PROJECT REPORT

Coffee Stock Prediction Using Backpropagation Algorithm

Ivan Harsono
15.K1.0002

Faculty of Computer Science
Soegijapranata Catholic University
2019
Coffee Stock Prediction Using Backpropagation Algorithm

by

Ivan Harsono – 15.K1.0002

This project report has been approved and ratified by the Faculty of Computer Science on January, 7, 2019

With approval,

Supervisor,

Robertus Setiarwan Aji Nugroho, ST., M.CompIT., PhD
NPP: 058.1.2004.264

Examiners,

1.)
Suyanto F.A. Jr., M.Sc

2.)
Rosita Herawati, ST., MIT
NPP: 058.1.2004.263

Dean of Faculty of Computer Science,

NPP: 058.1.2002.254
STATEMENT OF ORIGINALITY

I, the undersigned:

Name : Ivan Harsono
ID : 15.K1.0002

Certify that this project was made by myself and not copy or plagiarize from other people, except that in writing expressed to the other article. If it is proven that this project was plagiarizes or copy the other, I am ready to accept a sanction.

Semarang, January, 7, 2019

Ivan Harsono
15.K1.0002
ABSTRACT

Luwak Brand is already known as a famous coffee brand. They also have many types of coffee and coffee packaging. Providing Luwak Coffee stock everyday is difficult for the Luwak Coffee company. This happens because of the uncertain sales order every day making the company hesitant to prepare the amount of stock everyday. To solve this problem, this project makes a program that can predict amount of coffee stock.

The method to be used in this project is Backpropagation Algorithm. This algorithm can calculate based on the existing data. Then, the algorithm produce an output that will be compare with the actual output. The RSME calculation is used to calculate the error comparison for getting the optimal result.

The result from this program is RMSE value from Backpropagation Algorithm with various number of learning rate and hidden layer. The best result learning rate is 0.9 and the best result number of hidden layer is 7 with percentage 90%. This result had been compared with the other result and considered as the optimal result.

Keyword: Backpropagation Algorithm, Neural Network, Luwak Coffee Item Stok, Prediction
PREFACE

This project is titled “Coffee Stock Prediction Using Backpropagation Algorithm”. This project will make a program that can predict coffee stock. This project consists of 6 chapters. In chapter 1 discuss about background, scope and objective of this project about coffee stock prediction. Chapter 2 contains literature study from journal to support creating the program. This project use six journals. Furthermore, in this chapter contains similarities and difference between the journals and this research. Chapter 3 discuss about research methodology. This chapter has 5 step from learning journals until data comparison analysis. Chapter 4 discuss about analysis data and design. This chapter contains analysis data, step of normalization and algorithm step by step. This chapter also contains use case diagram and flow chart in sub chapter design. Chapter 5 discuss about implementation the concept into program such as read CSV File, Data Normalization, Backpropagation Algorithm and MSE calculation for get the result. The optimal result will be explain in this chapter. Chapter 6 discuss about the conclusions from this project and the suggestions for the future project.
TABLE OF CONTENTS

Cover..................................................................................................................................................i
APPROVAL AND RATIFICATION PAGE..................................................................................... ii
STATEMENT OF ORIGINALITY.................................................................................................. iii
ABSTRACT........................................................................................................................................iv
PREFACE.........................................................................................................................................v
TABLE OF CONTENTS.................................................................................................................. vi
ILLUSTRATION INDEX.................................................................................................................... vii
INDEX OF TABLES........................................................................................................................ viii
CHAPTER 1 INTRODUCTION........................................................................................................ 1
  1.1 Background......................................................................................................................... 1
  1.2 Scope.................................................................................................................................. 2
  1.3 Objective.............................................................................................................................. 2
CHAPTER 2 LITERATURE STUDY............................................................................................. 3
CHAPTER 3 RESEARCH METHODOLOGY............................................................................ 6
CHAPTER 4 ANALYSIS AND DESIGN................................................................................... 8
  4.1 Analysis............................................................................................................................... 8
  4.2 Desain................................................................................................................................ 12
CHAPTER 5 IMPLEMENTATION AND TESTING.................................................................. 16
  5.1 Implementation................................................................................................................... 16
  5.2 Testing................................................................................................................................. 20
CHAPTER 6 CONCLUSION......................................................................................................... 25
REFERENCES..................................................................................................................................
APPENDIX...................................................................................................................................... A
ILLUSTRATION INDEX

Illustration 4.1: Data Chart.................................................................9
Illustration 4.2: Min-Max Normalization..............................................10
Illustration 4.3: Backpropagation Structure...........................................10
Illustration 4.4: Calculation Hidden Unit Formula...............................11
Illustration 4.5: Activation Function Hidden Unit Formula......................11
Illustration 4.6: Calculation Output Unit Formula.................................11
Illustration 4.7: Activation Function Output Unit Formula.......................11
Illustration 4.8: Calculation δ Output Formula......................................11
Illustration 4.9: Δ Hidden Weight Formula...........................................12
Illustration 4.10: Calculation δ Hidden Unit Formula.............................12
Illustration 4.11: Δ Input Weight Formula.............................................12
Illustration 4.12: Weight Update Formula............................................12
Illustration 4.13: Square Loss Function...............................................12
Illustration 4.14: Use Case Diagram.................................................13
Illustration 4.15: Backpropagation Flow Chart......................................14
Illustration 5.1: RMSE Formula............................................................19
Illustration 5.2: Comparison Graph With Trial 1, Hidden Layer 7 and Learning Rate 0.9...........................................................21