



UNDERGRADUATE THESIS

IMPLEMENTATION OF A HYBRID ARIMA-XGBOOST MODEL FOR WEEKLY SALES FORECASTING OF EYEGLOSS FRAME PRODUCTS

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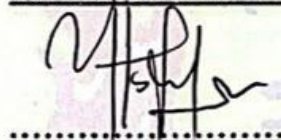
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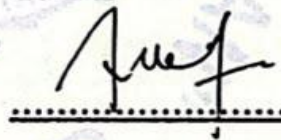
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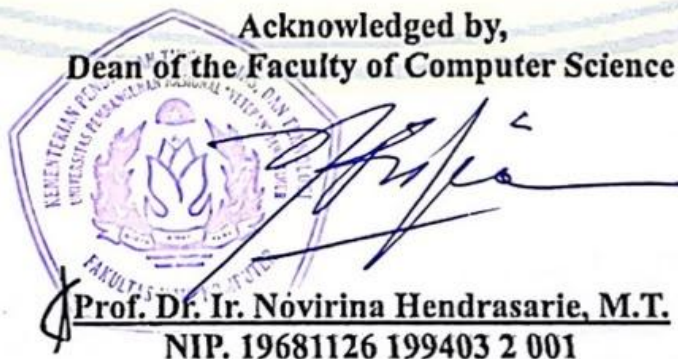
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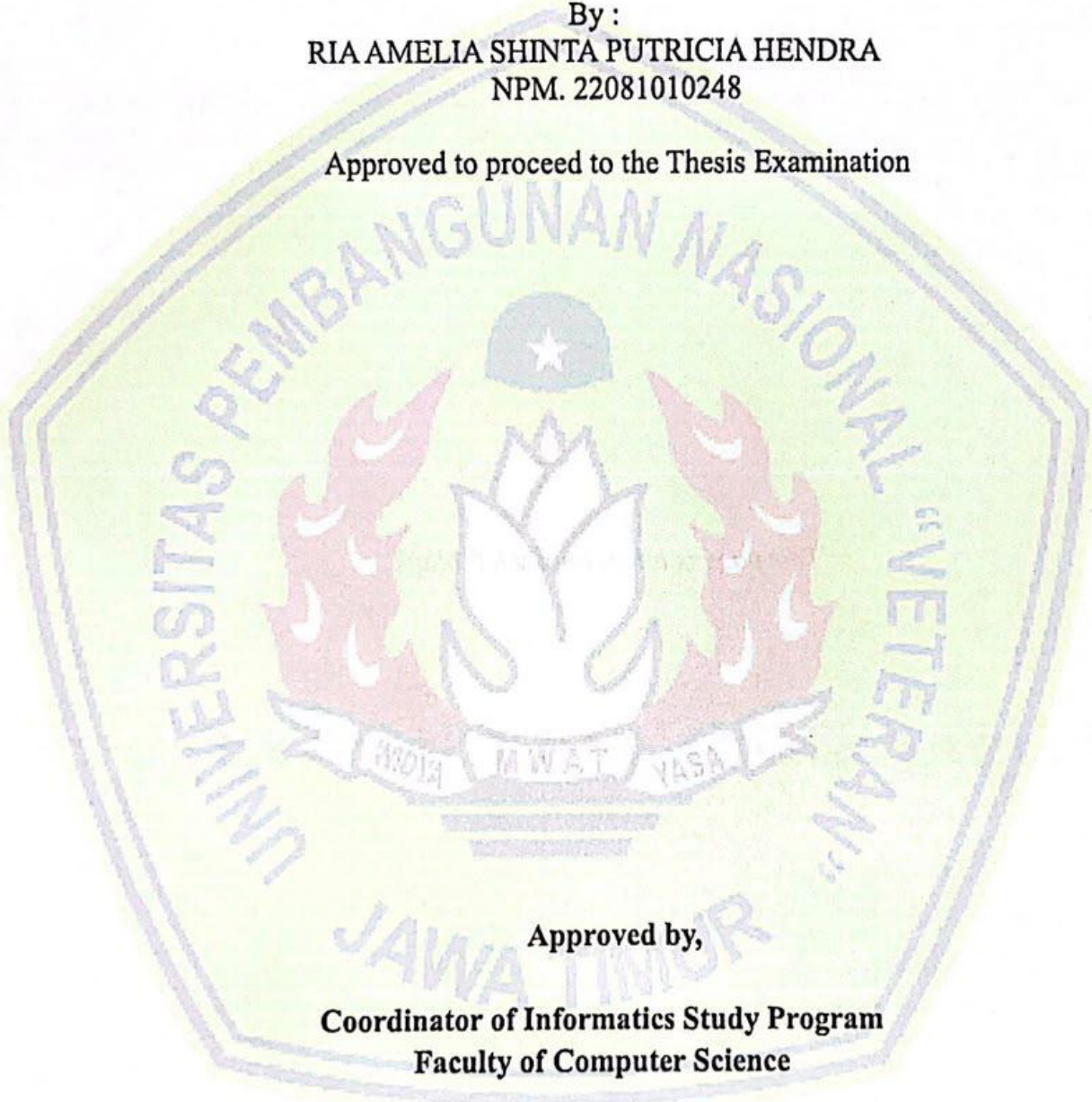
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ABSTRACT

