



Project Report

Shape-Based Object Search in Images Using Edge Detection Algorithm

Peter Alvino

08.02.0061

2012

**FACULTY OF COMPUTER SCIENCE
SOEGIJAPRANATA CATHOLIC UNIVERSITY**

Jl. Pawiyatan Luhur IV/1, Bendan Duwur, Semarang 50234

Tel. 024-8441555 (hunting) Web : <http://www.unika.ac.id>

Email : ikom@unika.ac.id

APPROVAL AND RATIFICATION PAGE

PROJECT REPORT

SHAPE-BASED OBJECT SEARCH IN IMAGES USING EDGE DETECTION ALGORITHM

This project has been approved and ratified by Dean of Computer Science Faculty on

.....

With the approval,

Examiner,

Examiner,

Hironimus Leong, S.Kom., M.Kom.

Suyanto E.A, Ir., M.Sc.

NIP: 058.1.2007.273

NIP: 058.1.1992.116

Examiner,

Shinta Estri Wahyuningrum, S.Si., M.Cs.

NIP: 058.1.2007.272

Supervisor,

Dean of Faculty of Computer Science,

R. Setiawan Aji N., ST., McompIT.

Hironimus Leong, S.Kom., M.Kom.

NIP: 058.1.2004.264

NIP: 058.1.2007.273

STATEMENT OF ORIGINALITY

Hereby signed,

Name : Peter Alvino

NIM : 08.02.0061

Hereby certify that the project I made was the result of masterpiece alone and it is not a plagiarism, except those started in print taken from other writing. If it is proved later days that the project is the result of rubbing, hence I settle for sanction.

Semarang, January 19th 2012

Peter Alvino

08.02.0061



ABSTRACT

A human being can differentiate between various objects by observing their shape, color, texture, and features. To impart this intelligence into a system, we need to implement techniques like edges detection to help the system in recognizing the shapes of objects.

The result of edge detection is an image of the edge with a thickness of one response / pixel. Ideally, the edge detection process will describe the geometric shape of an object and identify the lines that form the objects.

Keywords: Edge detection, Shape



FOREWORD

Thanks to God because of His blessings, so I could complete my final project with title: Shape-Based Object Search in Images Using Edge Detection Algorithm.

In this opportunity, I would like to thanks to:

1. My lord and my savior, Buddha who gave me strength to finish this project.
2. My parents and my whole family for their unstinting supports, love, and pray.
3. Mr. Robertus Aji Setiawan, ST., McompIT., as my supervisor for helping, guiding, and giving me ideas and advices in finishing this project.
4. All lecturers in Faculty of Computer Science, Hironimus Leong, S.Kom., M.Kom , Suyanto EA., Ir, M.Sc, Rosita Herawati ST.,MIT., Shinta Estri Wahyuningrum, S.Si., M.Cs., for their helps and advices.
5. All of my friends who helps and supports me to finish this project, and also all the people who helped me in the prayers and supports.

Finally, I would like to apologize because this project is still far beyond perfect, there still some bugs but I hope this project can inspire other students to make better projects. I'll receive any questions and critics about this project in open arm.

Semarang,

Peter Alvino

TABLE OF CONTENT

APPROVAL AND RATIFICATION PAGE	i
STATEMENT OF ORIGINALITY	ii
ABSTRACT.....	iii
FOREWORD	iv
TABLE OF CONTENT	v
TABLE OF FIGURE	viii
I. CHAPTER I INTRODUCTION	1
1.1. Background.....	1
1.2. Scope	2
1.3. Objective.....	2
II. CHAPTER II LITERATURE STUDY	3
2.1. Data Structures.....	3
2.1.1. Matrix.....	3
2.1.2. Linked List	3
2.2. Algorithm.....	4
2.2.1. Canny Edge Detection Algorithm.....	4
2.2.2. Shape Detection Algorithm.....	9
III. CHAPTER III PLANNING	10
3.1. Research Methodologies.....	10
3.2. Project Management	10
IV. CHAPTER IV ANALYSIS AND DESIGN	11
4.1. Analysis.....	11
4.1.1. Use Case Diagram.....	11
4.2. Design	11
4.2.1. Class Diagram	11
4.2.2. Detailed Class Diagram	12
4.2.2.1. RGBtoGray	12
4.2.2.2. Array2d	12
4.2.2.3. Result	12

4.2.2.4. toMatrix.....	13
4.2.2.5. LinkNode	13
4.2.2.6. LinkList.....	14
4.2.2.7. getDots	14
4.2.2.8. shapeDetect	15
4.2.2.9. CannyEdgeDetector	15
4.2.3. Sequence Diagram	16
V. CHAPTER V IMPLEMENTATION AND TESTING	17
5.1.Implementation	17
5.1.1. Convert RGB images into grayscale images	17
5.1.2. Map the binary images into matrix and determine the dots.....	18
5.1.3. Analyze the coordinates.....	21
5.2.Testing	
5.2.1. Installation.....	22
5.2.2. GUI Layout	22
5.2.3. GUI Layout : image upload	23
5.2.4. GUI Layout : image uploaded.....	23
5.2.5. Background Process : grayscale image.....	24
5.2.6. Background Process : Edge Detection.....	25
5.2.7. GUI Layout : image processed	26
5.2.8. Some Failures.....	27
VI. CHAPTER VI CONCLUSION AND FURTHER RESEARCH.....	28
6.1.Conclusion	28
6.2.Further Research.....	28
REFERENCES	29

TABLE OF FIGURES

Figure 1. Linked List of Linked List.....	4
Figure 2. 5x5 Gaussian Filter.....	6
Figure 3. The Sobel Operator.....	6
Figure 4. Pixels of a 5x5 image	7
Figure 5. The Model of Edge Orientation.....	8
Figure 6. Table of Activities	10
Figure 7. Use Case Diagram	11
Figure 8. Class Diagram Communication Link	11
Figure 9. RGBtoGray.java	12
Figure 10. Array2d.java	12
Figure 11. Result.java	12
Figure 12. toMatrix.java	13
Figure 13. LinkNode.java	13
Figure 14. LinkList.java.....	14
Figure 15. getDots.java	14
Figure 16. shapeDetect.java	15
Figure 17. CannyEdgeDetector.java	15
Figure 18. Sequence Diagram.....	16
Figure 19. RGBtoGray.java (source code)	17
Figure 20. toArray.java (source code)	18
Figure 21. getDots.java (source code)	19
Figure 22. Pixel Movement.....	19

Figure 23.getDots.java (source code)	20
Figure 24. shapeDetect.java (source code)	21
Figure 25. Upload Page.....	22
Figure 26. Upload File GUI.....	23
Figure 27.Image Preview Page	23
Figure 28. Grayscale Image Sample	24
Figure 29. Edge Detection Sample	25
Figure 30. Circle Detection Sample.....	26
Figure 31. Square Detection Sample	26
Figure 32. Some Detection Failures.....	27

