2 BBNI Model Comparison	129
4.7.3 BBRI Model Comparison	130
4.7.4 BBTN Model Comparison	132
4.7.5 BMRI Model Comparison	133
4.7.6 BRIS Model Comparison	134
4.7.7 Overall Analysis and Conclusions	136
4.8 GUI Implementation Results	140
4.8.1 Data Input Page	141
4.8.2 Prediction Results Page	142
CHAPTER V CONCLUSIONS AND RECOMMENDATIONS	145
5.1 Conclusions	145
5.2 Recommendations	146
BIBLIOGRAPHY	149

ATTACHMENT..... 153

LIST OF FIGURES

Figure 2.1 Genetic Algorithm Flowchart	16
Figure 2.2 The LSTM Cell Sequence That Processes the Input Sequence	17
Figure 2.3 Data Flow Mechanism in LSTM Memory Cells	17
Figure 2.4 Data Flow Mechanism in GRU Cell.....	23
Figure 3.1 Research Flowchart	31
Figure 3.2 Sample Data for BBCA Quarterly Financial Ratios Report	34
Figure 3.3 Stages of the Data Preprocessing Workflow.....	35
Figure 3.4 Sample BBCA Data with Missing Dates	36
Figure 3.5 Sample BBCA Data After Handling Missing Values	37
Figure 3.6 Sample BBCA Data After Normalization.....	41
Figure 3.7 Hybrid LSTM-GRU Model Architecture	44
Figure 3.8 Hyperparameter Tuning Flowchart.....	49
Figure 3.9 Mock Up Design of The Data Input Page	57
Figure 3.10 Mock Up Design of The Prediction Result Page.....	58
Figure 4.1 Publication of Banking Financial Reports on the OJK Website	63
Figure 4.2 Analysis of the Distribution of Missing Dates.....	65
Figure 4.3 BBCA Dataset Normalized.....	73
Figure 4.4 Hybrid LSTM-GRU Model Architecture	77
Figure 4.5 Training History BBCA Baseline Model.....	83
Figure 4.6 Training History BBNI Baseline Model	84
Figure 4.7 Training History BBRI Baseline Model	85
Figure 4.8 Training History BBTN Baseline Model.....	86
Figure 4.9 Training History BMRI Baseline Model	87
Figure 4.10 Training History BRIS Baseline Model.....	87
Figure 4.11 Actual vs Predicted Graph BBCA Baseline Model	90
Figure 4.12 Actual vs Predicted BBNI Baseline Model	91
Figure 4.13 Actual vs Predicted BBRI Baseline Model.....	91
Figure 4.14 Actual vs Predicted BBTN Baseline Model	92
Figure 4.15 Actual vs Predicted BMRI Baseline Model.....	93
Figure 4.16 Actual vs Predicted BRIS Baseline Model	94
Figure 4.17 Graph of the Generation Count Validation Experiment.....	97

Figure 4.18 Genetic Algorithm Convergence Graph BBKA Model	108
Figure 4.19 Genetic Algorithm Convergence Graph BBNI Model	109
Figure 4.20 Genetic Algorithm Convergence Graph BBRI Model.....	110
Figure 4.21 Genetic Algorithm Convergence Graph BBTN Model	110
Figure 4.22 Genetic Algorithm Convergence Graph BMRI Model.....	111
Figure 4.23 Genetic Algorithm Convergence Graph BRIS Model	112
Figure 4.24 Comparison of GA Convergence Charts for All Issuers.....	113
Figure 4.25 Training History BBKA Optimized Model.....	117
Figure 4.26 Training History BBNI Optimized Model.....	117
Figure 4.27 Training History BBRI Optimized Model	118
Figure 4.28 Training History BBTN Optimized Model.....	119
Figure 4.29 Training History BMRI Optimized Model	120
Figure 4.30 Training History BRIS Optimized Model.....	120
Figure 4.31 Actual vs Predicted BBKA Optimized Model	122
Figure 4.32 Actual vs Predicted BBNI Optimized Model	123
Figure 4.33 Actual vs Predicted BBRI Optimized Model.....	124
Figure 4.34 Actual vs Predicted BBTN Optimized Model	124
Figure 4.35 Actual vs Predicted BMRI Optimized Model.....	125
Figure 4.36 Actual vs Predicted BRIS Optimized Model	126
Figure 4.37 Data Input Page.....	141
Figure 4.38 Prediction Results Page	142

LIST OF TABLES

Table 2.1 Previous Research	5
Table 3.1 Sample BBCA Stock Price Dataset	33
Table 3.2 Structure of the ROA and ROE Dataset for BBCA	34
Table 3.3 Structure of the BBCA Stock Price Dataset After Data Merging.....	38
Table 3.4 Example of a Sliding Window Implementation	43
Table 3.5 Input Data Assumptions for the Hybrid LSTM-GRU Model	45
Table 3.6 Example of Assumed LSTM Weight Parameter Values.....	46
Table 3.7 Example Assumptions for GRU Weight Parameter Values.....	47
Table 3.8 Example of Random Hyperparameter	50
Table 3.9 Example of Model RMSE Results	50
Table 3.10 Example of Calculated Fitness Results	51
Table 3.11 Sample Prediction Results	54
Table 3.12 Testing Scenarios for the LSTM-GRU Hybrid Model.....	56
Table 4.1 BBCA Dataset	61
Table 4.2 BBCA ROA and ROE Dataset	63
Table 4.3 Pseudocode for Handling Missing Values.....	66
Table 4.4 Pseudocode for Data Merging.....	68
Table 4.5 BBCA Dataset Merged.....	69
Table 4.6 Data Splitting Scenario.....	70
Table 4.7 Pseudocode for Data Splitting.....	71
Table 4.8 Pseudocode for Data Normalization	72
Table 4.9 Pseudocode for Data Transformation.....	74
Table 4.10 Statistics on the Results of Data Transformation	76
Table 4.11 Pseudocode of the Hybrid LSTM-GRU Model Architecture.....	79
Table 4.12 Pseudocode for the Model Training Function	81
Table 4.13 Baseline Model Configurations.....	82
Table 4.14 Baseline Model Performance Evaluation Results	88
Table 4.15 Hyperparameter Search Space	95
Table 4.16 Genetic Algorithm Parameters	97
Table 4.17 Pseudocode for Population Initialization Operator	99
Table 4.18 Pseudocode for Fitness Function Operator	100

Table 4.19 Pseudocode for Tournament Selection with Elitism Operator	102
Table 4.20 Pseudocode for Crossover Operator.....	103
Table 4.21 Pseudocode for Mutation Operator	105
Table 4.22 Pseudocode for Population Regeneration Mechanism.....	106
Table 4.23 Best Hyperparameter Found By GA	114
Table 4.24 Optimized Model Performance Evaluation Results	121
Table 4.25 Model Performance Evaluation Run Test Results.....	127
Table 4.26 Comparison Reducing Overall Stock Error Results.....	136
Table 4.27 Comparison of Average Metric Values and Cumulative Reduction..	139