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Undergraduate Thesis Title : Implementation of a Hybrid ARIMA-XGBoost
Model for Weekly Sales Forecasting of Eyeglass
Frame Products

Thesis Supervisor : 1. Dr. Eng. Ir. Anggraini Puspita Sari, S.T., M.T.
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Inventory management for eyeglass frame products requires accurate planning because demand changes over time and varies across Stock Keeping Units (SKUs). Inaccurate demand estimation may cause overstock or stockouts; therefore, forecasting is needed to support measurable inventory decisions. This study implements a Hybrid ARIMA-XGBoost model to forecast weekly sales of eyeglass frame products at Grand Optic and applies the results to inventory policy calculations. The data comprise 4,713 daily sales transactions from 2021 to 2025, weekly stock data, and product master data covering 500 SKUs. Daily transactions were transformed into 261 weekly sales observations and chronologically divided into training data for 2021–2024 and testing data for 2025. ARIMA was used to capture linear patterns, while XGBoost modelled nonlinear relationships based on historical features. Predictions from both models were combined using a weighted ensemble approach. Performance was evaluated using MAE, RMSE, and MAPE. The results show that an ARIMA weight of 0.05 and an XGBoost weight of 0.95 produced the best performance, with an MAE of 1.716390, RMSE of 2.296153, MAPE of 9.987841%, and prediction accuracy of 90.012159%. The forecast was then distributed to the SKU level and used to calculate safety stock, reorder points, restock status, recommended restock quantities, and restock priorities by considering service levels and lead time. All results were presented through a decision support system dashboard to support more systematic, effective, and data-driven inventory planning.

Keywords: Hybrid ARIMA-XGBoost, Weighted Ensemble, Sales Forecasting, Inventory Management, Decision Support System Dashboard

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The author realizes that this thesis still has limitations and shortcomings. Therefore, constructive criticism and suggestions are highly appreciated for future improvement. The author hopes that this thesis can benefit readers and serve as a useful reference for further research related to sales forecasting, inventory management, and decision support systems.

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Author

LIST OF CONTENTS

APPROVAL SHEET	i
APPROVAL SHEET	ii
STATEMENT OF ORIGINALITY	iii
ABSTRACT	iv
ACKNOWLEDGEMENTS.....	v
LIST OF CONTENTS	vii
LIST OF FIGURES	xii
LIST OF TABLES.....	xvi
LIST OF PROGRAM CODES	xviii
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 Research Limitations.....	5
CHAPTER II LITERATURE REVIEW	6
2.1 Related Literature.....	6
2.2 Demand Forecasting.....	12
2.3 Data Time Series	14
2.4 ARIMA Method	16
2.4.1 ARIMA Model Components and General Model	18
2.4.2 Identification, Model Selection, and the Role of ARIMA in the Research	20
2.5 XGBoost Method	22
2.5.1 Application of XGBoost in the Research.....	24

2.6	Hybrid ARIMA-XGBoost Model for Forecasting	26
2.6.1	Modelling and Construction of the Hybrid Model.....	30
2.7	Forecasting Model Evaluation	32
2.7.1	Mean Absolute Error (MAE)	33
2.7.2	Root Mean Squared Error (RMSE).....	33
2.7.3	Mean Absolute Percentage Error (MAPE).....	34
2.8	Inventory Management	36
2.8.1	Stock Keeping Unit (SKU)	39
2.8.2	Distribution of Forecast Results to SKUs	41
2.8.3	Safety Stock	42
2.8.4	Reorder Point (ROP)	44
2.9	Restock Policies and Decisions.....	47
2.9.1	Identification of Restock Requirements.....	47
2.9.2	Recommended Restock Quantity	48
2.9.3	Restock Priority.....	50
2.10	Decision Support System (DSS)	51
CHAPTER III METHODOLOGY		54
3.1	Research Object and Location	54
3.2	Research Stages.....	55
3.3	Requirements Analysis.....	58
3.3.1	System Requirements.....	59
3.3.2	Tools Used.....	59
3.4	Research Data.....	61
3.5	Data Preprocessing	65
3.5.1	Data Transformation and Aggregation	66
3.5.2	Weekly Sales Data.....	67

3.5.3	Data Cleaning.....	68
3.5.4	Dataset Construction for the Models.....	71
3.5.5	Division of Training and Testing Data	73
3.6	Forecasting Modelling	74
3.6.1	ARIMA Modelling.....	76
3.6.2	XGBoost Modelling.....	86
3.6.3	Hybrid ARIMA-XGBoost Modelling	91
3.7	Model Evaluation.....	95
3.7.1	MAE Calculation	95
3.7.2	RMSE Calculation	97
3.7.3	MAPE Calculation	100
3.8	Inventory Policy Calculation	103
3.8.1	Safety Stock Calculation.....	105
3.8.2	ROP Calculation.....	108
3.9	Determination of Restock Recommendations.....	110
3.9.1	Identification of Restock Requirements.....	111
3.9.2	Determination of the Recommended Restock Quantity.....	112
3.9.3	Determination of Restock Priority	114
3.10	Testing Scenarios	115
3.11	Dashboard Design	118
CHAPTER IV RESULTS AND DISCUSSION		122
4.1	Dataset Preparation	122
4.2	Data Preprocessing.....	124
4.2.1	Data Transformation and Aggregation.....	124
4.2.2	Missing Value Examination	126
4.2.3	Duplicate Data Examination	127

4.2.4	Data Format Examination	128
4.2.5	Value Reasonableness Examination.....	129
4.2.6	Loading the ARIMA and XGBoost Datasets	131
4.2.7	Division of Training and Testing Data	133
4.3	ARIMA Training Results	134
4.3.1	ARIMA(1,0,0) Scenario.....	136
4.3.2	ARIMA(2,0,0) Scenario.....	139
4.3.3	ARIMA(1,0,1) Scenario.....	143
4.3.4	Summary of ARIMA Testing Results.....	147
4.4	XGBoost Testing Results	148
4.4.1	Learning Rate Testing	150
4.4.2	Max Depth Testing	162
4.4.3	N Estimators Testing	175
4.4.4	Summary of XGBoost Testing Results	187
4.5	Hybrid ARIMA-XGBoost Testing Results	189
4.5.1	ARIMA Weight 0.05 and XGBoost Weight 0.95 Scenario	190
4.5.2	ARIMA Weight 0.10 and XGBoost Weight 0.90 Scenario	193
4.5.3	ARIMA Weight 0.20 and XGBoost 0.80 Scenario	196
4.5.4	Summary of Hybrid ARIMA-XGBoost Testing Results.....	199
4.6	Comparison of Model Testing Results	200
4.7	Inventory Policy Calculation Results.....	202
4.7.1	Forecast Distribution to SKUs	202
4.7.2	Safety Stock Calculation	204
4.7.3	Reorder Point (ROP) Calculation.....	206
4.7.4	Restock Calculation	207
4.7.5	Restock Priority.....	209

4.7.6	Summary of Restock Recommendation Results	210
4.8	Presentation of the Decision Support System Dashboard.....	212
CHAPTER V CLOSING		221
5.1	Conclusions	221
5.2	Future Recommendation	222
BIBLIOGRAPHY		223

LIST OF FIGURES

Figure 2. 1 Conceptual Flow of Forecasting as a Basis for Inventory Decision-Making	13
Figure 2. 2 Structure of Components in Time Series Data	14
Figure 2. 3 ARIMA Modelling Workflow for Time Series Forecasting	16
Figure 2. 4 XGBoost Modelling Flow in Sales Prediction	25
Figure 2. 5 Hybrid ARIMA–XGBoost Model for Sales Forecasting	28
Figure 2. 6 Integration of Forecasting and Inventory Control	39
Figure 2. 7 Determination of Service Level in Inventory Control.....	43
Figure 2. 8 Illustration of the Relationship between Safety Stock and Reorder Point	46
Figure 2. 9 Decision Support System for Inventory Management.....	52
Figure 3. 1 Grand Optic Research Location (Master of Grand Optical’5)	55
Figure 3. 2 Research Stages	56
Figure 3. 3 Data Preprocessing Workflow	66
Figure 3. 4 Training and Testing Data Split	73
Figure 3. 5 Hybrid ARIMA–XGBoost Model Flowchart	75
Figure 3. 6 System Login Page Design.....	119
Figure 3. 7 Forecasting and Restock Dashboard Design	120
Figure 4. 1 Dataset Row and Column Count Output	122
Figure 4. 2 Initial Dataset Preview Output.....	123
Figure 4. 3 Data Transformation and Aggregation Output	125
Figure 4. 4 Weekly Sales Visualisation Output.....	125
Figure 4. 5 Missing Value Examination Output.....	126
Figure 4. 6 Duplicate Data Examination Output.....	127
Figure 4. 7 Data Format Examination Output.....	128
Figure 4. 8 Value Reasonableness Examination Output	130
Figure 4. 9 Weekly Sales Boxplot Output.....	130
Figure 4. 10 ARIMA and XGBoost Dataset Construction Output.....	132
Figure 4. 11 Initial ARIMA and XGBoost Dataset Preview Output.....	132
Figure 4. 12 Training and Testing Data Split Output	133
Figure 4. 13 Training and Testing Data Split Visualisation Output	134

Figure 4. 14 Output of ARIMA (1,0,0) Testing Results.....	136
Figure 4. 15 Actual and Predicted Plot of ARIMA (1,0,0).....	137
Figure 4. 16 Training Accuracy and Training Loss Plots of ARIMA (1,0,0): (a) training accuracy and (b) training loss	138
Figure 4. 17 ARIMA (2,0,0) Test Results Output	140
Figure 4. 18 Actual and Predicted Values Plot for ARIMA (2,0,0).....	141
Figure 4. 19 Training Accuracy and Training Loss Plots for ARIMA (2,0,0): (a) training accuracy and (b) training loss	142
Figure 4. 20 ARIMA (1,0,1) Test Results Output	144
Figure 4. 21 Grafik Aktual dan Prediksi ARIMA (1,0,1).....	145
Figure 4. 22 Training Accuracy and Training Loss Plots for ARIMA (1,0,1): (a) training accuracy and (b) training loss	146
Figure 4. 23 XGBoost Test Results Output with a Learning Rate of 0.01	152
Figure 4. 24 Actual and Predicted Values Plot for XGBoost with a Learning Rate of 0.01	153
Figure 4. 25 Training Accuracy and Training Loss Plots for XGBoost with a Learning Rate of 0.01: (a) training accuracy and (b) training loss	153
Figure 4. 26 XGBoost Test Results with a Learning Rate of 0.03	155
Figure 4. 27 Actual and Predicted Values Plot for XGBoost with a Learning Rate of 0.03.....	156
Figure 4. 28 Training Accuracy and Training Loss Plots for XGBoost with a Learning Rate of 0.03: (a) training accuracy and (b) training loss	157
Figure 4. 29 XGBoost Test Results Output with a Learning Rate of 0.10.....	158
Figure 4. 30 Actual and Predicted Values Plot for XGBoost with a Learning Rate of 0.10.....	159
Figure 4. 31 Training Accuracy and Training Loss Plots for XGBoost with a Learning Rate of 0.10: (a) training accuracy and (b) training loss	160
Figure 4. 32 XGBoost Test Results Output with a Max Depth of 2	164
Figure 4. 33 Actual and Predicted Values Plot for XGBoost with a Max Depth of 2	165
Figure 4. 34 Training Accuracy and Training Loss Plots for XGBoost with a Max Depth of 2: (a) training accuracy and (b) training loss	166

Figure 4. 35 XGBoost Test Results Output with a Max Depth of 3	167
Figure 4. 36 Actual and Predicted Values Plot for XGBoost with a Max Depth of 3	168
Figure 4. 37 Training Accuracy and Training Loss Plots for XGBoost with a Max Depth of 3: (a) training accuracy and (b) training loss	169
Figure 4. 38 XGBoost Test Results Output with a Max Depth of 5	171
Figure 4. 39 Actual and Predicted Values Plot for XGBoost with a Max Depth of 5	172
Figure 4. 40 Training Accuracy and Training Loss Plots for XGBoost with a Max Depth of 5: (a) training accuracy and (b) training loss	173
Figure 4. 41 XGBoost Test Results Output with N Estimators of 50	176
Figure 4. 42 Actual and Predicted Values Plot for XGBoost with N Estimators of 50.....	177
Figure 4. 43 Training Accuracy and Training Loss Plots for XGBoost with N Estimators of 50: (a) training accuracy and (b) training loss	178
Figure 4. 44 XGBoost Test Results Output with N Estimators of 100	180
Figure 4. 45 Actual and Predicted Values Plot for XGBoost with N Estimators of 100.....	180
Figure 4. 46 Training Accuracy and Training Loss Plots for XGBoost with N Estimators of 100: (a) training accuracy and (b) training loss	181
Figure 4. 47 XGBoost Test Results Output with N Estimators of 150	183
Figure 4. 48 Actual and Predicted Values Plot for XGBoost with N Estimators of 150.....	184
Figure 4. 49 Training Accuracy and Training Loss Plots for XGBoost with N Estimators of 150: (a) training accuracy and (b) training loss	185
Figure 4. 50 Hybrid Test Results Output with ARIMA Weight of 0.05 and XGBoost Weight of 0.95	191
Figure 4. 51 Actual and Predicted Values Plot for the Hybrid Model with ARIMA Weight of 0.05 and XGBoost Weight of 0.95	192
Figure 4. 52 Hybrid Test Results Output with ARIMA Weight of 0.10 and XGBoost Weight of 0.90	194

Figure 4. 53 Actual and Predicted Values Plot for the Hybrid Model with ARIMA Weight of 0.10 and XGBoost Weight of 0.90	195
Figure 4. 54 Hybrid Test Results Output with ARIMA Weight of 0.20 and XGBoost Weight of 0.80	197
Figure 4. 55 Actual and Predicted Values Plot for the Hybrid Model with ARIMA Weight of 0.20 and XGBoost Weight of 0.80	198
Figure 4. 56 Comparison Plot of Actual and Predicted Values Across Models ..	201
Figure 4. 57 Forecast Distribution to SKUs Output.....	203
Figure 4. 58 Safety Stock Calculation Output	205
Figure 4. 59 ROP Calculation Output	206
Figure 4. 60 Restock Calculation Output	208
Figure 4. 61 Restock Priority Output	210
Figure 4. 62 Dashboard Login Page Output.....	213
Figure 4. 63 Dashboard Main Page and Research Results Summary	214
Figure 4. 64 Weekly Total SKU Sales Prediction Check Output	215
Figure 4. 65 Weekly Sales Prediction Check Output per SKU	215
Figure 4. 66 Weekly Restock Recommendation Output	216
Figure 4. 67 Monthly Restock Recommendation Summary Output.....	217
Figure 4. 68 Actual and Forecast Values Plot for the Best Model	218
Figure 4. 69 Restock Visualisation.....	219
Figure 4. 70 Products Requiring Attention	219
Figure 4. 71 Stock and Restock Decision Details	220

LIST OF TABLES

Table 2. 1 Previous Studies with the Closest Relevance	11
Table 2. 2 Differences in the Characteristics of Evaluation Metrics	35
Table 2. 3 Example of SKU Data Strcucture	40
Table 3. 1 List of Hardware	59
Table 3. 2 List of Software.....	60
Table 3. 3 Example of Sales Transaction Data	62
Table 3. 4 Example of Weekly Sales Data	63
Table 3. 5 Example of Weekly Stock Data	64
Table 3. 6 Example of Product Master Data	65
Table 3. 7 Daily Transaction Data (Example of Calculation Data)	66
Table 3. 8 Weekly Sales Dataset	68
Table 3. 9 Missing Value Examination Results	69
Table 3. 10 Duplicate Data Examination Results	70
Table 3. 11 Data Format Examination Results	70
Table 3. 12 Value Reasonableness Examination Results	71
Table 3. 13 XGBoost Dataset with Features	72
Table 3. 14 Division of Training and Testing Data	74
Table 3. 15 Differencing Examination Result	77
Table 3. 16 ACF Calculation Result	79
Table 3. 17 PACF Calculation Results.....	82
Table 3. 18 ARIMA Model Candidates	83
Table 3. 19 Comparison of Actual and Predicted Values Using ARIMA(1,0,0)	84
Table 3. 20 Comparison of Actual and Predicted Values Using ARIMA(2,0,0)	85
Table 3. 21 ARIMA(1,0,0) Residual Calculation Results.....	86
Table 3. 22 Construction of Input and Target Data for XGBoost	87
Table 3. 23 XGBoost Residual Calculation	89
Table 3. 24 Comparison of Actual and Predicted Values Using XGBoost	90
Table 3. 25 Weight Combination in the Hybrid ARIMA-XGBoost Model	92
Table 3. 26 Hybrid ARIMA-XGBoost Prediction Calculation Results	93
Table 3. 27 Comparison of Actual Values and Hybrid ARIMA-XGBoost Prediction	94

Table 3. 28 MAE Calculation Results	97
Table 3. 29 RMSE Calculation Results	99
Table 3. 30 MAPE Calculation Results	102
Table 3. 31 Summary of Model Evaluation Results	102
Table 3. 32 Selected SKUs in Periods 4 and 5.....	103
Table 3. 33 Forecast Results per SKU	105
Table 3. 34 Safety Stock Calculation Results per SKU	108
Table 3. 35 ROP Calculation Results per SKU.....	109
Table 3. 36 Actual Stock per SKU	110
Table 3. 37 Identification of Restock Requirements per SKU	112
Table 3. 38 Determination of the Recommended Restock Quantity per SKU ..	113
Table 3. 39 Restock Priority Criteria	114
Table 3. 40 Determination of Restock Priority per SKU	115
Table 3. 41 Testing Scenarios	116
Table 4. 1 Summary of ARIMA Testing Results	147
Table 4. 2 Summary of Learning Rate Testing Results	162
Table 4. 3 Summary of Max Depth Testing Results	174
Table 4. 4 Summary of N Estimators Testing Results	186
Table 4. 5 Summary of XGBoost Testing Results	187
Table 4. 6 Summary of Hybrid ARIMA-XGBoost Test Results	199
Table 4. 7 Comparison of Model Testing Results.....	200
Table 4. 8 Summary of Final Restock Recommendation Results.....	211

LIST OF PROGRAM CODES

Program Code 4. 1 Dataset Loading	122
Program Code 4. 2 Data Transformation and Aggregation.....	124
Program Code 4. 3 Missing Value Examination	126
Program Code 4. 4 Duplicate Data Examination	127
Program Code 4. 5 Data Format Examination	128
Program Code 4. 6 Value Reasonableness Examination.....	129
Program Code 4. 7 Loading the ARIMA and XGBoost Datasets	131
Program Code 4. 8 Division of Training and Testing Data	133
Program Code 4. 9 ARIMA Model Testing.....	135
Program Code 4. 10 Calling the ARIMA(1,0,0) Test.....	136
Program Code 4. 11 Calling the ARIMA(2,0,0) Test.....	140
Program Code 4. 12 Calling the ARIMA(1,0,1) Test.....	143
Program Code 4. 13 XGBoost Model Testing	149
Program Code 4. 14 Calling the XGBoost Test with a Learning Rate of 0.01 ...	151
Program Code 4. 15 Calling the XGBoost Test with a Learning Rate of 0.03 ...	154
Program Code 4. 16 Calling the XGBoost Test with a Learning Rate of 0.10 ...	158
Program Code 4. 17 Calling the XGBoost Test with Max Depth 2	163
Program Code 4. 18 Calling the XGBoost Test with Max Depth 3	167
Program Code 4. 19 Calling the XGBoost with Max Depth 5	170
Program Code 4. 20 Calling the XGBoost Test with N Estimators 150	176
Program Code 4. 21 Calling the XGBoost Test with N Estimators 100	179
Program Code 4. 22 Calling the XGBoost Test with N Estimators 150	182
Program Code 4. 23 Hybrid ARIMA-XGBoost Testing.....	189
Program Code 4. 24 Calling the Hybrid Test with ARIMA Weight 0.05 and XGBoost Weight 0.95	190
Program Code 4. 25 Calling the Hybrid Test with ARIMA Weight 0.10 and XGBoost Weight 0.90	193
Program Code 4. 26 Calling the Hybrid Test with ARIMA Weight 0.20 and XGBoost Weight 0.80	196
Program Code 4. 27 Forecast Distribution to SKUs	203
Program Code 4. 28 Safety Stock Calculation.....	204

Program Code 4. 29 ROP Calculation	206
Program Code 4. 30 Restock Calculation	207
Program Code 4. 31 Restock Priority	209
Program Code 4. 32 Loading Forecast and Restock Result Data on the Dashboard	212